

Dear Future Trine Graduate,

Welcome to the Trine University family, where we are putting you into motion to revolutionize the 21st century. We have taught generations of successful learners and plan to do so for years to come. With an educational heritage spanning 127 years, we will hold you to the same rigorous academic standards we have set for those who came before you.

Our expectations for academic excellence will serve you well, even before you graduate, as many of you will find jobs and internships with companies who know our reputation. After graduation you will find that having Trine University on your resume will carry immense clout with employers. Our job-placement numbers speak for themselves. In 2011, 91 percent of our graduates were enrolled in graduate school or found meaningful employment within six months of graduation. We expect those numbers to be even higher for our 2012 graduates, many of whom received multiple job offers before graduation at starting salaries above the national average. Several of our 2012 graduates went on to pursue doctorates at schools such as Yale, Stanford, University of Michigan and Case Western, to name a few.

In the last decade we have experienced some of the most substantial changes than any other time in our history. The changes will continue because of the vision of our administration, faculty, staff, trustees, community and – most importantly – **you**. We are focusing on your future. You are our most valuable asset and, quite frankly, the reason we’re here.

Your professors will expect active participation, collaboration, theoretical study and creativity. Not only will you learn how to do, you’ll learn what to do. We are giving you the tools – quality teaching, labs, resources, technology, support – to be successful in your college career. It’s up to you to use them. We believe in you and look forward to the day we receive word that you got your dream job or were accepted to graduate school.

That’s why we’re here – to send you out into the 21st century, help you reach your goals and impact the world.

Please feel free to stop by my office anytime. My door is always open.

Sincerely,

Earl D. Brooks II

Earl D. Brooks II, Ph.D.
President, Trine University

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TRINE UNIVERSITY PROFILE

DESCRIPTION

Trine University is a private, comprehensive, career-oriented, degree granting institution. It offers degrees in over 35 academic programs through five schools—Allen School of Engineering & Technology, Franks School of Education, Jannen School of Arts & Sciences, Ketner School of Business and the School of Professional Studies. The University is governed by a self-perpetuating Board of Trustees.

MISSION STATEMENT

Trine University promotes intellectual and personal development through professionally-focused and formative learning opportunities, preparing students to succeed, lead, and serve.

To achieve this mission, Trine University undergraduate and graduate students receive personal attention through small classes and excellent teaching. We focus on your future by providing career-oriented higher education that emphasizes:

1. active participation in classes, with a focus on teaming and collaboration
2. the useful and practical, to complement rigorous theoretical study
3. intentional co-curricular experiences to cultivate holistic student development
4. learning how to do, while learning what to do

VISION

Trine University will be the very best mid-sized private university, contributing to local and regional economic and cultural development. We will be characterized as engaged, dynamic, growing, and adding value.

VALUES

Trine University's mission and vision for the future rest on five core values that define our foundational beliefs and guide all that we aspire to accomplish.

1. Personal and professional growth with a focus on creative endeavors and lifelong learning
2. Quality teaching, learning, and scholarship
3. A highly responsive, dynamic environment
4. A trustworthy, secure, and caring community that embraces diversity
5. The highest ethical standards in all activities

GOALS (Specific, Measurable, Attainable, Realistic, and Timely=SMART)

To realize our mission and achieve our vision, the following operational goals have been established to guide our day-to-day activities:

- Provide a responsive and effective environment for student learning, living, student living and personal achievement through exceptional programs and services
- Continue to enhance its processes, tools, and to complement the quality of academic programs; optimally utilizing information, technology, or both
- Build a community which exemplifies and celebrates diversity
- Develop and strengthen corporate and community partnerships
- Consistently and passionately engage all stakeholders in the mission and life of the University

- Support systematic planning, developmental, and assessment processes to assure on-going improvement of the University and its programs

Adopted on May 7, 1999 and revised April 30, 2004, September 2006, and October 2010 by the Board of Trustees

ACCREDITATION

Trine University is accredited by the Higher Learning Commission and a member of the North Central Association, www.hlcommission.org. Telephone 312.263.0456. Trine University's programs in chemical engineering, civil engineering, computer engineering, electrical engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET. ABET's national office is located at 111 Market Place, Suite 1050, Baltimore, Maryland, 21202-4012, USA, Telephone 410.347.7700. All teacher preparation programs are accredited by the National Council for the Accreditation of Teacher Education (www.ncate.org) and the Department of Education/Office of Educator Licensing and Development (DOE/OELD)www.doe.state.in.us/dps. The Ketner School of Business, Bachelor of Science in Business Administration Program is accredited by the Accreditation Council for Business Schools and Programs (ACBSP), www.acbsp.org. Accredited majors include: accounting, business administration, entrepreneurship, finance, golf management, management, marketing, and sport management. Associate degree programs in accounting and business administration are also accredited.

DISCLAIMER

The information contained in this catalog is subject to change. It is the responsibility of the student to ensure that information, particularly in regard to fees, is current. Up-to-date information is available through academic advisors or on the Trine University Web site at trine.edu.

HISTORY

The University was founded in 1884 by 12 private citizens. It was and is a product of the normal school movement of that time, a fact that was reflected in its original name, Tri-State Normal College.

As a result, the mission and focus differed radically from the prevailing concepts of higher education in that day. The first schools of higher education in this country were essentially in the British mold, with emphasis on the liberal arts and training for the learned professions, particularly the clergy. By contrast, normal schools provided higher education for students in the "normal occupations" of life, such as teaching, engineering, telegraphy, domestic science and other practical arts.

Although they provided an unpretentious type of education, normal schools were generally bold and innovative. They simply took students in and encouraged them to do as much as they could through self-development. They also encouraged active student participation in classes, as opposed to the prevailing lecture format. For the convenience of their students, the schools operated on a year-round basis. Coeducation was another striking feature of the normal school movement.

But it was the emphasis on the useful and practical, rather than the traditional, that enabled normal schools to flourish. By 1888, 30 normal schools had been founded in Indiana, including Ball State Teacher's College, Valparaiso and, of course, Tri-State Normal College, located on six

acres of land in the tiny village of Angola. Within 30 years, however, Tri-State was the only school to survive as an independent; all of the other schools had perished or had become state-or church-sponsored.

One reason that Trine University succeeded while the other schools failed was because of its early leader, Littleton M. Sniff. His fierce sense of independence and total devotion to this school is documented in hundreds of letters he wrote to prospective students, assuring them they could start college regardless of their academic background and that they could earn degrees in the shortest time possible at a cost they could afford. Most of these letters concluded with the simple command and exhortation of "Come."

Sniff, the institution's second president, presided over the school's first commencement ceremonies in 1888. By May 1922, Tri-State College—renamed in 1906—had more than 200 graduates, representing nearly every state in the Union and 30 countries. Sniff died on September 14, 1922, in his 36th year as president, the longest tenure in school history. The strength of his character and the power of his convictions were part of his legacy to Trine University.

The original curricula featured teaching, bookkeeping, science, commercial law, penmanship and some courses in the classics and music. Under Sniff's guidance, the institution kept pace with the needs of the new scientific era by adding or dropping courses of study according to demand, financial feasibility and the needs of the marketplace. In 1927, the University reorganized to focus solely on its strengths in engineering and business. All other programs were discontinued, including teacher preparation, fine arts, music and the School of Law. The School of Pharmacy opened in 1902 and closed in 1922.

The School of Engineering, which was established in 1902 by George Neihous (who had come to the college at the request of President Sniff), offered accelerated bachelor of science degree programs in civil, mechanical, electrical, and chemical engineering. There was also a new engineering need to be met in the expanding world of transportation: aviation. Ever flexible and alert, Tri-State College listed aeronautical engineering as a degree program in 1929, two years after Charles Lindbergh crossed the Atlantic. During this time, the school's flying clubs—the Stick and Wing Club and the Glider Club (later renamed the Thunderbirds)—were formed. In 1934, the University celebrated its 50th anniversary at the 1934 World's Fair in Chicago with daily demonstrations of its miniature wind tunnel.

The School of Commerce, built around the objectives of the American private enterprise system, offered accelerated Bachelor of Science degree programs in business administration and accounting.

World War II could not have ended too soon for Tri-State College. By 1945 its enrollment sank to 170, putting its future in jeopardy. Several administrators had gone two years without pay. But the war ended and more than 1,300 students—mostly GIs—swelled the campus in the fall of 1946. War surplus buildings were secured from the Federal Public Housing Agency to provide additional classroom buildings and student housing for an over-crowded campus. In 1947, due to the volume of students completing their coursework early, a mid-year commencement was instituted. With its future secure, the stockholders agreed to reorganize the 60-year-old school into a nonprofit educational corporation, marking the first time the College was granted exemption from federal tax.

Dr. Richard M. Bateman began his 15-year tenure on campus in 1960. His era would prove to be of great significance. The campus underwent one of its largest expansions in history, adding Ford Library (1962), Stewart Hall (1965), Best Hall of Sciences (1967), Hershey Hall (1970) and Zollner Golf Course (1971). Five new dormitories were constructed in 1968 as student enrollment hit a record: 2,022 students.

In 1964, as a first step in gaining accreditation with the North Central Association of Colleges and Secondary Schools (NCA), the University discontinued its accelerated 27-month programs and began enrolling students in standard 36-month programs. While many had serious misgivings about ending the accelerated programs, most realized the importance of gaining accreditation. NCA accreditation was achieved in 1966.

In 1968, the Division of Arts and Sciences was formed to offer two-year transfer programs to students who planned to earn Bachelor of Science degrees in the liberal arts at other schools. The new programs proved popular, and in 1970, the division was upgraded to a school with four-year degree programs. Teacher preparation returned to the curriculum in the 1970s. With three schools—Engineering, Business, Arts & Sciences—the institution had become more than a college. Shortly after Bateman's departure in 1975, Tri-State College was officially renamed Tri-State University.

During the 10 years leading up to its Centennial Celebration in 1984, the University continued to innovate and excel. The first Grand Prix go-kart race was held in 1971. The first International Students Association dinner was served in 1974. The first WEAX (student radio station) broadcast was heard in 1978. A free film series was inaugurated in 1980. The Trojans, known as the Engineers until 1967, had great success in golf, track and field, and particularly basketball, which collected 11 consecutive Mid-Central Conference titles and earned two appearances in the NAIA national tournament.

Tri-State University celebrated its 100th anniversary with the publishing of *From Carriage to Computer: The First 100 Years of Tri-State University*, written by Elizabeth Brown Orlosky.

In the early 1990s, the University received approval from NCA to offer adult degree programs outside of Angola. Between 1994 and 1998, the University opened four locations across northern Indiana—Angola, Fort Wayne, Merrillville and South Bend. In 2002 the Masters of Science in Engineering Technology was approved as the first of five graduate programs currently offered.

Hershey Hall was the site of the 1996 and 1997 NAIA Division II Women's Basketball Championship. The Tri-State University Thunder advanced to the Elite Eight in 1996. The women's golf team captured the University's first national championship in 1997. The men's volleyball team won the school's second national championship in 1998, the same year Thunder football rolled to an 11-3 record and a semi-final appearance in the national playoffs.

More than 120 years after its founding, TSU, now Trine University, continues on a successful path. Since 2001, significant renovations have given the campus new life. The Keith E. Busse Athletic and Recreation Center with 200-meter indoor track and practice areas for tennis, volleyball, baseball and softball, opened 'Fall 2009'. In Fall 2010, the new Fred Zollner Athletic Stadium will serve 5,000 fans of football, lacrosse, soccer and field hockey. The renovated Sniff Building now houses the school's executive offices once again, under the name C.W. Sponsel Administration Center. The school's newest and most modern building opened on Homecoming weekend in October, 2007. The University Center and the Center for Technology and Online

Resources houses the new Library and Information Resources, 320-seat Fabiani Theatre, Trine Bookstore, Student Life and Student Success and Retention offices, a post office, IT help desk and department, Hornbacher Fitness Center and Hornbacher Studios, the new home for WEAX 88.3-FM, Trine University's radio station.

Students moved into new apartments near the University Center and on Kinney and Moss streets in fall 2007. The apartments feature a central living area with private bedrooms and baths and kitchen area with microwave. The buildings include a central lounge with big screen TV, fireplace and small bistro area.

Trine University has completed a \$2 million technology upgrade, creating a campus-wide wireless environment. The Center for Digital Excellence, a technology classroom for group learning, is housed in the new University Center. SMART classrooms, new classrooms equipped with access to modern computers, projector systems, connectivity for laptops and additional resources for electronic instruction such as DVD players, have also been installed on the campus. The University provides more than 200 computers dedicated to student access in labs across campus. Students can also access the Internet at their convenience because every room in each apartment enjoys connectivity.

Academics remain strong in all five schools: Allen School of Engineering & Technology, Franks School of Education, Jannen School of Arts & Sciences, Ketner School of Business, and School of Professional Studies. Master's degree programs in criminal justice, leadership, and engineering (majors in civil, biomedical and mechanical).

CORPORATE STATUS

Trine University is an educational corporation organized and existing under the laws of the state of Indiana. The correct corporate name of the institution is Trine University, Incorporated. The University was founded in 1884 as Tri-State Normal College. The governing body of the University is the Board of Trustees, which has an authorized membership of 30 trustees, each of whom serves without compensation and none of whom may be employed by the University in any administrative or teaching capacity. Two of the trustees are authorized to be elected by the alumni. Consistent with this form of organization and non-profit operation, Trine University has been granted exemption from federal income tax by the Commissioner of Internal Revenue, Treasury Department under Section 501 (c) (3) of the Internal Revenue Code. Contributions to the University are deductible to the extent provided by law; bequests, legacies, devises or transfers to the University are deductible in arriving at the value of the net estate of a decedent for estate tax purposes in the manner and to the extent provided by law; gifts of property are deductible in computing net gift for gift tax purposes in the manner and to the extent provided by the Internal Revenue Code.

FINANCIAL INFORMATION

Selected financial data are available from the institution's annual report. That report may be obtained from the office of the President or of the Vice President for Finance.

CAMPUS SECURITY

A copy of the annual campus security report is available by September 1 of each year on the Trine University Web site (trine.edu). It contains statistics, policies, and a description of programs that promote campus safety as well as drug prevention program information.

LOCATIONS

MAIN CAMPUS

Nestled in the heart of Steuben County, Trine University's 400-acre main Angola campus serves as the hub of Trine University's various locations. Besides being home to 101 of Indiana's natural lakes, Steuben County is one of the fastest growing areas in the state. In recent years, it has been touted as one of 50 boom towns in the U.S. in Money magazine. All though the town has a population of only 9,000 residents, 750,000 visitors flock to Steuben County's scenic gem, Pokagon State Park annually. Due to the abundance of water and natural beauty, fishing, camping, skiing and boating are all popular pastimes. Angola's location at the major highway intersection of Interstate 80/90 and Interstate 69, makes it easily accessible from any of the major cities in the area. It also has a healthy economy, with 300 businesses and industries, many of which partner with Trine University to offer enhanced educational opportunities. Restaurant and shopping chains, in addition to an outlet mall in Fremont, also provide quick access to many convenient retail businesses. Additionally, a variety of family-centered activities are nearby, like putt-putt, a roller skating rink, and movie theaters. Virtually every necessity, including healthcare at Cameron Memorial Community Hospital or Urgent Care, is met on or near campus.

The **Aerospace Engineering Building** is slated for remodeling as the **Bock Center for Biomedical Engineering** to serve a new Master of bio-medical engineering degree.

Named in honor of John G. Best, a distinguished alumnus and former member of the Board of Trustees, the **John G. Best Hall of Science** contains classrooms and science laboratories. The building houses the **Jannen School of Arts & Sciences**, which was named in honor of Trine University alumnus and trustee Dr. Robert L. Jannen and his wife, Dolores.

Best Hall also houses the **Fairfield Lecture Room**; the Department of Mathematics & Informatics; the Department of Science; the science laboratories; the Department of Criminal Justice, Psychology & Social Sciences; and the study abroad program.

Forman Hall, named after trustee emeritus Leamen Forman, trustee emeritus which includes the **Trine Welcome Center**, named to honor trustees Ralph and Sheri Trine, and the **Radcliffe Conference Room**. Dedicated in April 2001, it houses the Office of Admission, Office of Financial Aid, Office of the Registrar, Business Office, and Centennial Station Cafe.

The **Thomas L. Fawick Hall of Engineering** was named in honor of Thomas L. Fawick, an inventor, industrialist and friend of the University. Renovation on the interior of the building and the updating of all laboratories, classrooms, offices and the **Kitsuda Seminar Room** were completed in 1997. The building, which houses a scanning electron microscope, is home to the University's **Allen School of Engineering & Technology**, named for alumni Jerry and Jorja Allen. Fawick Hall also houses the **McKetta Department of Chemical & Bioprocess Engineering**, the **Wade Department of Mechanical & Aerospace Engineering**, the **Reiners Department of Civil & Environmental Engineering**, the Department of Electrical & Computer Engineering and the Department of Technology.

The chemical engineering laboratories and offices are housed in the **Howard P. Conrad Chemical Engineering Wing** of Fawick Hall, named in honor of Howard P. Conrad, distinguished industrialist and friend of the University.

The central entrance of Fawick Hall is known as the **Clifford W. Sponsel Tower** and is named to honor of Dr. Clifford W. Sponsel, an emeritus member of Trine University's Board of Trustees and a 1931 civil engineering graduate of Tri-State College.

Honoring a former chair of the Board of Trustees, the **Perry T. Ford Memorial Building** is a three-level building that houses the **Franks School of Education**, the namesake of long-standing trustee Lawrence Franks. The **Mary Mogish Kostyshak Educational Media Resource Center** is also located in the Ford Building. The center offers a juvenile literature and school curriculum collection, kits and audio-visual resource materials as well as workspace and materials to support education students. Named in honor of Paul and Mary Mogish Kostyshak, the **Kostyshak Wing** of the Perry T. Ford Memorial Building was dedicated May 19, 1995. Paul Kostyshak was a 1949 Tri-State College civil engineering graduate. The Ford building also houses the Communication Department and the Angola Adult Education Center of School of Professional Studies.

The **General Lewis B. Hershey Hall** athletic complex was named in honor of General Lewis B. Hershey, a distinguished alumnus, member of the Board of Trustees, and 29-year director of the U.S. Selective Service System. Hershey Hall contains offices, classrooms, the **Ketner Sports Center**, the **Gettig Fitness Center**, the **John Behee Conference Room**, racquetball courts, an indoor track and a main arena for basketball and volleyball with a seating capacity of 4,000. Hershey Hall was renovated before serving as the site of the 1996 and 1997 NAIA women's national basketball tournament.

Platt Hall, Conrad Hall, Fabiani Hall, Cameron Hall and Alwood Hall house students at the main campus. Parking is available behind and in front of the residence halls, and additional street parking is available. In 1995 and 1996, the original Alwood, Cameron and Platt residence halls were demolished. They had been named in honor of three former trustees: Ray Alwood, an accomplished Angola businessman and former vice chair of the Board of Trustees; Dr. Don Cameron, a 1905 graduate and founder of Angola's Cameron Hospital; and Dr. Henry Platt Jr., a business and industry leader in the Chicago area. On April 5, 2000, the residence halls were renamed in the trustees' honor. On May 4, 2000, Conrad Hall was dedicated to honor the memory of Mr. Howard P. and Dr. Martha Conrad, both past presidents of Northern Indiana Fuel & Light Co. Dr. Martha Conrad was also a former member of the Board of Trustees. Fabiani Hall was named in honor of Dr. Dante C. Fabiani, a 1938 graduate and former chair of the Board of Trustees. His son, James P. Fabiani, is currently a member of the Board of Trustees.

Named in honor of Jack F. Ealy, a 1927 electrical engineering graduate, the **Ealy International Center** was dedicated in the summer of 1996. It is located on the lower level of Conrad Hall and houses lounges for students and visitors and a kitchen and dining room for international students.

From 1905 to 1970, **William D. Shambaugh Hall** was known first as the Engineering Building and later as the Recitation Building, which housed the classrooms for basic subjects. The building was renovated in 1988-89 and was named in honor of William D. Shambaugh, a distinguished alumnus. It now houses the **Ketner School of Business** which includes the Department of Business Administration and the Department of Sport Management & Public Relations, People Services, Career Services, Trine Middle College and School of Professional Studies.

Built in 1887, the **Littleton M. Sniff Administration Building** is the second- oldest building on campus. It was named in honor of the second president of Tri-State College, Littleton M. Sniff. In 2004, a multi-year, \$2 million renovation began, which included renaming the building the **C.W. Sponsel Administration Center**. The addition of a carillon in the bell tower of the building was a gift from current trustee and alumnus William Gettig. The bell chimes on the quarter hour and plays, among other tunes, the University alma mater.

The oldest building on campus was completed in 1884 and received a complete renovation in 1992. It was named in honor of 1936 mechanical engineering graduate Dr. Charles Taylor, a Trine University Trustee since 1992, and his wife, Nancy. The **Charles and Nancy Taylor Hall of Humanities** houses the Department of Language & Humanities as well classrooms, the *Triangle*, the student newspaper; the **Wells Gallery**, the Humanities Institute, the Writing Center, the Fine Arts Library, the English as a Second Language Department and the **Wells Theater**, which includes a GTE projection system.

The 18-hole **Zollner Golf Course** offers scenic recreation with its renovated bunkers and many challenging holes. The golf course is named in honor of Fred Zollner, a prominent industrialist and former chair of the University Board of Trustees. In 1999, the **Witmer Clubhouse** was named for Wilber E. Witmer, a 1947 business administration graduate and golf course benefactor.

SCHOOL OF PROFESSIONAL STUDIES

The School of Professional Studies is designed to provide quality, continuous higher education learning opportunities for adults who want to advance in their careers and keep pace with the growing complexities of today's career environment. Nearly one-fourth of all students attending Trine University are School of Professional Studies' students.

SCHOOL OF PROFESSIONAL STUDIES

Angola Education Center
One University Ave.
Angola, IN 46703; 260.665.4623

Columbus Education Center
2222 Poshard Drive
Columbus, IN 47203; 812.350.6387

Fort Wayne Regional Campus
9910 DuPont Circle Drive East
Fort Wayne, IN 46825; 260.483.4949

Indianapolis Regional Educational Center
7508 Beechwood Center Road
Avon, IN 46123; 317.775.8410

Logansport Educational Center
2815 E. Market St.
Logansport, IN 46947; 574.516.1218

Schererville Educational Center
746 E U.S. Hwy. 30
Schererville, IN 46410; 219.440.7180

South Bend Regional Campus
4101 Edison Lakes Parkway, Suite 250
Mishawaka, IN 45545; 574.243.0500

Sturgis Educational Center
107 W. West Street
Sturgis, MI 49091; 260.350.4834

Trine Virtual Campus/Public Safety Academy
9910 DuPont Circle Drive East
Fort Wayne, IN 46825; 260.439.4949

Warsaw Educational Center
907 Wooster Road
Winona Lake, IN 46590; 574.377.9278

UNDERGRADUATE ADMISSION

Trine University admits applicants on the basis of scholastic achievement and academic potential; selection is made without regard to race, religion, color, gender, sexual orientation, or age. Admission into Trine University is not an entitlement; attendance at Trine University is a privilege. Prospective students are encouraged to visit the campus. An admission counselor will make arrangements for a visitor to meet faculty, students, coaches, and financial aid personnel. Prospective students may visit classes and have a guided tour of campus facilities. Students who wish to arrange a campus visit should call or e-mail the Trine University Office of Admission at 260.665.4100 or *admit@trine.edu*.

Trine University accepts an online application only. It can be accessed via the Internet at *trine.edu*. Online applications may be sent by following the directions given on our Web site. No application fee is required.

RECOMMENDED HIGH SCHOOL PREPARATION

All prospective students should have satisfactorily completed a minimum of the following high school courses: four years of English and three years each of science, social studies, and mathematics.

ENGINEERING, MATHEMATICS, FORENSIC SCIENCE, AND COMPUTER SCIENCE APPLICANTS

In addition to the above, all prospective engineering, mathematics, forensic science, and computer science majors should at a minimum have completed two years of algebra, one year of geometry, and a semester of trigonometry.

ENGINEERING APPLICANTS

Prospective engineering majors should have completed one year each of chemistry and physics.

PREPARATORY COURSES

Every Trine University academic program has a mathematics component. Faculty advisors recommend a beginning mathematics course based upon a student's SAT and/or ACT exam results and high school GPA. If adequate information regarding a student's math skills is not available, a student may be required to take a mathematics placement exam. A student may be assigned to non-credit, preparatory courses in mathematics.

GENERAL APPLICATION PROCEDURES AND REQUIREMENTS

In addition to a completed application form, applicants must provide the following items: evidence of graduation from an accredited high school or an acceptable score on the General Education Development (GED) examination.

Official high school transcripts must be sent from the originating high schools or official documentation from GED provided directly to the Office of Admission.

Transfer students must request that all of the post-secondary schools they have attended send official transcripts directly to the Office of Admission.

Results from the American College Aptitude Test (ACT) or the Scholastic Aptitude Test (SAT) are required unless the applicant has been out of high school for five years or more.

A person may apply as a non-degree student without showing evidence of a high school diploma or an acceptable score on the GED test. Non-degree students who later apply for degree status must meet the degree requirements of the program to which they seek admittance.

NON-DEGREE SENIOR CITIZENS

Trine University offers free tuition for persons 60 years of age or older who are served by the Steuben County Council on Aging and who reside in Steuben County to take undergraduate courses for credit and/or non-credit. Enrollment is granted on a space-availability basis.

HOUSING INFORMATION

University residence room contracts are available online. Students must complete and submit their housing contracts and non-refundable enrollment deposits to the Office of Admission by the National Candidate Reply Date of May 1 for full-time admission. Request for an extension must be made in writing. For more information on housing requirements, see the "Student Life" section of the catalog, or review the "Student Life" section on the web at www.trine.edu.

AWARDING OF CREDIT BY EXAMINATION

ADVANCED PLACEMENT (AP) EXAMINATION

An applicant for freshman standing who achieves a score of 3, 4, or 5 on the College Entrance Examination Board's Advanced Placement (AP) Examination may be granted credit. Results of the examination should be sent to the Office of the Registrar. Students who score 5 on an exam should contact the appropriate department chair for consideration of additional credit:

AP EXAMINATION

TRINE UNIVERSITY CREDIT

Art

History	3 sem. hrs. Humanities electives
Studio	3 sem. hrs. Humanities electives
Drawing	3 sem. hrs. Humanities electives

Biology

Biology	BIO 114
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Chemistry

Chemistry	CH 104
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Computer Science

Computer Science	3 sem. hrs. Informatics electives
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Economics

Macroeconomics	ECO 223
Microeconomics	ECO 213

English

Language & Composition	ENG 103, 113
Literature & Composition	ENG 103, 153

French

Language	3 sem. hrs. Humanities electives
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Literature	3 sem. hrs. Humanities electives
German	
German	3 sem. hrs. Humanities electives
Government & Politics	
Government & Politics	GOV 113
History	
American	HIS 103, 113
European	HIS 203, 213
Latin	
Virgil	3 sem. hrs. Humanities electives
Catullus-Horace	3 sem. hrs. Humanities electives
Mathematics	
Calculus AB	MA 134
Calculus BC	If a student has a score of 4 or 5, credit will be given in MA 134 and MA 164. A score lower than 4 on the BC Exam may earn credit in MA 134 depending upon the AB subscore.
Statistics	MA 253
Music	
Music	3 sem. hrs. Humanities electives
Physics	
Physics B	PH 104
Physics C	PH 224
Psychology	
Psychology	PSY 113
Spanish	
Language	SPN 113, 123
Literature	SPN 113, 123

CLEP AND DANTES TESTING

Trine University awards credits based upon the College Level Examination Program's (CLEP) general and subject-matter examinations as well as all DANTES examinations. Trine University is not a testing site for either examination program. For information regarding CLEP or DANTES credits, contact the Office of the Registrar.

Trine University accepts the American Council on Education's recommended passing score in effect at the time of the administration of the examination. Upon achieving a score considered "passing" by Trine University, CLEP or DANTES credit will be listed on the student's transcript for the number of semester hours recommended in the official CLEP or DANTES publications. The student's department chair will determine whether the CLEP or DANTES credit received will apply toward a portion of the requirements in the University's general education requirements, school requirements, major requirements or electives.

PROJECT LEAD THE WAY TUITION SCHOLARSHIPS

- Value: \$500 annually (\$250 per semester) and may be renewed for up to three years for a total value of \$2,000 over four years. This scholarship may be stacked on top of two Trine University merit-based awards, but not to exceed tuition.
- Renewal Criteria: must continue to pursue a Trine University engineering or technology degree and make satisfactory progress towards completing the degree.
- Eligibility: must have completed minimum of (2) PLTW high school courses with grade of "B" or better in each course and provide a transcript documenting these courses from a PLTW certified high school.

TRINE UNIVERSITY/PROJECT LEAD THE WAY CREDIT

Course Equivalency:

- PLTW Introduction to Engineering Design equivalent to Trine University Basic Technical Drawing (ETD 103)
- PLTW Computer Integrated Manufacturing equivalent to Trine University Manufacturing Materials & Processes (ETD 123)
- PLTW Engineering Design & Development equivalent to Trine University Middle College designation (GE 113 or substitution/free elective for an introductory course to individual engineering degree programs)

NONCOLLEGIATE SPONSORED INSTRUCTION

Trine University awards credit for college-level courses offered by business and professional organizations as recommended by the American Council on Education in its National Guide to Educational Credit. Credit is awarded for course work offered by the military as recommended by the American Council on Education in its Guide to the Evaluation of Educational Experiences in the Armed Services. Credits are awarded subject to the approval of the student's department chair.

UNIVERSITY CREDIT BY EXAM

A student may earn credit by taking an examination for approved courses administered by the appropriate academic department. A list of courses for credit by examination is available in departmental offices. A fee is assessed, and application forms are available in the Office of the Registrar.

MIDDLE COLLEGE (Dual Credit Program for High School Students)

Through the Middle College, Trine University provides an opportunity for high school students to earn dual credit (college and high school credit simultaneously). Courses are offered in the following ways: on Trine University campuses and online (blended with Trine University students), and on the campuses of participating high schools (strictly for high school students through the concurrent enrollment program).

To qualify for Middle College, students must meet the following requirements: submit an official Middle College application and a current high school transcript, be in good academic standing in high school (GPA of B or higher or by recommendation of the high school guidance counselor), successfully completed the sophomore year of high school, and be currently enrolled in a public, private, or home school.

Courses on campus and online are offered throughout the calendar year, and students may register for any courses in which they meet the prerequisites. Courses on high school campuses are offered during the school year, and high schools only offer specific courses. Tuition is set at a significantly reduced rate. Students taking courses on the campuses of Trine University or online must provide the books specified by the course syllabus; students enrolled in the concurrent enrollment program generally rent books through their regular high school book rental program (this is decided by the participating high school).

All Middle College students must sign enrollment forms which cover the policies and procedures related to Middle College participation. Middle College students are registered students with the university and must abide by policies stated in the Trine University Student Handbook.

Trine University Middle College is a member of the National Alliance of Concurrent Enrollment Partnerships (NACEP).

More information is available at www.trine.edu/middlecollege or by calling the Middle College office at 260.665.4307.

TRANSFER STUDENT ADMISSION

A transfer student follows Trine University's general application admission procedures. Students are eligible for admission only from approved schools of higher learning, and cannot be on academic probation from the previous institution(s).

A student who does not meet Trine University's academic standards for freshman admission may apply as a transfer applicant once he/she has completed a minimum of 18 semester credit hours/or 27 quarter credit hours within a two semester/or three quarter period at a community or junior college or other 4-year institution. These 18 semester/or 27 quarter credits must include English Composition I, a mathematics course, and a social science or humanities elective. Developmental or preparatory classes are not to be included in this total. The student must earn a grade of "C" or better in each of these required courses and have a minimum grade point average of 2.0.

Transfer students applying to the School of Engineering must have a cumulative grade point average of 2.5 and a grade of "C" or better in Calculus I, Chemistry I, and English Composition I.

Trine University encourages applications from community college graduates. Transfer relationships facilitate the application process and offer special benefits with the following two and four-year institutions:

Bethel College, Mishawaka, IN

Genesee Community College, Batavia, NY

Glen Oaks Community College, Centreville, MI

Ivy Tech Community College, IN

Jackson Community College, Jackson, MI

Joliet Junior College, Joliet, IL

Kellogg Community College, Battle Creek and Coldwater, MI

Lansing Community College, Lansing, MI

Lorain Community College, Elyria, OH

Northwest State Community College, Archbold, OH

Owens Community College, Toledo, OH

Southwestern Michigan College, Dowagiac, MI

Vincennes University, Terre Haute, IN

Graduates of two-year programs in applied science should anticipate a minimum of six semesters to complete a bachelor's degree in engineering. Trine University offers a number of "two-plus-two" degree program options, including design engineering technology and selected business programs.

Trine University offers transfer scholarships to qualified full-time, main campus applicants.

TRANSFER CREDIT

Credits earned at an approved institution with grades of "C" or better may be transferred to Trine University. Credits acceptable toward a Trine University degree shall be determined by the department in which the student is enrolled. An evaluation of transfer credit shall be made when the University receives an official transcript of the completed course work. To facilitate the evaluation, the applicant should provide the Office of Admission with a catalog or guide which contains descriptions of the courses completed elsewhere.

INTERNATIONAL STUDENT ADMISSION

International students who wish to study full time on the main campus may apply for admission as freshmen or as transfer students. The application deadline for fall admission is June 1 and for spring admission November 1. By following these deadlines, the prospective student will have ample time for long distance correspondence, obtaining a US visa, and making travel arrangements. An international applicant to Trine University is required to submit the following materials:

APPLICATION FORM

A completed Trine University International online application must be submitted to the Office of Admission. Prospective students may apply online at *trine.edu*. (No application fee required.)

FINANCIAL GUARANTEE

US Department of Homeland Security regulations require that students demonstrate their ability to finance the first year of education before receiving the I-20 AB form. A financial guarantee (bank statement) must be submitted before the I-20 AB form is issued.

ACADEMIC RECORDS

The student must send complete, official academic records, in English, to: Trine University Office of Admission, and should include courses taken, grades received and degrees or certificates earned. An explanation of the coding system used to evaluate the student's work should accompany the records. Transfer students should have official transcripts sent from each institution of higher education attended, in English, as described above. Course descriptions and/or syllabi from those institutions must also be included. If the transfer student is presently residing in the United States, a photocopy of the current I-20 must be enclosed.

INSURANCE

All International students will be required to carry Trine University's student health insurance unless they are government sponsored and can provide proof of insurance through their sponsor.

TEST SCORES

Students must demonstrate proficiency in English by providing a TOEFL score (code is 1811), ACT (code is 1250), or SAT (code is 1811). A minimum TOEFL score of 530 is required on the paper test, or 71 on the iBT, or a 6.0 overall score IELTS.

Awarding of transfer credit is contingent upon demonstration of knowledge on placement examinations to be given upon arrival on campus.

ENGLISH AS A SECOND LANGUAGE PROGRAM (ESL)

Students who do not meet the English language proficiency requirement for admission directly into a University degree program may apply for admission to the English as a Second Language program with "conditional admission" to a University degree program.

The intensive ESL program strives to prepare non-native English speaking students with the academic, cultural, and social language skills needed for success in an American university setting and in everyday life in the United States. It offers a variety of classes to non-native English speakers who need to improve their English language skills before entering their academic field of study. Students who score below minimum requirements on the IELTS or TOEFL and those who do not have a TOEFL or IELTS score are placed in the appropriate level of English Language proficiency based on the results of an ESL placement test taken upon their arrival to the university.

The English as a Second Language Program at Trine University offers non-credit intensive English language courses to highly motivated international students whose native language is not English. The ESL program is designed to help equip students with the skills necessary to read, write, speak, and understand American English, so they can successfully complete college-level courses. Students will be tested at the end of the first semester of the ESL program and may need to continue taking intensive English preparation courses either full-time or part-time in combination with regular college courses as recommended by the Director of the ESL program. Students may begin their full-time degree program after successful completion of the ESL program.

READMISSION

A student whose enrollment is interrupted for any reason for more than one semester, not including the summer semester, is considered to have withdrawn and must be readmitted. Candidates for readmission must make application through the Registrar's Office.

For students not on academic probation who need some time away from campus and who do not wish to have their enrollment interrupted, Trine University has a Planned Academic Leave program (PAL). This program provides the student with on-campus benefits during the period of the leave. Application materials are available in the Registrar's Office.

TUITION AND FEES

PAYMENT OF EDUCATION COSTS

Payment of tuition, fees, and room and board is due at the Business Office on the date indicated on the student's bill. Any financial aid awarded will be deducted from the student's charges each semester. Each student is responsible for purchasing books using funds from personal and/or financial aid sources. Any student with outstanding financial obligations to the University will not be permitted to register for any subsequent semester, or receive a transcript or diploma until the obligation is fulfilled. Students maintaining a balance owed to the University will be assessed late fees and will be responsible for collection and/or attorney costs if such efforts should become necessary.

AUDITING FEE

A fee is charged per credit hour for auditing courses. To learn the amount of this fee, call the Business Office.

COURSE FEES

Additional fees may be incurred for online courses and other specialized courses.

CREDIT BY EXAMINATION

A fee per credit hour must be paid in advance to the Business Office for a school or department-administered examination for credit. To learn the amount of this fee, call the Business Office.

ENGINEERING AND SCIENCE FEE

A fee is charged for all engineering and science majors.

ENROLLMENT DEPOSIT

All admitted domestic applicants must confirm their intention to enroll by paying a \$300 Enrollment Deposit. A portion of the fee (\$150) will be used as a housing deposit. The \$300 Enrollment Deposit is not refundable and must be submitted no later than May 1. Request for an extension must be made in writing.

FLAT RATE TUITION

A flat rate tuition charge is assessed to each main campus student registered for the full-time load of 12–18 credit hours per semester. Individual credit hour charges are applied to overloads and loads less than full time.

INTERNATIONAL FEE

All entering international students are assessed a one-time non-refundable fee of \$500 upon enrollment for an orientation program and specialized programs and services.

TRANSCRIPT FEE

A per copy fee is assessed for issuance of official Trine University transcripts. A transcript will not be issued to a student with an outstanding financial obligation to the University.

OTHER COSTS

BOOKS AND SUPPLIES

Book and supply expenses vary depending on the number of courses taken and the major and are the personal obligation of each student.

MISCELLANEOUS FEES

A student is responsible for any additional fees such as long distance telephone charges, library fines, parking tickets, and lab breakage.

ROOM AND BOARD

A 19-meal per week plan or a 10-meal per week plan is required for all students residing in the units or apartments. Villa students are required to have a 50-meal per semester plan; however, they have the option of increasing to the other plans. When the University is in session, three meals are available daily Monday through Friday. Brunch and evening meals are available Saturdays and Sundays. Commuter students may purchase any of the meal plans.

PERSONAL EXPENSES

Expenditures for personal items such as laundry, dry cleaning, travel, membership fees and similar expenses should be included when prospective students are estimating total costs of their university experience.

PERSONAL INSURANCE

Trine University is not responsible for the damage and/or loss of a student's personal property of any type. This includes, but is not limited to, computers, printers, stereo equipment, microwaves, refrigerators, etc. All damage or loss incurred to a student's personal property is solely the responsibility of the student. This damage and/or loss can be caused by, but is not limited to, theft, power outages, power surges, etc. It is recommended that all students verify that their personal property is covered by their parents' homeowners insurance. If this is not the case, it is recommended that students acquire renter's insurance, which can be obtained through parents' homeowners insurance company and/or agent.

TELEPHONE SERVICE

Students living in University units, apartments or villas will be provided local telephone service and voice mail capabilities free of charge. On request, students may have long distance service enabled.

STUDENT HEALTH INSURANCE

All full-time students are required to demonstrate that they have adequate health insurance coverage; therefore, the insurance premium is automatically placed on your student account. If you determine that your current coverage is adequate and want to waive the Trine Student Accident and Sickness Insurance Plan, you will need to complete an on-line insurance waiver by the published deadline. The waiver must be completed each academic year. Information regarding the insurance and waiver process is available in the Business Office.

ATHLETES: If an athlete is granted a waiver, the athlete or his/her family's health insurance company will be responsible for the first \$5,000 of any sports-related injury. Athletes who are enrolled in the Trine Student Accident and Sickness Insurance Plan will be covered for intercollegiate sports injuries at 100% up to \$5,000. Trine University provides additional excess insurance coverage for students who are injured while participating in intercollegiate athletics at no additional cost to the student.

INTERNATIONAL STUDENTS: All International students will be required to carry Trine University's student health insurance unless they are government sponsored and can provide proof of insurance through their sponsor.

REFUNDS

Refunds of tuition and room and board follow the schedule below. The international fee and enrollment fee are not refundable.

Tuition:

Week One—100%;

Weeks Two & Three—50%;

Week Four—0%

Room and Board:

Week One—Prorated at \$50/day;

Weeks Two & Three—50%;

Week Four—0%

A \$50 administration fee will be assessed for “exception” drops (per occurrence).

Please note: If a student receiving financial aid withdraws during the semester, that aid is subject to the federal refund calculation.

Any student who is dismissed or suspended for misconduct shall not be entitled to any refund. No refund is provided at any time on fees, books and supplies, or personal expenses.

WITHDRAWAL

If a student decides to drop or withdraw after registering for classes:

- The student is responsible for completing the proper paperwork and filing it with the Office of the Registrar. By failing to do so, the student accepts financial responsibility for all charges incurred on their account.
- The Student may be eligible for a full or partial refund of tuition and room and board, depending on when the official withdrawal takes place.
- It may result in a change in the total amount due for the semester.
- It may result in a loss of financial aid from a federal, state or institutional source.
- Failure to attend classes does not constitute a drop/withdrawal.

MONTHLY PAYMENT PLAN

A monthly payment plan service is available through a national organization specializing in education financing. Parents desiring information concerning the monthly payment plan may request a pamphlet from the business office, or on the Trine University Web site (trine.edu).

FINANCIAL AID

PURPOSE

The Office of Financial Aid provides assistance to students and their families to make a college career at Trine University affordable. It is important to reward students for exceptional academic accomplishments. To provide such assistance allows students to attend who might not otherwise have the opportunity.

Most scholarships are merit-based. They are based on academic achievement. However, other grants and loans are awarded based upon financial need as determined by the federal and state governments after completion of the Free Application for Federal Student Aid (FAFSA).

The Office of Financial Aid provides a convenient location and several options of access for students and/or their families. The office offers walk-in counseling, telephone counseling, and can be contacted via electronic mail.

The Office of Financial Aid is located in Forman Hall, and has a street address of Office of Financial Aid, 1 University Avenue, Angola, Indiana, 46703.

Normal hours of operation are Monday through Friday, 8 a.m. to 5 p.m. The Office of Financial Aid can be reached by phone at 1.800.347.4878, option 2, by email at finaid@trine.edu, and accepts faxed documents at 260.665.4511.

APPLICATION PROCEDURES

All students applying for financial aid must complete the [Trine University Online Application for Admission](#) to be accepted into a degree-seeking program and complete a FAFSA at www.fafsa.gov with school code 001839.

The FAFSA (Free Application for Federal Student Aid) for new applicants or returning applicants is the primary application for assistance. This can be filed on line at www.fafsa.gov. It is used to determine eligibility for all Federal Title IV aid programs, such as Federal Pell Grant, Supplemental Educational Opportunity Grant, Federal Work Study Program, and Federal Direct Education Loan Programs. It is also the application for undergraduate Indiana residents to apply for tuition assistance programs from the State of Indiana.

The priority application filing deadline is March 1 of each academic year for fall/spring/summer enrollment; however, aid is awarded throughout the school year. Current students need only complete the FAFSA once each academic year before March 1 to reapply for all aid. The Trine University FAFSA filing priority deadline is March 1 to be eligible for all types of institutional aid.

The U.S. Department of Education's Central Processing System (CPS) reviews and analyzes the information provided on the FAFSA. The CPS uses this information to calculate an Expected Family Contribution (EFC) and the EFC is the index of the family's financial strength and not necessarily the amount a family will have to pay towards college. Once Trine University receives this information, it will be used to create an electronic award notification.

AWARDING

Each year Trine University awards over \$19 million of institutional funds in the form of scholarships and grants.

Awards are processed by the Office of Financial Aid in accordance with University policy and the regulations governing the various aid programs. The University policy is established by the financial aid committee, and the Director of Financial Aid is responsible for determining financial aid eligibility based on the results the Department of Education submits to Trine University after a FAFSA is processed. An award notification detailing the type and amount of each award is posted on line at MyTrineFA with a postcard or an email being sent to the student as soon as the FAFSA is received.

Assistance derived from Trine University may only be used for the costs of tuition, fees and room and board in University owned facilities during the academic year that it is issued.

Additional descriptions of aid programs and satisfactory academic progress standards are included in the Trine University Student Handbook and on the University website.

MERIT-BASED SCHOLARSHIPS

Merit-based scholarships are institutional awards available to full-time, main campus degree seeking students who have demonstrated outstanding academic achievement. Unless otherwise specified, academic awards are renewable for each year a recipient is enrolled while maintaining satisfactory academic progress. At the end of every semester hours earned (Pace) and cumulative GPA's are checked to verify eligibility.

If a student moves off campus, his/her need based grant/scholarships might be adjusted. Other aid can be affected as well. Starting August 2009, students are required to live in campus housing throughout their college career.

ACADEMIC SCHOLARSHIPS

Scholarship grants to full-time, main campus degree seeking students are based on test scores, either SAT or ACT, and cumulative grade point averages (GPA). The ranges of awards are from \$500 up to full tuition for the academic year. Awards are renewable each year that a recipient is enrolled at Trine University as a full-time student and maintains a satisfactory GPA. Additional details can be found on the Financial Aid website. Awards are available to incoming freshmen and transfer students, both commuters and residents.

LEGACY AWARDS

Awards of \$2,000 per year are available for full-time, main campus students who are children, grandchildren or siblings of Trine University alumni. This award may be placed on top of no more than two additional scholarships and cannot exceed tuition.

NEED-BASED ASSISTANCE

Need-based assistance is available to qualified main campus students who file the Free Application for Federal Student Aid (FAFSA) by the Trine University priority filing deadline of March 1. State of Indiana information is taken from the FAFSA— no separate form is required.

FEDERAL GRANTS

Federal Pell Grants - \$555 to \$5550

Federal Supplemental Educational Opportunity Grants (FSEOG) - \$200 to \$4000

(Amounts vary depending upon federal funding.)

STATE GRANTS

Indiana Higher Education Award (INHEA) - \$100 to \$706

Freedom of Choice (FOC) - \$100 to \$6350

Twenty-First Century Scholarship - Up to \$6500

INSTITUTIONAL

Additional awards may be available to a student with extreme economic need, after his/her FAFSA has been received by the March 1 priority deadline. Eligibility requirements and responsibilities for need-based assistance are as follows:

Student must be a U.S. citizen or an "eligible non-citizen."

Student must be accepted for admission to Trine University.

Student must complete and submit the FAFSA by March 1.

Student must submit documentation to complete his/her financial aid file by May 1.

Student must be accepted as a regular student in an eligible program that leads to a degree or certificate.

Student must be enrolled in the minimum number of credit hours needed to fulfill specific program requirements.

Student must not be in default on any Title IV loan (Perkins, NDSL, Federal Stafford, GSL, and FSL) or owe a repayment on any Title IV grant (Federal Pell Grant or FSEOG) received for attendance at any institution.

Student must be registered with the U.S. Selective Service System, if required by law.

FEDERAL DIRECT LOAN PROGRAM**STAFFORD LOANS**

Students apply for the Stafford loan by first completing the FAFSA. When the financial aid office reviews the FAFSA, the student's eligibility for the Federal Direct Loan is then determined. Upon acceptance of the Direct Loan, a master promissory note (MPN) and an entrance interview form need to be completed.

A Stafford loan can either be subsidized or unsubsidized. A student must be enrolled half-time (6 credit hours) to be eligible and the maximum amount a student can borrow is based upon grade level status.

A subsidized loan is awarded on the basis of financial need. A student must be enrolled half-time to be eligible. The student is not charged interest until repayment begins because the federal government "subsidizes" the interest. These loans have a 10-year payoff and a six-month grace period beginning after the student leaves college, either by graduation or withdrawal from the

University. For Direct subsidized student loans borrowed on or after July 1, 2012 and before July 1, 2014, the interest subsidy will not be available during the six-month grace period. This means that interest WILL be charged during the grace period for subsidized loans borrowed during this time period.

An unsubsidized loan is not awarded on the basis of need. A student must be enrolled half-time to be eligible. The student is charged interest from the time the loan is fully disbursed until it is paid in full. A student can choose to pay the interest while enrolled in school or defer those payments until repayment. These loans also have a 10-year payoff and a six-month grace period beginning after the student leaves college, either by graduation or withdrawal from the University.

PARENT LOANS

The Direct Parent Loan for Undergraduate Students (PLUS) is designed to help parents assist their dependent children with their educational expenses. Parents will need to go through a pre-approval process, which is based on specific credit criteria. There is no grace period with a PLUS loan. The interest rate is fixed at 7.9%. Interest is charged from the date of the first disbursement until the loan is paid in full. The repayment period for a Direct PLUS Loan begins at the time the PLUS loan is fully disbursed, and the first payment is due within 60 days after the final disbursement. Parents must begin paying both principal and interest while the student is still in school, specifically 45 days after the second disbursement. However, for Direct PLUS Loans with a first disbursement date on or after July 1, 2008, the parent may defer repayment either when the student on whose behalf the parent borrowed the loan is enrolled on at least a half-time basis or for an additional six months after the student ceases to be enrolled at least half-time.

ENROLLMENT STATUS

Each type of aid requires main campus, day program students to enroll for a certain number of credit hours per semester. Most federal aid requires at least half-time status (six credit hours); state, institutional and private aid requires fulltime enrollment (a minimum of 12 credit hours).

All Trine University Institutional Awards are created for 12-18 credit hours. Schedule overloads, or 19 or more credit hours and additional course fees, are the responsibility of the student.

MAINTAINING ELIGIBILITY

Currently enrolled students are required to maintain the appropriate grade point average for the award. Students must maintain satisfactory academic progress by completing the required number of credit hours each academic year (see the Trine University Student Handbook) and reapply for aid in the spring for the next academic year.

DISBURSEMENT

All aid is disbursed equally between semesters. (Aid is generally not available during the summer.) Aid is credited to students' accounts in the Business Office. Student loans are credited only after they are disbursed to the student's account. Students who work on campus will receive paychecks every two weeks. (For more information, see the Trine University Student Handbook or www.trine.edu.)

APPEALS

Appeals to financial aid decisions can be filed with the Director of Financial Aid, who will present them to the financial review committee. Appeals must be filed in a timely manner.

REFUNDS AND REPAYMENTS

Students, who withdraw from the University or drop classes during the first 60 percent of a term, may be required to repay some or all of their financial aid. Refund and repayment amounts are calculated based upon a required federal formula to determine how much is to be refunded to the student or refunded back to various federal, state, and institutional programs. (See the Fees section for information about the Tuition Refund Schedule and Residence Refund Schedule.)

Return of Title IV federal regulations require the Office of Financial Aid to review the aid packages of students who officially withdraw or unofficially withdraw from Trine University if they receive any type of federal aid, including federal grants and loans.

Examples of these calculations can be seen in the Office of Financial Aid.

STUDENT RIGHTS AND RESPONSIBILITIES

Trine University is committed to working with each student to provide the best financial aid package possible. At the same time, each student has the responsibility to apply for the aid and to meet and maintain eligibility requirements. Following is a list of basic rights and responsibilities of the students in regard to financial aid:

- Students must apply for financial aid.
- Financial aid information and counseling will be available.
- Students will be considered for financial aid on a first-come, first-served basis.
- Students will be notified electronically or via postcard of their eligibility for financial aid.
- Students will be informed of the specific type of financial aid, the amount of each type of aid and the conditions to renew each type.
- Students will have the opportunity to review with the Office of Financial Aid the process by which awarded aid was determined.
- Students may request an additional review of their aid package with the director of the Office of Financial Aid.
- All students who receive financial aid are required to abide by the policies and regulations of Trine University.
 - All Trine University financial aid policies and fund rules are either published on our website or available in our office. Aid recipients are required to be familiar with these policies. Information that is unclear should be brought to the attention of a financial aid staff member.
 - The Office of Financial Aid will process financial aid requests without regard to race, religious affiliation, gender, age, or disability. All funds are subject to individual student need as well as the availability of funds.
 - General information is communicated to students through their student e-mail account and financial aid information is communicated through their MyTrineFa account. It is recommended that students review their accounts daily. **For new students we use the email that was entered in on the FAFSA but after they receive their student email account we begin to communicate using that one.

- The student has the right to know what types of aid are available. That information is available on both our website and in our offices.
- Students are obligated to advise the Office of Financial Aid of any name, address, or phone number changes. Updating this information through the MyPortal will not update your financial aid records.
- Financial aid recipients are required to notify the Office of Financial Aid of any scholarships, loans, book allowances, employer assistance or other forms of assistance extended to them from sources outside the college. Adjustments of aid may occur as a result.
- The Office of Financial Aid reserves the right, on behalf of the Institution, to review and cancel any award at any time because of changes in a student's financial or academic status, state program rules, federal program rules or any other significant change. Students will be notified of any changes to their aid via an email communication to their Trine email account (refer to ** in #3 for new students). The email will include instructions on how to access MyTrineFA and review the changes. This will only show the changes made to your award notification and not your bill. If you want to know how this change will affect your bill you will need to log into your MyPortal account for that information.
- Financial aid is awarded to a student contingent upon maintaining standards set forth by the institution's Title IV Satisfactory Academic Progress (SAP) policies which complies with required Federal standards. Please refer to our website and/or student handbook for policy details.
- Disbursement of a student's financial aid award(s) (with the exception of CWS- College Work Study) will be in the form of a direct payment to the student's account in the Business Office. Work-study earnings are paid directly to the student on a bi-weekly basis via direct deposit after a job is secured and hours are worked.
- Financial aid will be awarded and disbursed based on full-time enrollment. Should the student register for less than a full-time course load or drop classes that adjusts enrollment, costs and aid will be adjusted and an acknowledgement will be sent to the student via email communication. In some cases, students may be required to repay funds to the University.
- It is the student's responsibility to ensure that their tuition is paid in full by the due date either by financial aid, payment plan, cash or whatever resource they plan to use. Students can check their account status on My Portal.
- The student must complete all application forms accurately and submit them on time to the appropriate location.
- The student must provide correct information. The intentional misreporting of information on financial aid application forms is a violation of the law and is considered a criminal offense which could result in indictment under the U.S. Criminal Code.

- The student must return all additional documentation, verification, corrections, and/or new information requested by the Financial Aid Office in a timely manner. Any delay can affect eligibility for certain types of aid.
- A student receiving federal financial aid earns their aid based on the number of days that they attend class. A recipient who fully withdraws from Trine University before 60% of the term is completed will be subject to an aid recalculations based on the number of days attended. The unearned aid will be refunded to the appropriate federal financial aid program by the institution and the student will repay the institution.
- A student receiving state financial aid earns those funds based on their enrollment at the end of the 28th class day. Therefore state aid will be affected should the student drop all of their coursework or below full time before that date.
- A student receiving a Federal Pell Grant earns those funds based on their enrollment as a first time bachelor degree seeking student. A student needs to begin enrollment in all of their coursework before Pell Grants will disburse to their student account. Therefore Pell Grants will be affected if you do not begin your enrollment in all of your coursework and/or drop some or all of the coursework for which you enrolled in.
- A student may be awarded employment under the CWS – Federal Work Study Program. The amount of CWS aid shown on the award letter is the maximum amount of money the student can expect to earn during the academic year as a result of work performed. The student will only be paid for hours worked and obtaining work is contingent on finding CWS approved employment.
- Financial aid awards are made for one academic year only. One half of the award will be applied each semester. It is always the student's responsibility to apply annually for aid; applications submitted by March 1st will receive priority consideration. Renewal of aid depends upon the student maintaining Title IV Satisfactory Academic Progress, continued need for financial aid assistance and the availability of funds.
- Students planning to attend summer semester and wishing to receive financial aid must complete a Request for Summer Aid Form in addition to the FAFSA. Applications are available on-line and in the Office of Financial Aid following spring break.
- Students who are incarcerated in a state or federal correctional institution are required by Federal law to inform the aid office of their incarceration.
- The student is responsible for reading and understanding all forms that he/she is asked to sign and for keeping copies of the forms.
- The student must accept responsibility for all agreements that he/she signs.
- The student must be aware of and comply with the deadlines for application or reapplication for aid.
- The student should be aware of the school's refund policy
- Students receiving financial aid must inform the Office of Financial Aid about additional awards

- Students must maintain satisfactory academic progress toward academic goals.
- Students must maintain good social standing.
- Students must reapply for financial aid between January 1 and March 1.
- Students must report to the Office of Financial Aid when transferring to another school.
- If applicable, students must participate in the Federal Stafford Loan entrance and exit interviews.

STUDENT SERVICES

In addition to the information regarding student life provided below, the Student Handbook provides a wide range of information for students.

HOUSING

A housing survey and residential room and board contract are available through MyPortal, and will not be processed until after a formal offer of admission has been extended by the Office of Admission and the Enrollment Deposit has been paid. Former students may submit housing applications upon readmission.

HOUSING REQUIREMENTS

Trine University students enrolled prior to fall 2009: All students are obligated to live on campus until he/she has completed 48 hours and has lived on campus for four semesters. Students who are married, responsible for a dependent child, living at home with a parent or legal guardian (within 40 miles of Angola), or are 21 years of age on or before the first day of fall classes may be waived from the housing requirements.

Trine University students, beginning with students entering in the fall of 2009, are required to live on campus. Students who are married, responsible for a dependent child, living at home with a parent or legal guardian (within 40 miles of Angola), or 21 years of age on or before the first day of fall classes may be waived from this requirement. Students with a cumulative GPA of a 2.0 or higher and have completed 48 credit hours and lived on campus for four semesters may be approved to move into a University recognized Sorority / Fraternity House or Christian Campus House.

Students are required to be enrolled full-time (12 credit hours per semester) to reside in university housing. Students must have the written approval from the Dean of Student Life prior to moving off campus. Failure to receive approval or providing false information may lead to expulsion from Trine University.

All residential students: A signed Residential Room and Board Contract, Housing Information Form, and Housing Deposit are required before arriving on campus. The Residential Room and Board Contract is binding for the entire academic year. If the Residential Room and Board Contract is broken or if permission from the Dean of Students has not been given to be released from the contract, the Housing Deposit is forfeited and a contract release fee will be assessed.

Additionally, any student leaving on-campus housing without a contract release may be subject to billing for the entire contract period. Falsification of housing arrangements may lead to expulsion from the University. For those students with an on-campus portion of the Trine University Merit Scholarship it will be withdrawn once the student is no longer an on-campus residential student. The academic merit portion will remain. The student is eligible for other types of financial assistance, and as always it is recommended that the student continue to complete the FAFSA by the March 10th institutional deadline.

RESIDENTIAL FACILITIES

Residential facilities at Trine University include men only traditional residence halls, women only traditional residence halls, and co-ed apartment buildings. Villas are available for juniors

and seniors, and are assigned based on combined academics and social standing. Honors students are eligible to be housed in Moyer Apartments on the golf course.

Applications are processed in the spring for the next academic year.

Whitney Commons dining facility in the University Center serves all residential students. A commuter meal plan is available for students not living on campus. The campus Mail Center and student mailboxes are also located in the University Center and serve all of the residential facilities.

PERSONAL PROPERTY INSURANCE

Trine University will not reimburse students for damage to personal items as a result of theft, fire, flood, and other disasters. Personal items must be covered by personal insurance.

COUNSELING SERVICES

The purpose of Counseling Services is to provide students with short-term counseling that will enable them to overcome a variety of personal and interpersonal difficulties that may interfere with their pursuit of academic and career goals. Clinical counseling services, as well as prevention, outreach, and consultation, are provided free on the residential Angola campus.

DISCIPLINARY STRUCTURE

Learning to live as productive members of a university community is a developmental process that starts as a freshman and continues throughout the college experience. The primary goals of educational discipline are to educate students in the understanding of community and to help them assume and demonstrate responsibility as a member of a civilized society. The primary principle upon which the disciplinary program is based is that actions have consequences. Educational discipline is different from law enforcement. The goal is education and restoration. For that reason, the Office of Student Services operates within a different realm and makes decisions differently than those agencies that enforce public law.

Attending Trine University is an optional and voluntary action. Institutional acceptance for attendance extends an invitation to students to join an academic and social community and to remain a member of that community as long as academic, community and residential standards are met. The standards and procedures of Trine University have been established to ensure the educational purpose of the university will be met and an atmosphere of intellectual growth exists. Any person may file a complaint, with the Campus Safety or the Office of Student Services, against another student, a member of the University community, or a student organization for the violation of community or residential standards as outlined in this Student Handbook. Students are expected to abide by the standards set forth in this Student Handbook. Failure to do so may result in disciplinary sanctions.

PROCESS:

The disciplinary system at Trine University consists of a Judicial Review Committee, Judicial Review Board, Dean of Students, and the University Disciplinary Review Board. Disciplinary issues may be handled by one or more of the above groups depending on the severity of the offense. The Judicial Review Committee shall determine which group will hear the individual case(s). The University Disciplinary Review Board will hear cases involving potential dismissal or expulsion. In addition, for serious offenses, acts, or crimes against other people or the university are grounds for immediate dismissal or expulsion by the Dean of Students.

The Judicial System at Trine University is operating under a standardized point system. Points are assigned depending on the severity of the violation. Points are accumulated for the duration of time spent at Trine University.

WARNING

Disciplinary Warning is an official sanction notifying the student or organization that certain behavior was unacceptable. Further misconduct may result in additional disciplinary sanctions.

INTERVENTION: 1 – 74 judicial points

Disciplinary Intervention is an official sanction indicating to a student or organization that their behavior was unacceptable. Disciplinary sanctions will be imposed.

PROBATION: 75 judicial points

When on Disciplinary Probation, a student or organization will meet with the Dean of Students and a disciplinary action plan will be developed. Probation is an official sanction notifying the student or organization that any additional inappropriate behavior may result in a referral to the University Disciplinary Review Board with a recommendation of possible dismissal from Trine University.

FINAL NOTICE – REVIEW BOARD REFERRAL: 80 judicial points

Final Notice is an official sanction notifying the student that his or her inappropriate behavior has resulted in a referral to the University Disciplinary Review Board and a recommendation of possible dismissal or expulsion from Trine University.

Disciplinary Dismissal is an official determination canceling the student's registration at the university. In the instance of dismissal, all academic grades will revert to "F's" and monetary reimbursements may not be made for tuition, room and board, or any other university fees. Students who wish to return to the university at a later date must submit a written request to return to the Registrar and Dean of Students. Notification will be sent to appropriate university offices when a student is dismissed. The student's parents or guardians will also be notified.

Disciplinary Expulsion is an official determination made by the Dean of Students that permanently prohibits the student from attending Trine University. In the instance of expulsion, all academic grades will revert to "F's" and monetary reimbursements may not be made for tuition, room and board, or any other university fees. Notification will be sent to appropriate university offices when a student is expelled. The student's parents or guardians will also be notified of the decision.

DISCIPLINARY SANCTIONS

Sanctions for misconduct may include, but not limited to fines, loss of privilege or participation in any university activities, sports, academic organizations, or trips for a set period of time, restitution, university service hours, educational/service activities, dismissal, and/or expulsion.

JUDICIAL REVIEW MEETING

During the judicial review meeting, the Judicial Review Committee will meet with the student to review the charge(s). During this review, the case will be presented to the student and a decision regarding actions and sanctions will be determined. If the student chooses to accept, responsibility for the violation(s), appropriate sanction(s) will be issued. If the student chooses to deny responsibility, the student will then meet with a Judicial Review Board. During a

disciplinary review meeting, students will:

- a) Have the opportunity to state his/her side of the case and provide any additional information that might be helpful in resolving the case.
- b) Receive written notification of the results of the judicial review meeting at the conclusion of the meeting.

APPEAL PROCESS:

The Dean of Students will address appeals of decisions made by the Judicial Review Board. These appeals must be submitted in writing, via email, within three working days of the notification. Appeals will only be accepted for the following reasons:

1. Insufficient evidence to support decision
2. Harshness of sanction
3. Procedural irregularity
4. New evidence

The reason of a student's appeal must be included in the written appeal. It is up to the Dean of Students to determine whether the appeal statement clearly identifies and explains one or more of the above reasons for the appeal. In the absence of such demonstration, the appeal will be denied and the sanctions stand. The appeal is not an opportunity to argue that the initial decision was wrong. If the Dean of Students determines that there is an acceptable reason(s) for an appeal, based on those indicated above, he/she will refer the case back to the Judicial Review Board for further evaluation and possible adjustment of sanctions.

UNIVERSITY DISCIPLINARY REVIEW BOARD PROCESS:

When a violation of university community or residential standards requires the convening of a University Disciplinary Review Board, the following procedure will be initiated by the Office of Student Services:

1. The University Disciplinary Review Board will be established consisting of the following five members: one administrator (who will serve as the chair of the board), one faculty member, one representative from the Athletic Department, a student resident director, and the President of Student Senate. Meeting minutes will be recorded.
2. The student accused of the violation will meet with the Dean of Students and charges and recommendations as a result of the violation(s) will be issued and explained.
3. A date and time of the hearing will be set.
4. The student is allowed to have two people present during the hearing.
5. The Dean of Students or Judicial Review Committee representative will introduce information about the disciplinary history of the accused and other relevant information. The Dean of Students or Judicial Review Committee will recommend a plan of action. The student will have the opportunity to provide his or her account of event(s). The Board will determine if the recommended sanctions will be imposed.
6. The accused student will receive written notice within 24 hours of the hearing.

The decision of the University Disciplinary Review Board is final with no avenue of appeal.

ADDITIONAL STUDENT SERVICES INFORMATION

For information on the following, please see the current Student Handbook available at:

http://www.trine.edu/campus_life/student_handbook/

- Student Organizations
- Professional Societies & Fraternities
- Honor Societies & Fraternities
- Greek Life
- Special Interest Groups
- Athletics
- Intramural Sports

CAREER SERVICES

Career Services offers programs and services to assist students and alumni to make career decisions and pursue the skill development necessary to compete in a rapidly changing, competency-based, global workplace. Career planning is an on-going process that begins when the student is a freshman and continues throughout the student's senior year. The office of Career Services works collaboratively with academic departments, faculty members, student services, employers and other relevant constituents to enhance students' career development and participation in internships and other experiential education programs. Career Services accumulates and makes accessible information and resources pertaining to career exploration, workforce trends, the job search, employment opportunities, current salary trends, and graduate employment statistics. The resources of Career Services are available throughout the student's academic preparation and when the student becomes an alumnus.

EMPLOYMENT ASSISTANCE

Students are offered advice and coaching for procuring major-related internships, cooperative education assignments, and full-time employment. Career Services facilitates communication between job seekers and employers, which includes hosting career fairs, networking events, guest speakers, and arranging student interviews for representatives of business, industry, and educational institutions who visit campus to recruit prospective employees. Career Services also reaches out to relevant individuals, campus offices, alumni, and external agencies to establish and maintain effective relations, disseminate information about programs and services, and increase experiential learning and employment opportunities for the benefit of Trine University students.

INTERNSHIPS

Career Services advertises internship requests throughout the academic year on www.trinecareers.org and refers students to other internship resources that meet their individual needs. These major-related work experiences, which usually are limited to a three-month time period, build credentials that are essential to a graduate's job search. Internships for credit are also available for students who meet specific requirements within the student's discipline or major field of study.

COOPERATIVE EDUCATION PROGRAM

The Cooperative Education Program (co-op) is a course that promotes professional learning and enhances traditional university course and lab work. The Cooperative Education Program is designed to allow students to alternate full-time work with an employer and campus sessions. This experience not only better prepares the student for entry into his/her chosen field, it allows students the opportunity to network with professionals and make industry contacts. Another advantage is that co-op students can earn a salary while on work assignments, enabling them to finance a portion of their education. Students eligible for the Cooperative Education Program must have completed a minimum of 30 semester hours with a 2.4 cumulative grade point average and must meet criteria established by the prospective employer.

A student is considered a cooperative education student after having accepted employment with a cooperative education employer, after the cooperative education director and department chair have approved the student's program, and after the student has registered for the course

CO 050 Co-op Employment. Work experience prior to acceptance into the Cooperative Education Program cannot be applied to the program.

A cooperative education student must complete a minimum of three semesters of work assignments. Approval of any changes in the alternating employment/class schedule must be obtained in writing from the cooperative education company, the cooperative education director, and the respective department chair. This approval should be obtained by mid-term of the semester before the proposed change. Consecutive work periods require separate registration.

A cooperative education student may have a second cooperative education employer only if a co-op position is terminated by the original employer or, in the extreme case, that no major-related experience or progression of responsibilities is occurring. Verification of major-related experience and progression must be made in writing by the cooperative education student and confirmed by both the cooperative education director and the respective department chair.

During or upon completion of the final work assignment, the student must enroll in CO 453 Co-op Work Experience. Through this course, the student will prepare and submit a comprehensive report on his/her work experience. Upon approval of the finished report, three (3) hours of academic credit will be awarded.

Upon satisfactory completion of both academic and co-op work experience requirements, the cooperative education student will be granted a baccalaureate degree with the inscription "Cooperative Education Program," as well as a designation on his/her transcript noting cooperative education participation.

WORK STUDY EMPLOYMENT

The Office of Financial Aid manages the work study program. All on-campus work study positions are posted on www.trinecareers.org.

ACADEMIC INFORMATION

PLANNING

ACADEMIC ADVISING

Each student is assigned a faculty advisor who assists the student in planning a program to meet graduation requirements and career goals. It is, however, the student's responsibility for meeting the academic program requirements presented in the catalog.

PREPARATORY COURSES

Every Trine University academic program has a mathematics component. Faculty advisors recommend a beginning mathematics course based upon student's SAT and/or ACT exam results and high school GPA. If adequate information regarding a student's math skills is not available, a student may be required to take a mathematics placement exam. A student may be assigned to non-credit, preparatory courses in mathematics or English.

ONLINE COURSES FOR MAIN CAMPUS STUDENTS

- A student must be in good academic standing to be eligible to register for an online course.
- Students may take a single online course per semester with the approval of their academic advisors during the regular academic year (fall and spring semester).
- Students may take two online courses per six-week session with the approval of their academic advisors during the summer term.

CHANGING A MAJOR

To change a major, students must get the approval of both their current department chair and the chair of the new department. When moving from one school to another, change of majors should only occur after the end of a semester. (This includes students in the Allen School of Engineering & Technology who change from an engineering major to Design Engineering Technology.)

Change-of-major forms are available in the *Office of the Registrar*. Admission requirements for each major are available in the departmental office.

A student who changes a major is subject to the program requirements in effect at the time of the major change.

When a student changes his or her major, all transcripts, including the Trine University transcript, are evaluated by the new chair. If the change of major is from one school to another, from a four-year to a two-year program, or from a two-year to a four-year program, courses with less than a "C" grade may be dropped from the student's cumulative totals, if the courses are not required in the new major and if the student is not currently enrolled in those courses. Dropped courses may not be repeated in the new major.

In cases where a student is readmitted to a school in which he or she was previously enrolled, all grades earned during enrollment in that school must be included in the cumulative grade point average.

Students wishing to change from non-degree status to a degree program should process the change through the Office of Admission.

FULL-TIME STUDENT

A full-time student at the main campus is one who is carrying a minimum of 12 academic credit hours. If a student wishes to register for more than 18 credit hours, he or she must have written permission as follows: 19–20 credits requires permission from the department chair; 21–23 credits also requires permission from the school dean; and 24 or more credits also requires permission from the vice president for academic affairs.

CLASSIFICATION OF STUDENTS

For purposes of registration and determination of eligibility for certain student activities, the registrar uses the following guidelines:

CLASS	CREDITS
Freshman	0–28
Sophomore*	29–59
Junior	60–89
Senior	90+

*Students enrolled in associate degree programs remain sophomores when they have 60 or more credits.

NON-DEGREE STUDENT

An applicant may be admitted to Trine University as a non-degree student in certain programs. The non-degree student is limited to a maximum of 30 semester credit hours attempted. To continue taking courses after 30 credit hours are earned, the non-degree student must apply for and be accepted to degree status. A change from non-degree to degree status is processed by the Office of Admission.

GENERAL EDUCATION PHILOSOPHY

The purpose of the general education curriculum components is to provide the Trine University graduate with skills necessary to think critically and to communicate clearly with persons in all professions. The General Education requirements are designed to ensure breadth of knowledge and to promote intellectual inquiry and critical thinking.

GENERAL EDUCATION OUTCOMES

After completion of the general education curriculum, the student will be able to:

- present written thoughts in an effective manner using correct grammar, punctuation, and organization of ideas,
- communicate thoughts orally in an effective manner,
- demonstrate critical thinking skills utilizing information and thought processes by various perspectives listed in the philosophy, and
- demonstrate use of quantitative problem solving and reasoning skills.

The General Education Requirements consist of courses in two categories: skills and perspectives

Skills courses include written and oral communication courses as identified by individual degree programs.

Perspective courses are required for all degrees, with specific information identified in the General Education Requirement section of the catalog. Perspective courses are divided into the following areas:

Sciences – to learn to use analytical tools and applications in the study of that which is material.

Mathematics – to learn to connect mathematical ideas and applications in the study of that which is material.

Humanities – to learn to appreciate the achievements which humanity has accomplished.

Social Sciences – to gain insight into the effects of human behavior on the individual, society, and the world through history as well as in current times.

GENERAL EDUCATION REQUIREMENTS FOR ALL BACHELOR DEGREES**Area****# of semester hours****Written Communication**

(must include ENG 103 or ENG 104 and either ENG 113 or ENG 133)

6

Oral Communication

(SP 203 or COM 163)

3

Social Sciences & Humanities

(*take at least two courses from Social Sciences and at least two courses from Humanities.

See table that follows.)

12

Mathematics & Science

(must include at least 1 course in mathematics and 1 course in science)

10

Other

(additional hours to be taken from the above categories*)

11

TOTAL**42**

*EXS 102 – Lifetime Wellness may be used to satisfy two (2) of the eleven (11) “Other” hours. HNR 121 – Introduction to Honors Seminar may be used to satisfy one (1) hour of the eleven (11) “Other” hours. Any approved computer literacy course may be used to satisfy three (3) of the eleven (11) “Other” hours under General Education requirements.

Cultural Events requirement: students must attend eight university-approved cultural events over the course of four years, with no limitations on the number of events per semester. Attendance at off-campus cultural events may be possible if first approved by the university.

The cultural events requirement relates to the university’s mission in that cultural events are co-curricular experiences that cultivate the holistic development of students.

Examples of cultural events include the following:

- Multicultural events
- International events
- Musical performances, recitals, and concerts
- Dance performances
- Theater productions
- Art exhibits
- Readings in prose or poetry
- Language & Humanities Department sponsored events
- Lectures, seminars, and symposia on a range of culturally-related themes
- University approved exhibits at cultural institutions

BACHELOR DEGREES

Humanities		Social Sciences	
ARC 293	FLM 203	SPN 203	HIS 113
ART 253	FRN 113	SPN 213	HIS 203
CHN 113	FRN 123	ECO 213	HIS 213
CHN 123	GER 104	ECO 223	HIS 251
COM 123	GER 114	ECO/SOC 243	HIS 423
COM 203	GER 203	ECO 323	HIS 433
COM 233	GER 213	ECO 363	HNR X2X
COM 363	HIS 253	ECO 383	PSY 113
ENG 153	HNR X1X	ECO/HIS 393	PSY 313
ENG 204	MUS 123	GEO 213	PSY 323
ENG 233	MUS 223	GEO 303	PSY 333
ENG 214	MUS 272	GEO 313	PSY/SOC 343
ENG 253	MUS 273**	GEO 323	PSY 353
ENG 263	PHL 203	GEO/GOV 353	PSY 383
ENG 273	PHL 251	GOV 113	PSY 403
ENG 323	PHL 313	GOV 313	PSY 413
ENG 333	PHL 323	GOV 333	SOC 103
ENG 363	PHL 333	GOV /HIS 323	SOC 313
ENG 403	PHL 343	GOV/HIS 343	SOC 323
ENG 423	SP 103	GOV/HIS 363	SOC 333
ENG 433	SPN 103	GOV/PSY 373	WS 103
ENG 443	SPN 113	GOV/HIS 403	
	SPN 123	HIS 103	

**School of Professional Study course only

GENERAL EDUCATION REQUIREMENTS FOR ALL ASSOCIATE DEGREES*

Area	# of semester hours
Written Communication (must include ENG 103 or ENG 104 and either ENG 113 or ENG 133)	6
Social Sciences & Humanities	6
Mathematics & Science (must include at least 1 course in mathematics and 1 course in science)	7
Other	3
TOTAL	22

*The above choices must include at least one course from the following perspective areas: Social Sciences, Humanities, Mathematics, and Sciences.

ASSOCIATE DEGREES

Humanities		Social Sciences	
ARC 293	FLM 203	SPN 203	HIS 113
ART 253	FRN 113	SPN 213	HIS 203
CHN 113	FRN 123	ECO 213	HIS 213
CHN 123	GER 104	ECO 223	HIS 251
COM 123	GER 114	ECO/SOC 243	HIS 423
COM 203	GER 203	ECO 323	HIS 433
COM 233	GER 213	ECO 363	HNR X2X
COM 363	HIS 253	ECO 383	PSY 113
ENG 153	HNR X1X	ECO/HIS 393	PSY 313
ENG 204	MUS 123	GEO 213	PSY 323
ENG 233	MUS 223	GEO 303	PSY 333
ENG 214	MUS 272	GEO 313	PSY/SOC 343
ENG 253	MUS 273**	GEO 323	PSY 353
ENG 263	PHL 203	GEO/GOV 353	PSY 383
ENG 273	PHL 251	GOV 113	PSY 403
ENG 323	PHL 313	GOV 313	PSY 413
ENG 333	PHL 323	GOV 333	SOC 103
ENG 363	PHL 333	GOV /HIS 323	SOC 313
ENG 403	PHL 343	GOV/HIS 343	SOC 323
ENG 423	SP 103	GOV/HIS 363	SOC 333
ENG 433	SPN 103	GOV/PSY 373	WS 103
ENG 443	SPN 113	GOV/HIS 403	
	SPN 123	HIS 103	

**School of Professional Studies course only

GRADUATION REQUIREMENTS

1. Specific degree requirements: Students must complete the degree requirements specific to their programs. Once in a program, if the requirements change, students have the option of graduating under the new requirements. Students who re-enter the University after an absence of more than one academic year are subject to the degree requirements in effect at the time of re-entry.
2. General Education Requirements: All Trine University students receiving a baccalaureate or associate degree must meet the General Education requirements. Details regarding the General Education philosophy and requirements are presented immediately before this section in the catalog.
3. A cumulative grade point average of not less than 2.0 must be achieved for all Trine University courses.
4. All required courses or approved substitutions must be completed as described in the respective degree programs.
5. Candidates for graduation must file with the registrar intent to graduate no later than one semester before the final semester of attendance in which degree requirements shall be completed.
6. Cultural Events requirement: students must attend eight university-approved cultural events over the course of four years, with no limitations on the number of events per semester. Attendance at off campus cultural events may be possible if first approved by the university. *(Implementation date Fall 2011)*

COMMENCEMENT PARTICIPATION FOR UNDERGRADUATE STUDENTS

All spring semester and summer semester prospective graduates are eligible to participate in the annual spring commencement ceremony. Fall semester graduates are eligible to participate in the spring commencement ceremony prior to completing their degrees only if, by the end of the spring semester, they have 18 or fewer credit hours to complete to earn their degrees. If a fall graduate has more than 18 credit hours to complete, the student is invited to attend the commencement ceremony the following spring.

COURSE SUBSTITUTIONS

An alternate course may be substituted for one required in a student's major if the student cannot schedule the required course without undue hardship. The substitution must be requested by the student's department chair. Proper notation must be made in the student's record and approval granted prior to the substitution. The substitution cannot be made simply on the request of the student to take a different course from the one required.

ACADEMIC RESIDENCY REQUIREMENT

To be eligible for a baccalaureate degree, a student must earn a minimum of 30 credits at Trine University. To be eligible for an associate degree, a student must earn a minimum of 16 credits at Trine University. The last 30 credits of a four-year degree program or the last 16 credits of a two-year degree program must be taken at Trine University unless a waiver is granted by the academic dean upon the recommendation of the department chair.

THE SECOND DEGREE

A candidate for a second Trine University baccalaureate degree is required to complete a minimum of 30 credit hours in residence above the total credit requirements for the first baccalaureate degree. In addition, the candidate must complete all other requirements for the second degree. A candidate for a second Trine University associate degree is required to complete a minimum of 16 credit hours in residence above the total credit requirements for the first associate degree as well as meet all course requirements. A candidate for a Trine University baccalaureate degree who has already earned an associate degree from Trine University must complete a minimum of 46 Trine University credit hours.

Two baccalaureate degrees may be received at the same time provided all requirements for both degrees have been met, and the student has earned a minimum of 30 credit hours more than the degree with the lower minimum hour requirement. Two associate degrees may be received at the same time provided all requirements for both degrees have been met, and the student has earned a minimum of 16 credit hours more than the degree with the lower minimum hour requirement.

ACADEMIC MINOR OR SECOND MAJOR

A candidate for a minor must file a minor declaration form with the registrar. Second majors must also be declared and are possible with certain degree programs. Students should check with their academic department, if interested. Students are subject to the program (major/minor) requirements in effect at the time the major or minor is declared.

SCHOLASTIC AWARDS AT GRADUATION

GOLD KEYS: Gold Keys are awarded to bachelor degree students enrolled at the main campus that have earned GPAs of 3.750 or better while carrying at least 15 credit hours in each of four consecutive semesters. In the event that a student qualifies for the equivalent of a second Gold Key, the name of that person is placed upon a scholastic plaque. The exception to this policy is when a main campus student meets all requirements of the second gold key with the exception of the requirement of registering for 15 credits in the final term. The student's name will be placed on the scholastic plaque provided the student has registered for a minimum of 12 credit hours, which are the final credits required for graduation.

SILVER KEYS: Silver Keys are awarded to associate degree main campus students who earn 3.750 grade point averages or better while carrying at least 15 credit hours in each of two consecutive semesters.

GRADUATION WITH HONORS: An undergraduate candidate for graduation will have his or her diploma inscribed as graduating cum laude if he or she achieves a cumulative grade point average of 3.500 to 3.749, magna cum laude if he or she achieves a cumulative grade point average of 3.750 to 3.949, or summa cum laude for a cumulative GPA of 3.950 or higher. The grade point average will be computed on the basis of all courses taken while at Trine University. To qualify for the award, a candidate for a bachelor's degree must earn a minimum of 40 semester hours at Trine University, and a candidate for an associate degree must earn a minimum of 20 semester hours.

HONORS DAY: For the purpose of Latin honors recognition at Honors Day, the grade point average requirement will be based upon the student's cumulative GPA before spring grades are posted. For such recognition, a minimum of 40 Trine University credits must be completed by the end of the spring term for a bachelor's degree or a minimum of 20 Trine University credits for an associate degree. Latin honors will be listed on the diploma and transcript based upon the student's cumulative GPA after the final term's grades are posted and the student has met all degree requirements.

GRADING SYSTEM

The grading system is as follows:

A	Excellent	4.0
B+	Very Good	3.5
B	Good	3.0
C+	Above Average	2.5
C	Average	2.0
D+	Below Average	1.5
D	Poor (lowest passing grade)	1.0
F	Failure	0.0
FI	Failure (original grade of I)	0.0
S	Satisfactory	not figured into GPA
U	Unsatisfactory	not figured into GPA
I	Incomplete	not figured into GPA
IP	In progress (grade deferred)	not figured into GPA
W	Withdrawal before completion of 80% of the semester	
WP	Withdrawal after completion of 80% of the semester with passing work at the time of withdrawal	

(issued only under special circumstances)

GRADE OF INCOMPLETE Incomplete (I) is a temporary grade used by the instructor in cases where a student is unable to complete course requirements because of circumstances beyond the student's control such as illness, family emergency or other similar circumstances. It is assigned only if the student has satisfactorily completed the major portion of the course requirements and has convinced the instructor of his or her ability to complete the remaining work without registering for the course again. An instructor who assigns a grade of "I" submits to the department chair a formal statement of requirements that must be satisfied for removal of the incomplete grade. A copy of the statement of requirements, including deadlines for their completion, shall be made available to the student.

It is the student's responsibility to contact the instructor to make arrangements for completing the remaining work. The required work should be completed and a grade reported by the end of the student's next semester in residence, but in no case later than one calendar year following

the receipt of the "I" grade. An "I" grade not removed within one year from the end of the semester in which the "I" grade was issued will be converted to an "FI" grade by the registrar. An "I" grade may not be removed by registering again for the course.

If the instructor giving the "I" grade is no longer a member of the faculty, the student should contact the department chair who will act on behalf of the former instructor. In the case of a graduating senior, if an "I" or "IP" grade is not removed until after the start of the next semester, the graduation date will reflect the new semester.

GRADE OF "IN PROGRESS" The "IP" (In Progress) grade is to be given only in courses so designated by the respective schools. The "IP" grade is designed for courses which require more than one semester for completion. An "IP" grade not removed within one year from the end of the semester in which the "IP" grade was issued will be converted to an "FI" by the registrar. An "IP" grade may not be removed by registering again for the course.

COURSE REPEAT

Course repeat means that a student may retake a course at Trine University for a better grade. When a student has repeated a course, the honor points for the higher grade are substituted.

The student's record will not show additional hours attempted for the repeated course. Additional earned hours are given if a student passes a class where an "F" or "U" grade was originally received. Courses which are repeated remain on the student's permanent record (transcript).

FAILING GRADES

Credit for a course failed at Trine University may not be obtained by examination.

WITHDRAWAL FROM CLASS

A student may withdraw from class through 80 percent of the semester, provided the student obtains the proper form from the registrar and obtains academic advisor approval. International students must also have the approval of the registrar if they will be dropping below 12 credit hours.

All students dropping below full-time status must have the approval of the director of financial aid. The completed form shall be submitted to the registrar before 80 percent of the semester is completed.

No classes shall be dropped after the completion of 80 percent of the semester except for circumstances beyond the control of the student, such as illness, family emergency, or other similar circumstances. Permission to withdraw after the completion of 80 percent of the semester must be obtained from the chair of the student's department, dean, and VPA. If permission is granted, a grade of "WP" will be issued if the student was passing at the time of withdrawal.

A grade of "F" will be issued if the student was failing and will count toward the student's cumulative and semester grade point averages. Any deviation from the policy will be considered an unofficial withdrawal, and a grade of "F" will be issued.

COURSE AUDIT

To audit is to take a course for no credit. A course may be audited only if space is available in the course. The approval of the student's academic advisor is required. A change to credit status is permissible if completed during the normal add period. Auditors shall receive a grade of "AU." At the discretion of the instructor, an auditor may participate in class discussion and take examinations.

SCHOLASTIC AWARDS AT THE END OF EACH SEMESTER

THE PRESIDENT'S LIST: A main campus student whose semester grade point average is 3.750 or better, while carrying at least 15 credit hours, will be placed on the President's List.

THE DEAN'S LIST: A main campus student whose semester grade point average is between 3.500 and 3.749, while carrying at least 15 hours, will be placed on the Dean's List.

CLASS ATTENDANCE AND EXCUSED ABSENCES

Students are expected to attend all class and laboratory sessions. Absences may be permitted for reasonable causes such as illness, disabling injury, death or serious illness in the immediate family, or in the case of a court order. Participation in University-sponsored activities shall also constitute a reasonable cause for absence from class. Written documentation of the reason for absence may be required and, in the case of University-sponsored events, such documentation will be provided by the University sponsor.

It is the student's responsibility to discuss pending absences (field trips, athletic competitions, etc.) with his/her professor prior to the missed class period. The faculty member may require the student to complete any work due prior to the absence. Class or team lists distributed via e-mail do not excuse a student from class or laboratory sessions, but rather provide confirmation to the faculty member that the activity is indeed University-sponsored.

It is the instructor's responsibility to present a class attendance policy to each class at the beginning of the semester. Decisions regarding submittal of assignments will be at the instructor's discretion, but students may not be penalized for absences due to reasonable cause.

ACADEMIC PROBATION

The academic performance of every student is monitored by the registrar and the academic departments to determine satisfactory progress. Students with GPAs below 2.0 will receive a letter warning them that they have fallen below the standard required for graduation. (See chart on page 51 for further explanation of required GPA.)

Students are placed on probation in the following situations:

- Degree seeking students who have attempted 59 or fewer semester hours at Trine University and are more than six cumulative honor points below the 2.0 graduation standard. (See chart on page 51 for further explanation of required GPA.)
- Degree seeking students who have attempted 60 or more semester hours of course work and have a cumulative grade point average lower than 2.0. Transfer hours are added to Trine University hours attempted for purposes of determining the 60 hours attempted.

A student on academic probation will have one semester to reach minimum standards or be dismissed. Students on probation who achieve at least a 2.0 GPA in summer courses will not be dismissed. Students on probation who raise their cumulative GPA to acceptable academic graduation standards will be removed from probationary status.

After a period of not less than one semester (not including summer school), a dismissed student may apply for readmission to the program from which he or she was dismissed. A dismissed student may be readmitted without a waiting period in any other degree program to which the student can gain acceptance by the readmit committee.

Financial aid is not automatically reinstated when a dismissed student is readmitted.

Students on academic probation will have the following restrictions placed on their attendance:

- They will be required to attend a meeting explaining a student success plan.
- They may not register for more than 15 credit hours. If they wish to take more, they must petition the Readmission/Probation Committee for permission.
- They may not participate in the “rush” system for any fraternity or sorority.
- They are not eligible to participate in any athletic competition. They may practice with the team only if their coach approves. They will not be permitted to travel with the team without approval of the athletic director.

For information concerning eligibility for the University's extra-curricular activities, consult the Student Handbook.

FULL-TIME STUDENT

A full-time student at the main campus is one who is carrying a minimum of 12 academic credit hours. If a student wishes to register for more than 18 credit hours, he or she must have written permission as follows: 19–20 credits requires permission from the department chair; 21–23 credits also requires permission from the school dean; and 24 or more credits also requires permission from the vice president for academic affairs.

The chart lists the grade point average (GPA) required to be removed from probation. The required GPA is based on the number of GPA hours attempted at Trine University.

GPA Hours Attempted	GPA	GPA Hours Attempted	GPA
1	0.000	31	1.806
2	0.000	32	1.813
3	0.000	33	1.818
4	0.500	34	1.824
5	0.800	35	1.829
6	1.000	36	1.833
7	1.143	37	1.838
8	1.250	38	1.842
9	1.333	39	1.846
10	1.400	40	1.850
11	1.455	41	1.854
12	1.500	42	1.857
13	1.538	43	1.860
14	1.571	44	1.864
15	1.600	45	1.867
16	1.625	46	1.870
17	1.647	47	1.872
18	1.667	48	1.875
19	1.684	49	1.878
20	1.700	50	1.880
21	1.714	51	1.882
22	1.727	52	1.885
23	1.739	53	1.887
24	1.750	54	1.889
25	1.760	55	1.891
26	1.769	56	1.893
27	1.778	57	1.895
28	1.786	58	1.897
29	1.793	59	1.898
30	1.800	60	2.000

When a student has attempted a total of 60 credit hours, INCLUDING transfer credits, a 2.0 GPA is required to be in academic good standing.

WITHDRAWAL FROM THE UNIVERSITY

VOLUNTARY

A student wishing to withdraw from the University during a term may obtain a withdrawal form from the registrar. A student living in a residence hall should consult the housing officer in Student Life about the room and board refund policy.

A student who plans to return to Trine University within one calendar year may apply for a Planned Academic Leave (PAL). Details and application forms are available in the Office of the Registrar.

UNAUTHORIZED

A student leaving the University during a term without officially withdrawing will receive "F" grades in all courses and will not receive refunds of any kind, including fees and deposits.

The withdrawal procedure will not take place automatically for a student who leaves campus because of illness or family emergency. If official notification of withdrawal cannot be made in person, the student should contact the registrar in writing.

DISCIPLINARY

Students dismissed for disciplinary reasons during a term may be given "F" grades and monetary reimbursement will not be made for tuition, housing, or any other university fees.

THE ACADEMIC RECORD

A report of the student's grades earned in all courses taken during a semester is posted online at the end of each term. Grade reports for first year students are mailed to permanent addresses for domestic students and to local addresses for international students.

In cases of unsatisfactory work, a student may be warned, placed on probation or dismissed from the University.

A permanent record of all the student's courses, credits and grades earned is kept in the Office of the Registrar. The student should maintain a record of courses, credits and grades each term and check from time to time to see that this record agrees with the University version. The official record may also help the student determine eligibility for any activity that requires meeting specific scholastic standards. Copies of the transcript are available to the student upon written request and advance payment, as determined per copy.

RELEASE OF INFORMATION FROM STUDENT ACADEMIC RECORDS

To ensure compliance with the federal government's Family Education Rights and Privacy Act (FERPA), the following general principles and procedures govern the release of information from student academic records.

A written request signed by the student whose name appears on the transcript and that contains information such as date of birth and/or the Trine University student identification number, is required before a University transcript or other information from the student's academic record may be released. Trine University will not release copies of transcripts from another institution. Exceptions to the above statements are outlined in the next paragraph:

- The Office of the Registrar may release transcripts or information from academic records including reports of academic standing to administrative and faculty members of Trine University whose responsibilities require this information.
- Public directory information from student records may be released at any time unless restricted by the student. This includes the student's name, local and permanent addresses and telephone numbers, e-mail address, date and place of birth, major field of study, class year, participation in officially recognized activities and sports, weight and height of athletic team members, dates of attendance, degrees, awards received, and photographs.
- Information pertaining to graduation and honors achieved may be released for publication unless otherwise restricted by the student.

Upon proper identification, a student will be shown the following:

- His or her Trine University permanent academic record, including the student's file and transcript
- His or her transcripts from another institution.

A hold may be applied to the release of a transcript or other information requested from an academic record for a student who has an overdue indebtedness to the University.

A current student may obtain a maximum of five unofficial (personal) copies of his or her Trine University transcript at no charge while attending the University. All official transcripts which bear the registrar's signature and school seal are \$3 per copy. Additional unofficial transcripts are also \$3 per copy.

ACADEMIC OPPORTUNITIES

ESL, Honors Program, Middle College, and ROTC

ESL PROGRAM –(ENGLISH AS A SECOND LANGUAGE)

In concert with the mission of Trine University, the mission of the ESL program is to provide Non-Native English Speaking Students with all the skills necessary to be successful in U.S. institutions of higher learning, to lead enriched lives during their time in the United States, and to share their cultures with their local communities.

To achieve this mission, the Trine University ESL program emphasizes:

- expecting and requiring the highest ethical standards from its students, faculty and support staff
- modeling and clearly explaining the rules of classroom etiquette
- respecting each student's culture while modeling and clearly explaining U.S. culture and traditions
- defining and promoting ethical study and test-taking practices
- providing daily opportunities for individual meetings with faculty
- requiring active classroom participation
- systematically teaching the four areas of language skills: reading, writing, understanding, and speaking
- promoting active participation in the local community
- providing opportunities to share students' cultures with the local community

Trine University's ESL Program envisions seven core values. They are:

1. Providing a secure environment that embraces diversity
2. Breaking down language and cultural barriers through education
3. Focusing on the needs of the students
4. Maintaining and teaching the highest ethical standards in all activities
5. Providing quality instruction and individualized help as needed
6. Promoting professional growth
7. Recognizing each student as an individual with potential greatness

The Trine University ESL program is comprised of four levels:

1. In level 1, students practice the basics of English Communication.
2. In level 2, students improve on basic communication tasks while gaining exposure to academic English.
3. Level 3 students have a good command of English for communicative purposes and concentrate more on academic skills.
4. In level 4, students focus on the academic skills they will need for matriculation into their degree program.

In order to matriculate into a degree program, students must attain an overall average of C+ in all their level 4 courses.

Undergraduate students may also enter into a degree program by officially submitting a score of 71 on the TOEFL iBT (530 PBT) or 6.0 on the IELTS test before the last day to drop/add courses. Graduate students need a TOEFL iBT of 79 (550 PBT) or 6.5 on the IELTS.

HONORS PROGRAM

The mission of the Trine University Honors Program is to provide support, resources, and academic experiences to high achieving and highly motivated students, thus allowing them to grow intellectually and become active independent learners. A student in the Honors Program would be exposed to a breadth of teaching methods and topics and, through this exposure, will have a more fulfilling and varied educational experience.

ADMISSION REQUIREMENTS

First-year students accepted to any Trine University program with a minimum SAT of 1220/ACT 27 and a High School GPA of 3.750 or higher may be invited into the Honors Program. The Honors Program Director will review qualifications of incoming freshmen and will make recommendations for admittance, which will then go before the Honors Program Advisory Board for final approval. Current Trine University freshmen or sophomores may also apply for admission into the Honors Program. These students must notify the Honors Program Director of their intentions, have a current Trine University GPA of 3.500 or higher, and must submit a letter of recommendation from a Trine University faculty member. Decisions regarding admission will be made on a case-by-case basis as space allows.

PROGRAM REQUIREMENTS

Students accepted into the Honors Program will need to earn 22 Honors Program Points and satisfy the basic requirements for each category listed below. In addition, students also must maintain a 3.500 GPA to successfully earn an Honors Degree.

Introduction to Honors Seminar—HNR 121 (1 pt)

Honors students are required to take this course their first semester in the Honors Program. This course provides an introduction to the Honors Program and is also a forum to read about and discuss various current topics. Writing, critical thinking, and classroom discussion are emphasized. This is a one credit hour course and can be applied toward a student's social sciences general education requirements.

Honors Courses/Contract Courses (13 - 16 pts)

Honors students are required to compile at least 13 points with any combination of dedicated HNR courses, honors sections of regularly offered courses, or contract courses in their departments. For HNR courses and honors sections of courses, the credits for each course will directly correlate to the number of points earned. Contract course points will vary depending on the degree of extra work involved. Students must take courses in at least two of the three categories listed above.

Enrichment Experiences (4 -6 pts)

Honors students are required to participate in extracurricular activities that enrich classroom learning. These activities are varied in scope and will center on the students' interests. Students are required to earn at least one enrichment experience point per year to total a minimum of four points before graduation.

Honors Project (4 pts)

Honors students are required to complete an Honors Project during their senior year. Activities that qualify for an Honors Project include an original Honors Thesis, a semester of

study abroad, or elaboration of a capstone project to include Honors Program requirements. Honors Projects will culminate in a written paper as well as a presentation at the Honors Symposium held at the end of the spring semester.

ACADEMIC PERFORMANCE

To participate in the Honors Program, a student must maintain a 3.500 cumulative grade point average at the end of each academic year. A student whose GPA falls below 3.500 will be placed on probation in the Honors Program and will have one semester to raise his/her GPA. A student may only be placed on probation once. If the GPA would fall below 3.500 a second time, the student would be removed from the Honors Program.

MIDDLE COLLEGE (Dual Credit Program for High School Students)

Through the Middle College, Trine University provides an opportunity for high school students to earn dual credit (college and high school credit simultaneously). Courses are offered in the following ways: on Trine University campuses and online (blended with Trine University students), and on the campuses of participating high schools (strictly for high school students through the concurrent enrollment program).

To qualify for Middle College, students must meet the following requirements: submit an official Middle College application and a current high school transcript, be in good academic standing in high school (GPA of B or higher or by recommendation of the high school guidance counselor), successfully completed the sophomore year of high school, and be currently enrolled in a public, private, or home school.

Courses on campus and online are offered throughout the calendar year, and students may register for any courses in which they meet the prerequisites. Courses on high school campuses are offered during the school year, and high schools only offer specific courses. Tuition is set at a significantly reduced rate. Students taking courses on the campuses of Trine University or online must provide the books specified by the course syllabus; students enrolled in the concurrent enrollment program generally rent books through their regular high school book rental program (this is decided by the participating high school).

All Middle College students must sign enrollment forms which cover the policies and procedures related to Middle College participation. Middle College students are registered students with the university and must abide by policies stated in the Trine University Student Handbook.

Trine University Middle College is a member of the National Alliance of Concurrent Enrollment Partnerships (NACEP).

More information is available at www.trine.edu/middlecollege or by calling the Middle College office at 260.665.4307.

ROTC – AIR FORCE RESERVES OFFICER TRAINING CORPS

The Air Force Reserves Officer Training Corps (ROTC) is an educational program designed to give men and women the opportunity to become Air Force officers while completing their degrees. The Air Force ROTC Program develops leadership and management skills students need to become leaders in the 21st Century. In return for challenging and rewarding work, ROTC offers the opportunity for advancement, education and training, and the sense of pride that comes from serving your country. Upon completion of the Air Force ROTC program, students are commissioned as second lieutenants in the United States Air Force. Following commissioning, there are excellent opportunities for postgraduate study in a wide variety of academic fields. In accordance with the Crosstown Agreement with Detachment 225 at the University of Notre Dame, Trine University students may participate in ROTC by travelling to South Bend one afternoon and evening per week for coursework. For more information contact Shawn P. Braue, Lt Colonel, USAF; 574.631.4675.

TRINE UNIVERSITY GRADUATE PROGRAMS

MASTER OF ENGINEERING

- **BIOMEDICAL MAJOR**
- **CIVIL ENGINEERING MAJOR**
- **MECHANICAL ENGINEERING MAJOR**

MASTER OF SCIENCE WITH A MAJOR IN CRIMINAL JUSTICE **

MASTER OF SCIENCE IN LEADERSHIP **

**see SPS Catalog for degree information

http://www.trine.edu/adult_students/resources/documents/SPS2010_2012CourseCatalogTrineGeneralInformation_Section_1_05_2011.pdf

GRADUATE POLICIES

CULTURE OF GRADUATE LEARNING

Graduate learning, teaching and scholarship differ from the undergraduate educational experience through the intensity of learning and the role of applicable research. All graduate experiences should reflect an in-depth study of a particular curricular field and should lead students to independent thinking, learning and knowledge acquisition.

AFFIRMATIVE ACTION STATEMENT

Trine University is committed to the equitable treatment of students, faculty and staff; therefore, all who work, live, study and teach in the Trine Community will be valued on the basis of scholastic achievement and academic potential without regard to race, religion, color, gender, sexual orientation, or age.

ADMISSION REQUIREMENTS

Students seeking to enroll in graduate studies must have:

1. A bachelor's degree from a regionally-accredited institution in an appropriate academic field, **or**
2. a bachelor's degree from a regionally accredited institution in a related field and significant major-specific professional experience, **or**
3. a bachelor's degree from a non-regionally accredited institution in an appropriate or related field and GRE test scores of 475 verbal and 600 quantitative or higher. (A GMAT score of 570 or higher may substitute for the GRE at the discretion of the department chair, program director, or dean.)

Applicants whose native language is not English must provide evidence of a minimum score of 550 on the paper-based or 213 on the computer-based Test of English as a Foreign Language (TOEFL).

Admittance to any graduate program is valid for one year from the time of admission to enrollment.

STUDENT CLASSIFICATIONS

1. Dual Undergraduate/Graduate

Dual undergraduate/graduate enrollment status is granted to those who concurrently seek a bachelor's and master's degree from the Allen School of Engineering and Technology. These students will be changed to graduate status after earning 132 credit hours, at which time they must have a cumulative grade point average of at least 3.0. Students who do not meet this standard will not be given graduate status and will be awarded the BS degree when the BS requirements are met. Students will be awarded each degree upon completion of its respective degree requirements.

2. Graduate

Prospective graduate students are required to submit a completed Graduate Application, official academic transcripts from each previous undergraduate and graduate institution attended

(except Trine University), and supplemental admission materials as required by the department or program in order to be considered for admission into graduate programs.

Transcripts from prospective students will be evaluated by the program chair/director in consultation with the school dean to determine if additional undergraduate coursework is required to adequately prepare for the rigors of graduate coursework.

One of the following conditions must be met to enroll in graduate coursework:

1. An undergraduate grade point average of 3.0 or greater **or**
2. Permission for admission as a conditional graduate student as approved by the program chair/director and dean as follows:

Conditional Admission

In order to be considered as a candidate for conditional graduate admission, students who have not earned a cumulative GPA of 3.0 in an undergraduate degree program must submit the following materials to the program chair/director in addition to required application materials:

- A 1-page narrative describing the challenges or extenuating circumstances that led to the student earning less than 3.0 GPA in undergraduate work. Students must include a description of specific strategies they will use to ensure academic progress within the graduate degree program.
- An additional letter of recommendation from a professional colleague who can address the applicant's situation and potential for success.
- The applicant's resume or vita indicating positions held that demonstrate task commitment, knowledge and skill relevant to the applicable course of study.

Upon receipt of the all materials, the application will be reviewed by the department chair/program director and a recommendation will be made to the dean for conditional admission. A student admitted conditionally will become a graduate student in good standing upon completion of four graduate level courses maintaining a B or better grade in each course. Conditional graduate students not garnering a grade of B or better in each of their first four courses will be dismissed.

3. Special Graduate Student

Special Graduate Student status is granted to those students who wish to (1) audit a course, (2) seek certification in specialized areas, or (3) enroll in certain courses but do not plan to pursue a graduate degree program.

For degree-seeking students who audit courses, a fee of $\frac{1}{2}$ the nominal rate is charged per credit hour. For special graduate students who are non-degree seeking, full tuition will be charged.

All graduate admission decisions must be reported once each semester to the assistant vice president for graduate studies.

ACADEMIC RESIDENCY/TRANSFER CREDIT

A maximum of 6 semester hours of graduate course credit completed at other graduate schools may be counted toward completion of the master's degree at Trine University with a grade of B or above and with the approval of the program chair/director and dean. All other courses must be taken at Trine University. Transfer credit will not include a grade and, therefore, will not impact the student's GPA. Courses used to satisfy the requirements of a bachelor's degree cannot be applied to the master's degree.

The final 15 credits of a master's degree must be taken at Trine University unless a waiver is granted by the academic dean upon recommendation of the program chair/director.

For the five-year engineering programs, students holding senior class standing may take up to 6 credit hours in the graduate program with the approval of the program coordinator, and providing: (1) these credits were not applied to the undergraduate degree, (2) the credits were earned in designated graduate courses, and (3) a grade of B or better was earned in the course.

GRADUATION REQUIREMENTS

Students must have a 3.0 cumulative GPA, complete all necessary program requirements, and carry a grade of C or better in all courses to qualify for graduation.

GRADUATE STUDENT COMMENCEMENT PARTICIPATION

Graduate students are eligible to attend the spring commencement ceremony following their degree completion. No graduation honors or honor cords are used for graduate degrees.

CREDIT BY EXAMINATION

There is no credit by examination in the Trine graduate programs.

GRADING SYSTEM

The grading system is as follows:

A	Excellent	4.0
B+	Very Good	3.5
B	Good	3.0
C+	Above Average	2.5
C	Average (lowest passing grade)	2.0
F	Failure	0.0
I	Incomplete	not figured into GPA
IP	In progress (grade deferred)	not figured into GPA
W	Withdrawal before completion of 80% of the semester	
WP	Withdrawal after completion of 80% of the semester with (passing work at the time of withdrawal) issued only under special circumstances and with the approval of the department chair/program director.	

INCOMPLETE GRADE POLICY

Incomplete (I) is a temporary grade used by the instructor in cases where a student is unable to complete course requirements because of circumstances beyond the student's control such as illness, family emergency or other similar circumstances. Incomplete grades are rarely assigned and only if the student has satisfactorily completed the vast majority of the course requirements and has convinced the instructor of his or her ability to complete the remaining work without

registering for the course again. An instructor who assigns a grade of "I" submits to the program chair/director a formal statement of requirements that must be satisfied for removal of the incomplete grade. A copy of the statement of requirements, including deadlines for their completion, shall be made available to the student.

It is the student's responsibility to contact the instructor to make arrangements for completing the remaining work. The required work should be completed and a grade reported by the end of the student's next semester in residence, but in no case later than one calendar year following the receipt of the "I" grade. An "I" grade not removed within one year from the end of the semester in which the "I" grade was issued will be converted to an "FI" grade by the registrar. An "I" grade may not be removed by registering again for the course.

If the instructor giving the "I" grade is no longer a member of the faculty, the student should contact the program chair/director who will act on behalf of the former instructor. In the case of a graduating senior, if an "I" or "IP" grade is not removed until after the start of the next semester, the graduation date will reflect the new semester.

IN PROGRESS GRADE POLICY

The "IP" (In Progress) grade is to be given only in courses so designated by the respective schools. The "IP" grade is designed for courses which require more than one semester for completion. An "IP" grade not removed within one year from the end of the semester in which the "IP" grade was issued will be converted to an "F" by the registrar. An "IP" grade may not be removed by registering again for the course.

COURSE REPEAT

A student may retake a course at Trine University; however, no more than two courses may be retaken during the student's course of study. The number of repeated courses may be further limited by individual departments, and scheduling constraints may impact the length of the program.

Whenever a course is repeated on a credit basis, the higher grade and credits earned completely replace the previous grade in the satisfaction of requirements and computation of grade-point averages. All entries remain a part of the student's permanent academic record.

WITHDRAWAL FROM CLASS

A student may withdraw from class through 80 percent of the semester, provided the student obtains the proper form from the registrar and obtains academic advisor approval. International students must also have the approval of the registrar if they will be dropping below 9 credit hours.

All students dropping below full-time status must have the approval of the director of financial aid. The completed form shall be submitted to the registrar before 80 percent of the semester is completed.

No classes shall be dropped after the completion of 80 percent of the semester except for circumstances beyond the control of the student, such as illness, family emergency, or other similar circumstances. Permission to withdraw after the completion of 80 percent of the

semester must be obtained from the program chair/director of the student's department. If permission is granted, a grade of "WP" will be issued if the student was passing at the time of withdrawal.

A grade of "F" will be issued if the student was failing and will count toward the student's cumulative and semester grade point averages.

Any deviation from the policy will be considered an unofficial withdrawal, and a grade of "F" will be issued.

ACADEMIC STANDING

Students whose cumulative GPA drops below a 3.0 will be dismissed from Trine University. A student who is dismissed may apply for readmission immediately by contacting the Registrar and completing the re-admit form, providing a 3-4 paragraph written statement explaining why he/she was not meeting academic standards and outlining a plan for his/her future success. The re-admit form requires students to submit a plan for raising their cumulative GPA back to 3.00.

The Graduate Council will determine the outcome of the re-admit request.

GRADE APPEALS

The awarding of grades is the prerogative of the classroom instructor in accordance with policies posted in the Trine University Catalog. Faculty members are responsible for informing students of their grading policy. Grades become official when they are reported to the Registrar. If a faculty member discovers incorrectly reported grades due to miscalculation or clerical error, the error should be reported to the Registrar immediately on the prescribed form. The appropriate program chair/director must approve any adjustment of grades.

A student who disagrees with an assigned grade will take the following steps:

- Approach the professor and explain the problem.
- If the professor and student do not come to an agreement, the student should write a letter to the program director/chair.
- If the program director/chair's mediation does not resolve the issue, the student should file a written appeal to the Dean.

If these steps do not resolve the problem, or if impractical, the student may petition the Grade Review Board in writing for a hearing of the issue. Information regarding this may be obtained from the Vice President for Academic Affairs. The petition shall set forth in detail the basis for the review. This should be done by the midterm of the first regular term following the assignment of the grade. The Board may grant an extension of this time limit. If the Board agrees to hear the case, it will so inform the student by the end of that term. In grade review cases, the student is responsible for presenting evidence to support his/her position.

At the Grade Review Hearing, the student shall present his/her argument followed by the professor's response. The Board shall promptly prepare a written recommendation and forward copies to all parties involved, including the Chairperson and Vice President for Academic Affairs. The report shall include dissenting opinions on the Board, if any. Recommendations of the Board are advisory. In cases involving death, incapacity, or prolonged inaccessibility of the professor,

or in similar unusual circumstances, the professor's immediate supervisor is responsible for assigning the grade. Records of each case heard by the Board shall be maintained in the office of the Vice President for Academic Affairs. If the student or professor involved wishes to appeal the decision on procedural grounds, he/she should file an appeal within two working days for the decision with the Vice President for Academic Affairs. If any procedural irregularities are discovered, he/she will notify the student and the Board within ten working days after the appeal.

The Vice President for Academic Affairs shall appoint the faculty members who will serve on the Board. He shall choose one regular member and one alternate (who will be from a different department, if possible) from each school. In addition, the Student Senate shall elect two student members and their alternates. Student members must have junior or senior standing. The faculty members shall serve three-year, staggered terms, and faculty members serving their third year will chair the committee. Student members shall serve one-year terms.

ASSESSMENT

The academic assessment process at Trine University is designed to measure the abilities and knowledge of students graduating from all degree programs. It also measures student satisfaction with the program. Sometimes students will be asked to reply to surveys or questionnaires that rate the quality of instruction, the level of satisfaction with career preparation, and the overall satisfaction of the Trine experience. Occasionally, anonymous samples of student course work will be used in an assessment process.

Trine University is committed to providing quality educational experiences for our students. The information gathered through the assessment process provides information for continual improvement of our programs.

PAYMENT OF EDUCATIONAL COSTS

Payment of tuition and fees is due at the Business Office on the date indicated on the student's bill. Any student with outstanding financial obligations to the University will not be permitted to register for any subsequent semester or receive a transcript or diploma until the obligation is fulfilled. Students maintaining a balance owed to the University will be assessed late fees and will be responsible for collection and/or attorney costs if such efforts should become necessary.

ACADEMIC INTEGRITY

The University prohibits all forms of academic misconduct. Academic misconduct refers to dishonesty in examinations (cheating), presenting the ideas or the writing of someone else as one's own (plagiarism) or knowingly furnishing false information to the University by forgery, alteration, or misuse of University documents, records, or identification. Academic dishonesty includes, but is not limited to, the following examples: permitting another student to plagiarize or cheat from one's own work, submitting an academic exercise (written work, printing, design, computer program) that has been prepared totally or in part by another, acquiring improper knowledge of the contents of an exam, using unauthorized material during an exam, submitting the same paper in two different courses without knowledge and consent of professors, or submitting a forged grade change slip or computer tampering. The faculty member has the authority to grant a failing grade in cases of academic misconduct as well as referring the case to Student Life.

PLAGIARISM

A student is expected to submit his/her own work and to identify any portion of work that has been borrowed from others in any form. An ignorant act of plagiarism on final versions and minor projects, such as attributing or citing inadequately, will be considered a failure to master an essential course skill and will result in an F for that assignment. A deliberate act of plagiarism, such as having someone else do your work or submitting someone else's work as your own (e.g., from the Internet, fraternity file, etc., including homework and in-class exercises), will at least result in an F for that assignment and could result in an F for the course.

DEGREES

An "Intent to Graduate" form obtained through the Registrar's office should be filed at the beginning of the master's program. This form will include an expected graduation date and other information pertinent to graduation. All degree requirements must be completed within 5 years.

TRANSCRIPTS

A hold may be applied to the release of a transcript or other information requested from an academic record for a student who has an overdue indebtedness to the University.

A current student may obtain a maximum of five unofficial (personal) copies of his or her Trine University transcript at no charge while attending the University. All official transcripts which bear the registrar's signature and school seal are available at an additional cost. Additional unofficial transcripts are also available at additional cost.

RELEASE OF STUDENT INFORMATION

To ensure compliance with the federal government's Family Education Rights and Privacy Act (FERPA), the following general principles and procedures govern the release of information from student academic records.

A written request signed by the student whose name appears on the transcript and that contains information such as date of birth and/or the Trine University student identification number, is required before a University transcript or other information from the student's academic record may be released. Trine University will not release copies of transcripts from another institution. Exceptions to the above statements are outlined in the following paragraph:

- The Office of the Registrar may release transcripts or information from academic records including reports of academic standing to administrative and faculty members of Trine University whose responsibilities require this information.
- Public directory information from student records may be released at any time unless restricted by the student. This includes the student's name, local and permanent addresses and telephone numbers, e-mail address date and place of birth, major field of study, class year, participation in officially recognized activities and sports, weight and height of athletic team members, dates of attendance, degrees, awards received, and photographs.
- Information pertaining to graduation and honors achieved may be released for publication unless otherwise restricted by the student.

Upon proper identification, a student will be shown the following:

- His or her Trine University permanent academic record, including the student's file and transcript.
- His or her transcripts from another institution.

SEMESTER HOUR LOAD

The semester course load of a full-time graduate student is 9 hours. The maximum load for a full-time student is 12 credits in any fall or spring semester or combined summer sessions. Any course load greater than 12 credit hours must be approved by the assistant vice president for graduate studies upon the petition of the school dean.

MASTER OF ENGINEERING

The rapid pace of technological advancement has resulted in a demand for engineers with advanced training. There is growing support for the concept that the master's degree should be the first professional degree for the practice of engineering. A proposal to require one year of education beyond the bachelor's degree for registration as a Professional Engineer is now being considered in many states. Engineers with the skills necessary to lead the design of a complex system are highly sought by industry. By emphasizing advanced design skills rather than research, the Master of Engineering program addresses this need.

ADMISSION REQUIREMENTS

Students seeking to enroll in graduate studies must have:

1. A bachelor's degree from a regionally-accredited institution in an appropriate academic field, ***or***
2. a bachelor's degree from a regionally accredited institution in a related field and significant major-specific professional experience, ***or***
3. a bachelor's degree from a non-regionally accredited institution in an appropriate or related field and GRE test scores of 475 verbal and 600 quantitative or higher. (A GMAT score of 570 or higher may substitute for the GRE at the discretion of the department chair, program director, or dean.)

Applicants whose native language is not English must provide evidence of a minimum score of 550 on the paper-based TOEFL, 79 on the Internet-based TOEFL, or 6.5 on the International English Language Testing System (IELTS).

STUDENT CLASSIFICATIONS

1. Dual Undergraduate/Graduate

Dual undergraduate/graduate enrollment status is granted to those who concurrently seek a bachelor's and master's degree from the Allen School of Engineering and Technology. These students will be changed to graduate status after earning 132 credit hours, at which time they must have a cumulative grade point average of at least 3.0. Students who do not meet this standard will not be given graduate status and will be awarded the BS degree when the BS requirements are met. Students will be awarded each degree upon completion of its respective degree requirements.

2. Graduate

Prospective graduate students are required to submit a completed Graduate Application, official academic transcripts from each previous undergraduate and graduate institution attended (except Trine University), and supplemental admission materials as required by the department or program in order to be considered for admission into a graduate program.

Transcripts from prospective students will be evaluated by the program chair/director in consultation with the school dean to determine if additional undergraduate coursework is required to adequately prepare for the rigors of graduate coursework.

One of the following conditions must be met to enroll in graduate coursework:

1. An undergraduate grade point average of 3.0 or greater **or**
2. Permission for admission as a conditional graduate student as approved by the program chair/director and dean as follows:

Conditional Admission

In order to be considered as a candidate for conditional graduate admission, students who have not earned a cumulative GPA of 3.0 in an undergraduate degree program must submit the following materials to the program chair/director in addition to required application materials:

- A 1-page narrative describing the challenges or extenuating circumstances that led to the student earning less than 3.0 GPA in undergraduate work. Students must include a description of specific strategies they will use to ensure academic progress within the graduate degree program.
- An additional letter of recommendation from a professional colleague who can address the applicant's situation and potential for success.
- The applicant's resume or vita indicating positions held that demonstrate task commitment, knowledge and skill relevant to the applicable course of study.

Upon receipt of the all materials, the application will be reviewed by the department chair/program director and a recommendation will be made to the dean for conditional admission. A students admitted conditionally will become a graduate student in good standing upon completion of four graduate level courses maintaining a B or better grade in each course. Conditional graduate students not garnering a grade of B or better in each of their first four courses will be dismissed.

3. Special Graduate Student

Special Graduate Student status is granted to those students who wish to (1) audit a course, (2) seek certification in specialized areas, or (3) enroll in certain courses but do not plan to pursue a graduate degree program.

ACADEMIC RESIDENCY/TRANSFER CREDIT

A maximum of 6 semester hours of graduate course credit completed at other graduate schools may be counted toward completion of the master's degree at Trine University with a grade of B or above and with the approval of the program chair/director and dean. All other courses must be taken at Trine University. Transfer credit will not include a grade and, therefore, will not impact the student's GPA. Courses used to satisfy the requirements of a bachelor's degree cannot be applied to the master's degree.

The final 15 credits of a master's degree must be taken at Trine University unless a waiver is granted by the academic dean upon recommendation of the program chair/director.

For the five-year engineering programs, students holding senior class standing may take up to 6 credit hours in the graduate program with the approval of the program coordinator, and providing: (1) these credits were not applied to the undergraduate degree, (2) the credits were earned in designated graduate courses, and (3) a grade of B or better was earned in the course.

GRADUATION REQUIREMENTS

The Master of Engineering degree requires 30 semester credits. A student can choose a capstone-course option, requiring 27 credits of approved course work and a 3 credit capstone project, or a design-project option, requiring 24 credits of approved coursework and 6 credits of design work. A full-time student will normally complete the program in twelve months.

Students must have a 3.0 cumulative GPA and carry a "C" or better in all courses to qualify for graduation. Students whose cumulative GPA drops below a 3.0 will be dismissed from Trine University. A student who is dismissed may apply for readmission immediately by contacting the Registrar and completing the re-admit form, providing a 3-4 paragraph written statement explaining why he/she was not meeting academic standards and outlining a plan for his/her future success. The re-admit form requires students to submit a plan for raising their cumulative GPA back to 3.00. The Graduate Council will determine the outcome of the re-admit request.

BIOMEDICAL ENGINEERING MAJOR

MISSION AND OBJECTIVES

The biomedical engineer requires the analytical tools and broad understanding of modern engineering and science, fundamental understanding of biological or physiological systems, and familiarity with recent technological innovations. Biomedical engineers seek to improve human health through advances in healthcare and medicine. This includes advancing the understanding of prevention, diagnosis, and treatment of human injury, disease, and the health complications associated with aging. Yet, despite dramatic advances in medicine and biology during the past two decades, most of these achievements have not yet led to any substantial improvement in human health. Addressing this problem constitutes a major challenge for biomedical engineers of the present generation and for those of future generations as well.

The difficulty in translating advances in biomedical research to improved healthcare is due, in large part, to the dramatic shift in the character of healthcare problems in industrialized nations. Chronic illness, rather than acute injury and disease, is now the dominant issue in healthcare, consuming the vast majority of healthcare dollars, personnel, and facility usage. This situation will be exacerbated in coming decades as the population ages. As a result, improvements in our ability to prevent, diagnose, and treat chronic illness has become the primary focus of the national healthcare agenda. Accordingly, the mission of the biomedical engineering program is to prepare graduate engineers to face these new twenty-first century challenges, to initiate and foster collaboration in biomedical engineering education and in design and development, and to promote technology transfers and regional economic growth in the biomedical industry.

The goals of the graduate program in biomedical engineering are: to provide graduates with the broad skills necessary to make significant engineering contributions to medical and healthcare, to advance to leadership positions in the biomedical industry, and to provide service to society.

To meet these goals, the following objectives have been identified for the graduate program in biomedical engineering. A graduate of the Master of Engineering program with a Biomedical Engineering major shall be able:

1. to work professionally, at a leadership level, in applying engineering approaches to solve problems in medicine and/or biology;
2. to design, analyze, and test experimental processes for observing and discovering important structural and behavioral properties of physiologic systems, biological materials, or biomaterials;
3. to design, analyze, and test processes and products directed toward the prevention of injury or disease, or to enhance healing and/or quality of healthcare;
4. to clearly and effectively communicate design ideas and test results; and
5. to evaluate and implement engineering-oriented research and development in the biomedical sciences.

CURRICULUM

The Master of Engineering degree has a heavy design and/or testing emphasis. The Master of Engineering with a Biomedical Engineering major requires 30 semester credits. A student can choose a capstone-course option, requiring 27 credits of approved course work and a 3 credit capstone project, or a design project option, requiring 24 credits of approved coursework and 6 credits of design work. The design project will ideally involve industrial sponsorship.

BIOMEDICAL ENGINEERING MAJOR		30 HRS.	
PROGRAM REQUIREMENTS		REQUIRED HOURS	
BIOMEDICAL ENGINEERING CORE		12 HRS.	
BME	5003	Principles of Biomedical Engineering	(3)
BME	5013	Applied Anatomy & Physiology	(3)
BME	5103	Musculoskeletal Biomechanics	(3)
BME	5203	Introduction to Biomaterials	(3)
BIOMEDICAL ENGINEERING ELECTIVES		9-12 HRS.	
BME	5023	Biomedical Measurements & Instrumentation	
BME	5043	Finite Element Analysis	
BME	5113	Kinematics of Human Motion	
MAE	5583	Design of Experiments	
MATHEMATICS		3 HRS.	
Any 400-level mathematics course.		(3)	
CAPSTONE/DESIGN PROJECT		3-6 HRS.	
BME 600X Capstone/Design Project			
TOTAL		30 HRS.	

CIVIL ENGINEERING GRADUATE PROGRAM

MISSION AND OBJECTIVES

The mission of the civil engineering program at Trine University is to provide graduates with quality preparation for the practice of civil engineering, to provide graduates with opportunities to pursue graduate studies, and to provide technical and educational services to their profession and communities. To meet these goals the following outcomes have been identified for the graduate program in civil engineering. A graduate of the Master of Engineering program with a Civil Engineering major must have:

1. the ability to apply knowledge in the specialized areas of
 - A. **structural** engineering, or
 - B. **environmental** engineering,
2. the ability to understand business, management, and leadership fundamentals, and
3. the ability to clearly and effectively communicate design ideas in written and oral formats.

CURRICULUM

Program requirements draw from the American Society of Civil Engineers' Body of Knowledge report, which outlines the knowledge, skills, and attitudes of a licensed professional engineer. The degree requires 30 semester credits. A student can choose a capstone-course option, requiring 27 credits of approved coursework and a 3 credit capstone project, or a design-project option, requiring 24 credits of approved coursework and 6 credits of design work.

MASTER OF ENGINEERING – CIVIL ENGINEERING MAJOR

PROGRAM REQUIREMENTS	REQUIRED HOURS
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STRUCTURAL ENGINEERING TRACK 30 HRS.

STRUCTURES GRADUATE COURSES			12 - 15HRS.
CE	5503	Advanced Structural Analysis	
CE	5513	Structural Dynamics	
CE	5523	Finite Element Methods	
CE	5533	Advanced Solid Mechanics	
CE	5553	Structural Design Loads	
CE	5563	Structural Systems	
CE	5593	Special Topics in Structural Engineering	

ELECTIVES			9 HRS.
CE	4513	Advanced Steel Design	
CE	4543	Prestressed Concrete Design	
CE	4553	Timber Design	
CE	4563	Bridge Engineering	
CE	4703	Special Topics in Geotechnical Engineering	
CE	4713	Foundation Design	

CE 5573 Advanced Concrete Design
 MAE 5663 Materials Failure Analysis
 Or other engineering course approved by advisor.

PROFESSIONAL DESIGN ELECTIVE **0 - 3 HRS.**

Any course that is consistent with the student's professional goals and approved by graduate advisor.

CAPSTONE/DESIGN PROJECT **3- 6 HRS.**

CE 590X CE Capstone/Design Project I

TOTAL **30 HRS.**

ENVIRONMENTAL ENGINEERING TRACK **30 HRS.**

ENVIRONMENTAL GRADUATE COURSES **12 - 15 HRS.**

CE 5103 Special Topics in Water and Wastewater Treatment
 CE 5113 Environmental Engineering Chemistry
 CE 5123 Solid Waste Management
 CE 5303 Advanced Hydrologic and Hydraulic Modeling
 CE 5313 Groundwater Hydrology and Contaminant Transport

ELECTIVE COURSES **9 HRS.**

CE 4113 Hazardous Waste Engineering
 CE 4123 Water Treatment Principles and Design
 CE 4133 Wastewater Treatment Principles and Design
 CE 4303 Open Channel Hydraulics
 CE 4313 Water Resources Engineering
 CE 4323 Engineering Hydrology
 CE 4333 Design of Water Distribution Systems and Sewers
 CHE 4033 Air Dispersion Modeling
 CHE 4043 Air Environmental Control
 CHE 4073 Biochemical Engineering
 CHE 4083 Plant Management

Or other engineering course approved by graduate advisor.

PROFESSIONAL DESIGN ELECTIVE **0 - 3 HRS.**

Any course that is consistent with the student's professional goals and approved by graduate advisor.

(3)

DESIGN PROJECT **3 - 6 HRS.**

CE 590X CE Capstone/Design Project

TOTAL **30 HRS.**

MECHANICAL ENGINEERING GRADUATE PROGRAM

MISSION AND OBJECTIVES

The mission of the mechanical engineering program at Trine University is to enable graduates to become productive engineers, to advance to leadership roles in the profession, and to provide service to society. To meet these goals the following outcomes have been identified for the graduate program in mechanical engineering. A graduate of the Master of Engineering program with a Mechanical Engineering major must have:

1. the ability to work professionally, at a leadership level, in the areas of both thermal and mechanical systems design;
2. the ability to integrate technical knowledge, through trade-off studies, leading to a complex engineering design, with consideration of economic, manufacturability, sustainability, safety, and environmental concerns;
3. the ability to communicate design ideas clearly and effectively; and
4. the ability to evaluate and implement engineering design solutions.

CURRICULUM

The Master of Engineering degree has a heavy design emphasis, as opposed to the research emphasis of a Master of Science degree. The degree requires 30 semester credits. A student can choose a capstone-course option, requiring 27 credits of approved coursework and a 3 credit capstone project, or a design-project option, requiring 24 credits of approved coursework and 6 credits of design work.

MASTER OF ENGINEERING

MECHANICAL ENGINEERING MAJOR PROGRAM REQUIREMENTS

**30 HRS.
REQUIRED HOURS**

MECHANICAL ENGINEERING GRADUATE CORE

12 HRS.

MAE 5213	Advanced Heat Transfer	(3)
MAE 5223	Introduction to Computational Fluid Mechanics	(3)
MAE 5433	Mechanism Synthesis	(3)
MAE 5543	Advanced Machine Design	(3)

MECHANICAL ENGINEERING GRADUATE ELECTIVES

6 - 9 HRS.

MAE 5753	Computer Integrated Manufacturing
MAE 5663	Materials Failure Analysis
MAE 5473	System Dynamics and Control
MAE 5583	Design of Experiments

MATHEMATICS

3 HRS.

Any 400 level mathematics course.

(3)

BUSINESS

3 HRS.

One 500 level course selected from the Ketner School of Business with approval of the graduate advisor.

(3)

CAPSTONE/DESIGN PROJECT

3- 6 HRS.

MAE 600X Mechanical Engineering Graduate Project

TOTAL

30 HRS.

TRINE UNIVERSITY MINORS

- ACCOUNTING
- AERONAUTICAL ENGINEERING *(MECHANICAL ENGINEERING)
- ATHLETIC TRAINING
- BIOLOGY
- BIOMEDICAL
- BIOPROCESS ENGINEERING *(CHEMICAL ENGINEERING)
- BUSINESS
- CHEMISTRY
- COMMUNICATION
- CRIMINAL JUSTICE
- ECONOMICS
- ENERGY ENGINEERING MINOR
- ENTREPRENEURSHIP
- ENTREPRENEURSHIP FOR NON-BUSINESS STUDENTS
- ENVIRONMENTAL ENGINEERING *(CHEMICAL ENGINEERING, CIVIL ENGINEERING)
- FINANCE
- GOLF MANAGEMENT
- HISTORY
- HUMANITIES
- INTERNATIONAL STUDIES
- LEADERSHIP
- MANAGEMENT
- MARKETING
- MATHEMATICS
- METALLURGICAL ENGINEERING *(MECHANICAL ENGINEERING)
- MUSIC
- PSYCHOLOGY
- ROBOTICS *(ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING)
- STRUCTURAL ENGINEERING MINOR *(CIVIL ENGINEERING)

**The engineering minors are open to all engineering students. The departments offering the minors are indicated.*

ACCOUNTING MINOR		24 HRS.
AC	303	Cost Accounting (3)
AC	323	Intermediate Accounting I (3)
AC	333	Intermediate Accounting II (3)
AC	373	Accounting Information Systems (3)
AC	423	Income Tax (3)
FIN	313	Corporate Finance (3)
FIN	343	International Finance (3)
FIN	353	Personal Finance (3)
TOTAL IN MINOR PROGRAM		24 HRS.

AERONAUTICAL ENGINEERING MINOR (MECHANICAL ENGINEERING)

27 HRS.

The curriculum is designed to prepare students for professional engineering careers in the aerospace industry or for graduate studies in the aeronautical engineering field. A grade of C or better is required for all courses in the minor.

REQUIRED ENGINEERING SCIENCE COURSES		6 HRS.
ES	253	Electrical Science (3)
ES	343	Heat Transfer (3)

REQUIRED MATHEMATICS COURSE		3 HRS.
MA	313	Linear Algebra (3)

REQUIRED MECHANICAL ENGINEERING COURSES		18 HRS.
MAE	3033	Fluid Dynamics for Mechanical Engineering (3)
MAE	473	Applied Aerodynamics (3)
MAE	483	Vehicle Structures (3)
MAE	493	Aerodynamics Laboratory (3)
MAE	4173	Gas Turbines (3)
MAE	4183	Aircraft Stability and Control (3)
TOTAL IN MINOR PROGRAM		27 HRS.

ATHLETIC TRAINING MINOR**26 HRS.**

This minor enables students to gain experiences in athletic training and prepares them for potential certification as a trainer. The student desiring certification must meet the requirements of the NATA, which entails additional course work and training. Trine University does not certify athletic trainers.

EXS 243	Athletic Training	(3)
EXS 332	Drug Education	(2)
EXS 393	Advanced Athletic Training	(3)
EXS 403	Remedial Exercise & Rehabilitation	(3)
EXS 423	Evaluation of Athletic Injuries	(3)
EXS 443	Therapeutic Modalities	(3)
EXS 483	Internship in Sports Medicine	(3)
SM 393	Sport Psychology	(3)
SM 413	Organization & Administration of Athletics	(3)

TOTAL IN MINOR PROGRAM:**26 HRS.****BIOLOGY MINOR****24 HRS.**

(FOR A NON-EDUCATION STUDENT WITH ANOTHER MAJOR)

12 HRS.

BIO 114	Principles of Biology I	(4)
BIO 124	Principles of Biology II	(4)

CH 104 General Chemistry I

or

CH 104H Honors General Chemistry I (4)

One of the following physiology classes:

3-4 HRS.

BIO 283	Marine Biology	
BIO 304	Plant Biology	
BIO 354	Animal Physiology	
BIO 344	Cell Biology	
BIO 404	Embryology	

One of the following ecology classes:

4 HRS.

BIO 211 Conservation lab

and

BIO 213 Conservation

or

BIO 274 General Ecology

or

BIO 334 Environmental Biology

One of the following organism classes:

3-4 HRS.

BIO 283 Marine Biology

BIO 304 Plant Biology

BIO 314 Animal Biology

BIO 324 Microbiology

Additional BIO courses to bring the total to 24 credit hours.

0-3 HRS.**TOTAL IN MINOR PROGRAM:****24 HRS.**

BIOMEDICAL ENGINEERING MINOR			27 HRS.
REQUIRED BIOMEDICAL COURSES			18 HRS.
BME	114	Intro to Biomedical Engineering	(4)
BIO	254	Human Anatomy	(4)
BIO	354	Human Physiology	(4)
BME	4103	Intro to Biomechanics	(3)
BME	4203	Intro to Biomaterials	(3)
REQUIRED ENGINEERING SCIENCE COURSES			9 HRS.
ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
Choose one of the following two (2) options			
ES	243	Solid Mechanics	
Or one of:			
ES	253	Electrical Science	
ECE	213	Circuit Analysis	(3)
TOTAL IN MINOR PROGRAM:			27 HRS.

BIOPROCESS ENGINEERING MINOR (CHEMICAL ENGINEERING) 24-25 HRS.

There has been an increased focus on biological engineering techniques utilized by industries that include, but are not limited to, pharmaceuticals, food processing, consumer products, agricultural and biotechnology firms. This increased focus from an industrial standpoint has resulted in increased demand for prospective employees that have a strong background in both engineering and life sciences. The curriculum is designed to provide students with a foundation to pursue a career in these industries.

REQUIRED SCIENCE COURSES			12 HRS.
CH	203	Organic Chemistry I	(3)
CH	211	Organic Chemistry I Laboratory	(1)
BIO	324	Microbiology	(4)
BIO	434	Biochemistry	(4)
REQUIRED ENGINEERING COURSES			9 HRS.
CHE	303	ChE Fluid Dynamics	
or			
ES	323	Fluid Mechanics	(3)
CHE	4073	Biochemical Engineering	(3)
CHE	4173	Bio-Separations Processes	(3)
ADVANCED BIO-ELECTIVE (DEPARTMENTAL APPROVAL NEEDED) 3-4 HRS.			
TOTAL IN MINOR PROGRAM:			24-25 HRS.

BUSINESS MINOR**24 HRS.**

The business minor is designed for students in a degree program outside of the Ketner School of Business. Prerequisites as shown in the Course Descriptions section of this catalog must be carefully observed.

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	123	Business Concepts	(3)
FIN	303	Managerial Finance	(3)
LAW	203	Business Law I	(3)
MGT	363	Organizational Behavior	(3)
MKTG	303	Marketing	(3)
ELECTIVES			(3)

TOTAL IN MINOR PROGRAM:**24 HRS.****CHEMISTRY MINOR****24 HRS.**

(FOR NON-EDUCATION STUDENTS WITH ANOTHER MAJOR)

CH	104	General Chemistry I	
or			
*CH	104H	Honors General Chemistry I	(4)
CH	114	General Chemistry II	
or			
CH	114H	Honors General Chemistry II	(4)
CH	232	Quantitative Analysis	(2)
Chemistry electives			(14)
TOTAL IN MINOR PROGRAM:			24 HRS.

COMMUNICATION MINOR**24 HRS.**

(FOR A STUDENT WITH ANOTHER MAJOR)

*COM	153	Principles of Public Relations	(3)
*COM	163	Interpersonal Communication	(3)
*SP	203	Effective Speaking	(3)

Electives in COM, FLM, SP courses, or ENG 133, and MK 323 or MK 463, with at least 6 hours of COM prefix courses at the 300-level or above. (15)

TOTAL IN MINOR PROGRAM:**24 HRS.**

CRIMINAL JUSTICE MINOR 27 HRS.

(FOR A STUDENT WITH ANOTHER MAJOR)

LE	103	Introduction to Criminal Justice	(3)
LE	253	Probation, Parole & Community Corrections	(3)
LE	263	Introduction to Criminal Law and Justice	(3)
LE	273	Criminal Procedures and Evidence	(3)
LE	343	Criminalistics and Crime Scene Investigations I	(3)
PSY	383	Forensic Psychology	(3)
Law enforcement and/or psychology electives			(9)
TOTAL IN MINOR PROGRAM:			27 HRS.

ECONOMICS MINOR**27 HRS.**

ECO	213	Microeconomics	(3)
ECO	223	Macroeconomics	(3)
ECO	323	Money and Banking	(3)
ECO	363	Comparative Economic Systems	(3)
ECO	383	International Economics	(3)
Economics and/or finance electives			(12)

TOTAL IN MINOR PROGRAM:**27 HRS.****ENERGY ENGINEERING MINOR****27 HRS.**

(ELECTRICAL ENGINEERING)

The minor curriculum is designed to prepare students for professional engineering careers in both the traditional and renewable branches of the electrical energy industry or for graduate studies in the energy field. A grade of C or better is required for all courses in the minor.

REQUIRED ENGINEERING SCIENCE COURSES			(12)
ES	213	Statics	(3)
ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
ES	313	Thermodynamics	(3)

REQUIRED MECHANICAL ENGINEERING COURSES**(3)**

MAE	4023	System Dynamics and Controls	(3)
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REQUIRED ELECTRICAL ENGINEERING COURSES**(12)**

ECE	213	Circuit Analysis	
OR			
ES	253	Electrical Science	(3)
ECE	303	Electrical Machines	(3)
ECE	313	Electrical Power	(3)
ECE	403	Direct Generation Techniques	(3)

TOTAL IN MINOR PROGRAM:**27 HRS.**

ENTREPRENEURSHIP MINOR for Business Students 24HRS.

The entrepreneurship minor is designed for students who are interested in starting a business. Open to students from any Trine University program, the entrepreneurship minor uses collaborative, problem-based learning, assessment of learning outcomes, and collaboration among students, faculty, and business partners to deliver a dynamic program. Courses in the entrepreneurship program will help students develop an “entrepreneurial mindset,” so that they can be innovative thinkers and leaders in a startup company or an existing company.

PROGRAM REQUIREMENTS

24 HRS.

ENT	303	Entrepreneurial Leadership	(3)
ENT	323	Engineering Concepts	(3)
ENT	333	Entrepreneurship Seminar Series	(3)
ENT	413	Creativity–Product/Service Development	(3)
ENT	423	Entrepreneurship & Venture Planning	(3)
Management or Engineering electives			(9)

TOTAL IN MINOR PROGRAM:

24 HRS.

The choice of electives should reflect the student's area of entrepreneurial interest.

ENTREPRENEURSHIP MINOR for Non-Business Students 24HRS.

The entrepreneurship minor is designed for non-business students.

PROGRAM REQUIREMENTS

24 HRS.

CURRICULUM REQUIREMENTS			UNITS
AC	203	Accounting I	(3)
BA	123	Business Concepts	(3)
ENT	303	Entrepreneurial Leadership	(3)
ENT	413	Creativity - Product/Service Development	(3)
ENT	423	Entrepreneurship & Venture Planning	(3)
LAW	203	Business Law I	(3)
MGT	363	Organizational Behavior	(3)
MKT	303	Marketing	(3)

TOTAL IN MINOR PROGRAM:

24 HRS.

ENVIRONMENTAL ENGINEERING MINOR **27 HRS.**
(CHEMICAL ENGINEERING, CIVIL ENGINEERING)

In the past, the environmental impacts of an engineering project or design were considered as an afterthought. Today, environmental concerns strongly influence almost all aspects of engineering practice. The curriculum is designed to provide students with a foundation to pursue a career in environmental engineering and an understanding of the environmental consequences of their designs.

REQUIRED SCIENCE COURSES **11 HRS.**

CH	104	General Chemistry I	
or			
CH	104H	Honors General Chemistry I	(4)
CH	114	General Chemistry II	
or			
CH	114H	Honors General Chemistry II	(4)
ES	323	Fluid Mechanics or equivalent (i.e. CHE 303 ChE Fluid Dynamics)	(3)

REQUIRED ENVIRONMENTAL ENGINEERING BREADTH COURSES **7 HRS.**

CE	4103	Environmental Engineering (Non-Aqueous)	(3)
CE	3101	Environmental Engineering Lab	(1)
CE	3103	Environmental Engineering (Aqueous)	(3)

CHOOSE THREE OF THE FOLLOWING 3-CREDIT COURSES

ENVIRONMENTAL ENGINEERING DEPTH COURSES **9 HRS.**

CE	4113	Hazardous Waste Engineering	
CE	4123	Water Treatment Principles and Design	
CE	4133	Wastewater Treatment Principles and Design	
CE	4323	Engineering Hydrology	
or			
CE	4313	Water Resources and Water Power Engineering	
or			
CE	4333	Water Distribution and Design of Sewers	
or			
CE	4303	Open Channel Hydraulics	
CHE	4043	Air Environmental Control	
CHE	453	Chemical Engineering Kinetics	
CHE	4073	Biochemical Engineering	
CHE	4083	Plant Management	

TOTAL IN MINOR PROGRAM: **27 HRS.**

Choose courses prefixed by AC, BA, ENT, FIN, LAW, MGT, and/or MK Note: With careful planning, the majority of requirements for admission to most MBA programs may be met with this minor.

FINANCE MINOR			24 HRS.
AC	303	Cost Accounting	(3)
AC	423	Income Tax	(3)
FIN	313	Corporate Finance	(3)
FIN	323	Money and Banking	(3)
FIN	343	International Finance	(3)
FIN	353	Personal Finance	(3)
FIN	373	Finance Technologies	(3)
FIN	403	Investments	(3)
TOTAL IN MINOR PROGRAM:			24 HRS.

GOLF MANAGEMENT MINOR			24 HRS.
GM	101	Introduction to Golf Management	(1)
GM	201	Golf Course Architecture	(1)
GM	203	Golf Shop Management	(3)
GM	213	Golf Club Design, Repair and Fitting	(3)
GM	223	Promotion/Marketing of Golf Facilities	(3)
GM	302	Teaching the Short Game	(2)
GM	323	Teaching the Golf Swing	(3)
GM	411	Food and Beverage Management	(1)
Internship			(3)
One skills development course (golf, bowling, tennis, etc.)			(1)
MK	363	Buyer Behavior	
or			
MK	423	Personal Selling	(3)
TOTAL IN MINOR PROGRAM:			24 HRS.

HISTORY MINOR			27 HRS.
HIS	103	American History I	(3)
HIS	113	American History II	(3)
HIS	203	World Civilization I	(3)
HIS	213	World Civilization II	(3)
History electives			(15)
TOTAL IN MINOR PROGRAM:			27 HRS.

HUMANITIES MINOR**25 HRS.**

HUM	401	Humanities Portfolio	(1)
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HUMANITIES APPRECIATION COURSES

Choose nine (9) hours from:	9 HRS.
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ARC	293	Architecture Appreciation
ART	253	Art Appreciation
ENG	153	Introduction to Literature
FLM	203	Film Appreciation
MUS	272	Music Appreciation
SP	103	Introduction to Theater

One (1) course in a Foreign Language (Chinese/French/Spanish)

HUMANITIES CONDITION COURSES**3 HRS.**

Choose three (3) hours from:	(3)
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COM	233	Intercultural Communication
ENG	433	Shakespeare
GEO	303	Human Geography
PHL	313	Ethics
WS	103	Intro to Women's Studies

FOCUS AREA**12HRS.**

Choose two (4) courses from one of the following foci.	(12)
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Music

MUS	113	Music Theory I
MUS	123	Music History and Literature I
MUS	213	Music Theory II
MUS	223	Music History and Literature II

Literature*

ENG	233	Mythology
ENG	253	Readings in World Literature
ENG	273	Creative Writing
ENG	363	The English Language

*Or substitute another approved 200 or above level course in literature.

Philosophy

PHL	203	Introduction to Philosophy
PHL	323	Philosophy of Religion
PHL	333	Art, Technology, and Society
PHL	343	Logic

TOTAL IN MINOR PROGRAM:**25 HRS.**

INTERNATIONAL STUDIES MINOR	24 HRS.
COM 233 Intercultural Communication and 1 year of foreign language at the college level	(3) (6)
Choose five courses from the following ten courses (must include at least one course from each group)	(15)
Geographic and Historical Perspectives	
GEO 303 Human Geography	
GEO 323 World Geography	
GOV/GEO 353 Political Geography	
HIS/GOV 323 The Contemporary World	
GOV 313 Comparative Governments	
Business Perspectives	
BA 343 International Business	
ECO/GEO 343 Economic Geography	
ECO 363 Comparative Economic Systems	
ECO 383 International Economics	
MK 343 International Marketing	
TOTAL IN MINOR PROGRAM:	24 HRS.

LEADERSHIP MINOR	27 HRS.
CORE CLASSES	18 HRS.
PSY 113 Principles of Psychology	(3)
LDR 203 Leadership Strengths and Skills	(3)
LDR 303 Contemporary Leadership Theory & Practice	(3)
PHL 313 Ethics	(3)
LDR 403 Creativity, Innovation, and Influence	(3)
LDR 433 Leadership Practicum	(3)

LEADERSHIP ELECTIVES	9 HRS.
Choose three courses from the following:	(9)
BA 333 Social Media for Business	
COM 213 Business Communication	
COM 233 Intercultural Communication	
COM 363 Persuasion and Argumentation	
COM 413 Corporate & Organizational Communication	
ENT 303 Entrepreneurial Leadership	
GOV 343 American Political Thought	
GOV 373 Political Psychology	
MGT 313 Human Resource Management	
MGT 333 Supervision	
MGT 343 Human Resource Development	
MGT 363 Organizational Behavior	
MGT 413 Management of Quality	
MGT 443 Managing Operations	

MGT	453	Strategic Management	
PSY	333	Principles of Personality	
PSY	343	Social Psychology	
PSY	373	Political Psychology	
SM	313	Sport and Rec Management	
SM	393	Sport Psychology	
SM	413	Organization and Administration of Athletics	

TOTAL IN MINOR PROGRAM: **27 HRS.**

MANAGEMENT MINOR**24 HRS.**

BA	403	Business and Public Policy	(3)
ENT	303	Entrepreneurial Leadership	(3)
MGT	313	Human Resources Management	(3)
MGT	413	Management of Quality	(3)
MK	363	Buyer Behavior	(3)
MK	423	Personal Selling	(3)
Management electives			(6)

TOTAL IN MINOR PROGRAM: **24 HRS.**

MARKETING MINOR**24 HRS.**

BA	403	Business and Public Policy	(3)
ENT	303	Entrepreneurial Leadership	(3)
MK	323	Integrated Marketing Communications	(3)
MK	363	Buyer Behavior	(3)
MK	423	Personal Selling	(3)
MK	433	Marketing Management	(3)
MK	483	Senior Seminar in Marketing	(3)
Marketing electives			(3)

TOTAL IN MINOR PROGRAM: **24 HRS.**

MATHEMATICS MINOR**25 HRS.**

(FOR STUDENTS WITH ANOTHER MAJOR)

MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
MA	233	Differential Equations	(3)
MA	313	Linear Algebra	(3)
Mathematics Electives at the 300-400 level			(8)

A grade of "C" or higher is required for each mathematics course in the minor.

TOTAL IN MINOR PROGRAM: **25 HRS.**

PSYCHOLOGY MINOR	27 HRS.
PSY 113 Principles of Psychology	(3)
Any 300 level or higher psychology courses or SOC 313, SOC 323, SOC 343, LE 153, or LE 453.	(24)
TOTAL IN MINOR PROGRAM:	27 HRS.

ROBOTICS MINOR **29 HRS.**
(ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING)

The field of robotics has been constantly growing for the last several decades. With industries struggling to keep costs down by implementing more automation, there is a strong desire to hire students with a background in robotics. The curriculum is designed to prepare students for professional engineering careers that require specialized training in robotics or for graduate studies in robotics. A grade of C or better is required for all courses in the minor.

REQUIRED COMPUTER SCIENCE COURSE	3 HRS.
CS 1113 Object-Oriented Java	(3)
REQUIRED ENGINEERING SCIENCE COURSES	12 HRS.
ES 213 Statics	(3)
ES 223 Dynamics	(3)
ES 243 Solid Mechanics	(3)
ES 253 Electrical Science	(3)
or	
ECE 213 Circuit Analysis	(3)
REQUIRED ELECTRICAL ENGINEERING COURSES	11 HRS.
ECE 103 Prototyping and Projects	(3)
ECE 263 Digital Systems	(3)
ECE 261 Digital Systems Laboratory	(1)
ECE 273 Microcontrollers	(3)
ECE 271 Microcontrollers Laboratory	(1)
REQUIRED MECHANICAL ENGINEERING COURSE	3 HRS.
MAE 363 Mechatronics	(3)
TOTAL IN MINOR PROGRAM	29 HRS.

STRUCTURAL ENGINEERING MINOR **28 HRS.**
(FOR ANY STUDENT AT TRINE UNIVERSITY)

Structural engineering is traditionally viewed as a branch of civil engineering dealing with the analysis and design of structures to support or resist loads. The curriculum is designed to provide students with (a) a foundation to pursue graduate studies or a career in structural engineering and (b) an understanding of the theory, behavior, and design of individual structural elements and structural systems. Please contact Reiners Department of Civil and Environmental Engineering if you are interested in this program.

REQUIRED ENGINEERING SCIENCE COURSES **6 HRS.**

ES	223	Dynamics	(3)
ES	243	Solid Mechanics	(3)

REQUIRED STRUCTURAL ENGINEERING BREADTH COURSES **13 HRS.**

CE	3203	Civil Engineering Materials	(3)
CE	3201	Civil Engineering Materials Laboratory	(1)
CE	3503	Structural Analysis	(3)
CE	3513	Structural Steel Design	(3)
CE	3533	Reinforced Concrete Design	(3)

STRUCTURAL ENGINEERING DEPTH COURSES **9 HRS.**

(Choose three of the following 3-credit courses) (9)

MAE	453	Mechanical Vibrations
CE	4553	Timber Design
CE	4563	Bridge Engineering
CE	4713	Foundation Engineering
CE	5503	Advanced Structural Analysis
CE	5543	Prestressed Concrete Design
CE	5573	Advanced Concrete Design
CE	5583	Advanced Steel Design

TOTAL IN MINOR PROGRAM **28 HRS.**

ALLEN SCHOOL OF ENGINEERING & TECHNOLOGY

Trine University's Allen School of Engineering & Technology includes these Departments:

- McKetta Department of Chemical & Bioprocess Engineering
- Reiners Department of Civil & Environmental Engineering
- Department of Electrical & Computer Engineering
- Wade Department of Mechanical & Aerospace Engineering
- Department of Technology

Academic programs administered by the school are as follows:

Master of Engineering *PAGE 67

Majors

- Biomedical Engineering
- Civil Engineering
- Mechanical Engineering

- Bachelor of Science in Biomedical Engineering
- Bachelor of Science in Chemical Engineering
- Bachelor of Science in Civil Engineering
- Bachelor of Science in Computer Engineering
- Bachelor of Science in Computer Science
- Bachelor of Science in Design Engineering Technology
- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Mechanical Engineering

Minors * SEE PAGE 75

- Minor in Aeronautical Engineering
- Minor in Biomedical Engineering
- Minor in Bioprocess Engineering
- Minor in Energy Engineering
- Minor in Environmental Engineering
- Minor in Metallurgical Engineering
- Minor in Robotics
- Minor in Structural Engineering

THE SCHOOL

The Drs. Jerry and Jorja Allen School of Engineering & Technology was named in honor of Jerry Allen, a 1978 mechanical engineering graduate and member of the University's Board of Trustees, and Jorja Allen, a 1978 business administration graduate and member of the Alumni Board of Governors.

MISSION

The Allen School of Engineering & Technology promotes the application of science and technology by preparing graduates for the practice of engineering and engineering technology at the professional level.

VISION

The Allen School of Engineering & Technology will be nationally recognized for the quality of its graduates.

VALUES

To attain its mission and vision the Allen School accepts that we must educate engineers and technologists

- who have a broad education
- who see themselves as global citizens
- who have the potential for leadership in business and public service
- who have a strong ethical foundation

GOALS

The Allen School of Engineering & Technology will:

- Provide quality preparation for the practice of engineering and engineering technology at the professional level.
- Provide graduates with the opportunities to pursue graduate studies, lifelong learning, and to offer service to their profession.
- Provide technical and educational services to the community.

PROGRAMMATIC ACCREDITATION

Trine University's programs in chemical engineering, civil engineering, electrical engineering, computer engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET, www.abet.org, 410.347.7700.

PROGRAMS AND DEGREE REQUIREMENTS

The degree programs are listed and then described in the catalog section for each academic department. All undergraduate degrees require students to fulfill General Education requirements (discussed in detail under "General Education Requirements" on page 46), as well as specific program requirements.

GENERAL ENGINEERING

Engineering students who are undecided about their major are classified as "general engineers." Since most courses in the first year are common to all engineering disciplines, a general engineering student will still be able to make progress toward an engineering degree, even though a major has not been selected. During this year, the student should be actively investigating the options available in engineering by talking to faculty members and practicing engineers, attending meetings of the student chapters of professional societies, and doing library research. All general engineering students are expected to transfer into one of the engineering majors by the beginning of their second year. While classified as a general engineer, a student would normally take the following courses. The student's instructor in GE 101 Introduction to Engineering can provide additional guidance.

FIRST SEMESTER**15 HRS.**

CH	104	General Chemistry I	
or			
CH	104H	Honors General Chemistry I	(4)
ENG	103	English Composition I	(3)
GE	101	Introduction to Engineering	(1)
MA	134	Calculus I	(4)
Social Sciences & Humanities elective			(3)

SECOND SEMESTER**15-18 HRS.**

ENG	133	Technical Communication	(3)
MA	164	Calculus II	(4)
PH	224	University Physics I	(4)
Social Sciences & Humanities elective			(3)
Engineering or Science course			(1-4)

MCKETTA DEPARTMENT OF CHEMICAL & BIOPROCESS ENGINEERING

The Dr. John J. McKetta Department of Chemical & Bioprocess Engineering was named in honor of Dr. John J. McKetta, a 1937 chemical engineering graduate and member of the University's Board of Trustees. The McKetta Department of Chemical & Bioprocess Engineering offers the following degree:

- Bachelor of Science in Chemical Engineering

Chemical engineering has at its core the chemical sciences. The chemical sciences affect virtually every aspect of our lives: the food we eat, the clothes we wear, the materials for our homes and cars, our medicines and health care products, and the protection of the environment. Chemical engineers are found in every industry.

Chemical engineering is distinctive in its emphasis on chemistry. The chemistry studied by the chemical engineer includes quantitative analysis, organic chemistry, physical or biochemistry and instrumental analysis. These are the same courses that a chemist would be required to take. The chemical engineer takes these chemical principles and applies them to industrial processes.

Chemical engineering has many common elements with the other engineering disciplines. It is based upon the fundamentals of physics and mathematics. It shares the core engineering sciences of mechanics, fluid flow, heat transfer, thermodynamics, and economics. Oral and written communication skills and interpersonal skills are required for success.

Engineering design is an integral component in chemical engineering course work. Solution of open-ended problems and the design process are introduced in the department's freshman engineering course. Design of experiments is covered in the Unit Operations laboratories, and equipment and process design concepts are taught through the Unit Operations and Chemical Engineering Kinetics courses. This work culminates in the capstone courses Chemical Process Design I and Chemical Process Design II.

Chemical engineering differs from the other engineering disciplines in three main ways. First, chemical engineers work with not only pure or single component materials, but with complex mixtures or multi-component materials. A chemical engineer must characterize and predict the behavior of these complex mixtures. Second, chemical engineers are the purification and separation specialists. The processes for removing impurities or extracting a valuable product are the domain of the chemical engineer. Third, by using chemical or biochemical processes, chemical engineers create materials that did not previously exist. These new and useful components or materials improve the way we live.

Chemical engineers find themselves employed in positions of research and development, process engineering and operations, engineering design and construction, technical sales and service, and plant and corporate management. Typical industries employing chemical engineers include bulk and specialty chemical, petroleum and natural gas, consumer products, pharmaceuticals and biomedical, steel production, plastics and polymers, semiconductor and electronic materials, environmental and consulting. Chemical engineering is also an excellent preparation for those desiring to undertake graduate studies in engineering and other fields such as medicine, law or business.

Trine University's chemical engineering program is accredited by the Engineering Accreditation Commission of ABET.

MISSION AND OBJECTIVES

In concert with Trine University and the Allen School of Engineering & Technology mission statements, the mission of the chemical engineering program at Trine University is to provide career-oriented higher education in chemical engineering by providing a learning environment in which members of a diverse student body receive personal mentoring through small classes and excellent teaching. By emphasizing “hands-on” learning, the program prepares graduates to be productive early in their careers, to advance to leadership roles in their companies and professions, and to provide service to society.

To meet this mission, a graduate from the McKetta Department of Chemical & Bioprocess Engineering must be able to demonstrate:

1. Technical competence
2. Problem solving ability
3. Communication skills
4. A sense of social awareness and responsibility

THE CHEMICAL ENGINEERING CURRICULUM

The curriculum requires the completion of 132 hours of course work. The average course load is 16-17 hours based on eight semesters. In the degree program description that follows, an asterisk (*) indicates those courses that satisfy the University's general education requirements.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING 132 HRS.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 133 Technical Communication	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	(3)
SOCIAL SCIENCES & HUMANITIES	12 HRS.
*ECO 213 Microeconomics	
or	
*ECO 223 Macroeconomics	(3)
*Additional hours selected in accordance with the Social Sciences & Humanities section of the General Education Requirements.	(9)
MATHEMATICS & SCIENCE	44 HRS.
*MA 134 Calculus I	(4)
*MA 164 Calculus II	(4)
MA 213 Calculus III	(3)
MA 233 Differential Equations	(3)
*CH 104 General Chemistry I	
or	
*CH 104H Honors General Chemistry I	(4)
CH 114 General Chemistry II	
or	
CH 114H Honors General Chemistry II	(4)
CH 203 Organic Chemistry I	(3)
CH 211 Organic Chemistry I Laboratory	(1)
CH 3x4 Instrumental Analysis	(4)
Advanced Chemistry Elective	(6)
CH 213 Organic Chemistry II	
or	
CH 221 Organic Chemistry II Laboratory	
or	
CH 232 Quantitative Analysis	

or

CH 354 Physical Chemistry I

or

CH 434 Biochemistry

*PH 224	University Physics I	(4)
PH 234	University Physics II	(4)

FRESHMAN STUDIES

GE 101	Introduction to Engineering	1 HR.
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(1)

ENGINEERING SCIENCE

ES 233	Engineering Materials	5 HRS.
ES 382	Engineering Economics	(3)

(2)

ANALYSIS AND DESIGN

CHE 122	Introduction to Chemical & Biological Engineering	48 HRS.
*CHE 203	Material Balances	(2)
CHE 212	Energy Balances	(3)
CHE 222	Process Measurement Laboratory & Sustainability	(2)
CHE 252	Introduction to Statistical and Computational Methods	(2)
CHE 303	Chemical Engineering Fluid Dynamics	(3)
CHE 313	Chemical Engineering Thermodynamics I	(3)
CHE 333	Unit Operations Laboratory I	(3)
CHE 372	Chemical Engineering Thermodynamics II	(2)
CHE 373	Chemical Engineering Heat Transfer	(3)
CHE 383	Mass Transfer	(3)
CHE 393	Stagewise Separations	(3)
*CHE 412	Applied Numerical Methods	(2)
CHE 433	Unit Operations Laboratory II	(3)
CHE 453	Chemical Engineering Kinetics	(3)
CHE 463	Chemical Process Dynamics and Control	(3)
CHE 473	Chemical Process Design I	(3)
CHE 483	Chemical Process Design II	(3)

PROFESSIONAL DEVELOPMENT

GE 401	Professional Practice	1 HR.
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(1)

CHEMICAL ENGINEERING ELECTIVES**6 HRS.****FREE ELECTIVES****6 HRS.****TOTAL IN DEGREE PROGRAM:****132 HRS.**

REINERS DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

The Reiners Department of Civil and Environmental Engineering offers the following undergraduate degree:

- Bachelor of Science in Civil Engineering

The civil engineering profession provides for our basic needs: housing, cities, commerce, transportation, education, recreation, clean air, water, environmental projects, and energy production. Civil engineers plan, design, and construct safe and purposeful civic facilities that add to the quality of life.

Today, civil engineers explore the frontiers of high technology for solutions to global needs. They deal with the techniques of modern computer-integrated design, as well as do research for new methods and materials of construction. They design and conduct experiments to study the wind effects on tall buildings and the hydrodynamic effects on offshore structures. They use computer simulations to predict hydrologic events, assess flood damage, and manage transportation systems. They employ computers to monitor treatment facilities, lasers for precision surveying, and remote sensing technologies for geodetic surveying. The civil engineers of tomorrow will explore the frontiers of space and build space habitats where people will work and live.

Based on this vision of the future, the Reiners Department of Civil & Environmental Engineering, with the support of the Allen School of Engineering & Technology and Trine University, will excel in the education of individuals uniquely prepared for the practice of civil engineering at the professional level.

Civil engineers, individually, cannot be accomplished in all of the above areas. Therefore, they concentrate on specific areas of civil engineering, such as structures, hydraulics, geotechnics, environmental engineering, highway and transportation engineering, urban planning, or construction management. Yet, civil engineering projects require a combined knowledge of many of these areas, as well as managerial skills, which include the ability to make decisions that are based not only on sound engineering principles, but also on an understanding of the social, ethical, and economical makeup of society. Therefore, it is essential that students receive a broad foundation in the areas of mathematics, physical and engineering sciences, analytical and design methods, communication skills, and the social sciences and humanities.

Civil engineers find career opportunities with architectural and engineering firms, construction corporations, material manufacturers, material testing services, utility corporations, and the petroleum and aircraft industries. As many civil engineering entities, such as highways, bridges, dams, land reclamation and water distribution systems, belong to the public sector, a significant proportion of civil engineers work for local, state and federal governments, as well as the Army Corps of Engineers, the Air Force and the Navy. Those who pursue advanced degrees often enter teaching and research careers in universities. Presently, thirty-five percent of all civil engineers are in general management.

The civil engineering program is accredited by the Engineering Accreditation Commission of ABET.

MISSION AND OBJECTIVES

The mission of the civil engineering program at Trine University is to provide graduates with quality preparation for the practice of civil engineering, to provide graduates with opportunities to pursue graduate studies, and to provide technical and educational services to their profession and communities. The following educational objectives have been developed for the civil engineering program at Trine University:

Graduates have the ability to effectively prepare and present written and verbal proposals, design reports, drawings and other technical information to a diverse audience.

Graduates understand the importance of teamwork and leadership in executing projects, including their role within the team and their impact on the scope, budget, and schedule of the project.

Graduates can effectively use state of the practice engineering tools.

Graduates can analyze and design a structure, system or process, taking into consideration the legal, ethical and other societal impacts of the design.

Graduates take an active role in professional development including achieving professional licensure and active participation in professional societies.

Graduates are engaged in business aspects of the profession, including marketing, budgeting, client or public interaction, and contracting.

Program outcomes are defined as statements that describe what the students are expected to know and are able to do by the time of graduation. The achievement of these outcomes should indicate that the student is prepared to achieve the program educational objectives given above. Upon graduation, civil engineering students are expected to have:

The ability to clearly and effectively communicate ideas in written, graphical and oral formats.

The ability to apply mathematics and science to solve civil engineering problems.

Knowledge of engineering ethics and understand the professional engineer's ethical responsibility.

The ability to conduct experiments and interpret the results.

The ability to use computers for data analysis, problem solving, and reporting.

A broad education and knowledge of contemporary issues.

The ability and understanding of the need to engage in life-long learning.

The ability to work effectively in multi-disciplinary engineering design teams.

CIVIL & ENVIRONMENTAL ENGINEERING CURRICULUM

To prepare the student for a professional career in civil engineering, the curriculum listed below is specified. Its flexibility allows considerable freedom to choose courses that best fit a student's interests or objectives. Additional substitutions may be allowed when warranted.

The program design experience begins with the freshman engineering program. Introduction to the design process, ethics, professionalism, economics, and communication skills are presented and explored through individual and team assignments. As the analytical problem-solving capabilities of the students develop in their sophomore and junior years, design projects become more complex and involve engineering specifications, analysis, testing, safety, and societal constraints. Finally, the program design experience is completed with a senior design project. A multi-faceted civil engineering need is identified, and a problem statement is formulated. Alternative solutions are explored, and a detailed design is documented and presented. In the degree program description that follows, an asterisk (*) indicates those courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE IN CIVIL ENGINEERING 132 HRS.

All civil engineering students must sit for the Fundamentals of Engineering (FE) examination as a requirement for graduation.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

*ENG 103	English Composition I	(3)
*ENG 133	Technical Communication	(3)

ORAL COMMUNICATION

3 HRS.

*SP 203	Effective Speaking	(3)
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***SOCIAL SCIENCES & HUMANITIES**

12 HRS.

These hours must be selected in accordance with the Social Sciences & Humanities section of the General Education Requirements.

COMPUTER LITERACY

3 HRS.

*EGR 153	Engineering Graphics	(3)
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MATHEMATICS & SCIENCE

33 HRS.

(Each course may be replaced with an Honors version.)

*MA 134	Calculus I	(4)
*MA 164	Calculus II	(4)
MA 213	Calculus III	(3)
MA 233	Differential Equations	(3)
MA 393	Probability and Statistics	(3)
CH 104	General Chemistry I	(4)
CH 114	General Chemistry II	(4)
PH 224	University Physics I	(4)
PH 234	University Physics II	(4)

SCIENCE ELECTIVE

(Choose one of the following courses)

BIO	114	Principles of Biology I
BIO	213	Conservation
EAS	253	Weather & Climate
GEO	213	Physical Geography
GLY	273	Geology

3 HRS.

(3)

FRESHMAN STUDIES

GE	101	Introduction to Engineering
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1 HR.

(1)

ENGINEERING SCIENCE

ES	213	Statics
ES	243	Solid Mechanics
ES	323	Fluid Mechanics
ES	382	Engineering Economics
Engineering Science Electives		(3)
(Choose one of the 3-credit courses)		
ES	223	Dynamics
ES	253	Electrical Circuits
ES	313	Thermodynamics

14 HRS.

(3)

(3)

(3)

(3)

ANALYSIS AND DESIGN

CE	1021	Computer Tools for Civil Engineering
CE	2001	Basic Surveying Laboratory
CE	2003	Basic Surveying
CE	3301	Hydraulic Engineering Laboratory
CE	3303	Hydraulic Engineering
CE	3101	Environmental Engineering Laboratory
CE	3103	Environmental Engineering (Aqueous)
CE	3201	Civil Engineering Materials Laboratory
CE	3203	Civil Engineering Materials
CE	3501	Structural Analysis Lab
CE	3503	Structural Analysis
CE	3521	Introduction to Structural Design Lab
CE	3523	Introduction to Structural Design
CE	3603	Transportation Engineering
CE	3701	Soil Mechanics Laboratory
CE	3703	Soil Mechanics
CE	4912	Civil and Envir. Engineering Design Seminar
CE	4914	Civil and Envir. Engineering Design

47 HRS.

(1)

(1)

(3)

(1)

(3)

(1)

(1)

(3)

(3)

(1)

(3)

(3)

(1)

(3)

(3)

GEOTECHNICAL ELECTIVES

(Choose one of the following 3-credit courses)

(3)

CE	4703	Special Topics in Geotechnical Engineering
CE	4713	Foundation Engineering
CE	4723	Pavement Design

ENVIRONMENTAL ELECTIVE

(Choose one of the following 3-credit courses) (3)

- CE 4113 Hazardous Waste Engineering
CE 4123 Water Treatment Principles and Design
CE 4133 Wastewater Treatment Principles and Design

WATER RESOURCES ELECTIVE

(Choose one of the following 3-credit courses) (3)

- CE 4303 Open Channel Hydraulics
CE 4323 Engineering Hydrology
CE 4333 Water Distribution and Design of Sewers

BUSINESS ELECTIVE**3 HRS.**

(Choose one of the following 3-credit courses) (3)

- AC 203 Accounting I
BA 123 Introduction to Business
BA 343 International Business
ENT 303 Entrepreneurial Leadership

PROFESSIONAL DEVELOPMENT**7 HRS.**

GE 401 Professional Practice (1)

IN CONSULTATION WITH ACADEMIC ADVISOR,

select 6 hours of courses that further professional and career development. (6)

TOTAL IN DEGREE PROGRAM:**132 HRS.**

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

The Department of Electrical and Computer Engineering offers the following degrees:

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Computer Engineering

To prepare students for the innovative work required in these areas, students are provided an undergraduate preparation with a foundation in mathematics and science, proper development in communication skills, an understanding of the relevance and impact of engineering and technology on society, and a combination of classroom study and “hands on” laboratory experience.

In addition to academic activities, engineering experience has become a major factor in acquiring a desired position upon graduation. A Cooperative Educational Program (Co-op) is available to enhance the educational experience and provide necessary industrial experience; students are encouraged to participate in this optional program, and the department and Career Services offer help to any student seeking Co-op or summer employment in the majors.

Both engineering programs (the electrical engineering program and the computer engineering program) are accredited by the Engineering Accreditation Commission of ABET.

MISSION

Our Mission in the Department of Electrical and Computer Engineering is to provide our students with the nurturing environment of a small school accompanied by academically rigorous programs that prepare graduates for either immediate employment or entry to graduate school.

OBJECTIVES

We provide programs that assure that our graduates in all programs are prepared to:

1. Devise, choose, and use diagrams or other models to design systems and to communicate engineering ideas.
2. Recognize situations that demand new information, locate it, and use it in their work.
3. Give oral and written reports for communication with peers and decision-makers.
4. Coordinate with colleagues from their own and other disciplines.
5. Recognize their ethical obligations and social responsibilities and maintain awareness of non-technical perspectives.

OUTCOMES

As our accrediting body specifies, engineering programs must demonstrate that their students attain the following outcomes:

- A. An ability to apply knowledge of mathematics, science, and engineering
- B. An ability to design and conduct experiments, as well as to analyze and interpret data
- C. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- D. An ability to function on multidisciplinary teams
- E. An ability to identify, formulate, and solve engineering problems
- F. An understanding of professional and ethical responsibility

- G. An ability to communicate effectively
- H. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- I. A recognition of the need for, and an ability to engage in, life-long learning
- J. A knowledge of contemporary issues
- K. An ability to use the techniques, skills, and modern engineering tools, necessary for engineering practice.

PURPOSES

We of the Trine University Electrical and Computer Engineering Department, fulfill our Mission by providing a dedicated and enhanced learning environment featuring the following components:

- curriculum: rigorous, but carefully shaped to provide a path to success;
- faculty: committed to an excellent undergraduate learning experience;
- classrooms: sized and equipped to promote personal attention;
- laboratories: equipped to provide an excellent laboratory experience through many hands-on experiments with direct guidance from full-time faculty;
- mentoring: promoted at all levels – faculty to student and upperclassman to underclassman;
- peer interaction: fostered by team assignments in classes and membership in student organizations.

THE CURRICULA

Electrical engineering requires 132 semester hours comprising 42 hours of University general education, which overlaps 32 hours of engineering math and sciences with at least one on-site science lab course (even if AP credit would otherwise fulfill the requirement); 54 hours of electrical and computer engineering, with at least one lecture and one lab in each of circuits, analog electronics, digital electronics, signals, integrated systems, an advanced electrical engineering elective area and a capstone project; teamwork; and other major-related courses. For details, see the department chair.

Computer engineering requires 132 semester hours comprising 42 hours of University general education; which overlaps 32 hours of engineering math and sciences with at least one on-site science lab course (even if AP credit would otherwise fulfill the requirement); 54 hours of electrical and computer engineering, with at least one lecture and one lab in each of circuits, analog electronics, digital electronics, and embedded systems together with courses that include lecture and project work in: software design or engineering, an advanced computer engineering elective area and a capstone project; teamwork; and other major-related courses. For details, see the department chair.

Students will be required to provide out-of-course assessments of their learning, which may include surveys, exams, written work samples and sample working prototypes. In the following curriculum listings, an asterisk (*) indicates that those courses satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING 132 HRS.

The Computer Engineering Program is accredited by the Engineering Accreditation Commission of ABET. The degree requirements may be fulfilled with the Trine courses listed below or others at the Department's discretion.

PROGRAM REQUIREMENTS**REQUIRED HOURS****WRITTEN COMMUNICATION****6 HRS.**

- *ENG 103 English Composition I
 *ENG 133 Technical Communication

(3)
(3)**ORAL COMMUNICATION****3 HRS.**

- *SP 203 Effective Speaking

(3)

SOCIAL SCIENCE AND HUMANITIES*12 HRS.**

(University General Education restrictions apply.)

(12)

COMPUTER LITERACY**3 HRS.**

- *CS 1113 Object-Oriented Java Programming

(3)

MATHEMATICS AND SCIENCE**32 HRS.**

- *MA 134 Calculus I
 *MA 164 Calculus II
 MA 213 Calculus III
 MA 233 Differential Equations
 MA 393 Probability & Statistics
 MA 473 Graph Theory and Combinatorics
 *CH 104 General Chemistry I
 *PH 224 University Physics I
 *PH 234 University Physics II

(4)
(4)
(3)
(3)
(3)
(3)
(3)
(4)
(4)
(4)
(4)**ENGINEERING SCIENCE****5 - 6 HRS.**

(This may not include ES 253, Electrical Science)

GENERAL ENGINEERING**2 HRS.**

- GE 101 Introduction to Engineering
 GE 401 Professional Practice

(1)
(1)**ELECTRICAL AND COMPUTER ENGINEERING COMMON CORE****31 HRS.**

- ECE 103 Prototyping and Projects
 ECE 211 Circuit Analysis Laboratory
 ECE 213 Circuit Analysis
 ECE 231 Discrete Electronics Laboratory
 ECE 233 Discrete Electronics
 ECE 243 Analog Signals
 ECE 261 Digital Systems Laboratory
 ECE 263 Digital Systems
 ECE 271 Microcontrollers Laboratory

(3)
(1)
(3)
(1)
(3)
(3)
(3)
(1)
(3)
(1)

ECE	273	Microcontrollers	(3)
ECE	453	Random Processes in ECE	(3)
ECE	4001	Contemporary Issues for Engineers	(1)
ECE	4002	Project Management	(2)
ECE	4003	Design Project	(3)

COMPUTER ENGINEERING CONCENTRATION COURSES 23 HRS.

CS	1123	C++ and Object-Oriented Design	(3)
ECE	361	Logic and Computer Design Laboratory	(1)
ECE	363	Logic and Computer Design	(3)
ECE	371	Embedded Systems Laboratory	(1)
ECE	373	Embedded Systems	(3)
CO/CS/ECE		Elective courses	(12)

OTHER ELECTIVES 15 HRS.

Choose other technical or non technical electives with your advisor's consent to reach 132 hours.

TOTAL IN DEGREE PROGRAM: 132 HRS.

The degree program requirements maybe fulfilled with the Trine University courses listed below or others at the Department's discretion.

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING 132 HRS

The Electrical Engineering Program is accredited by the Engineering Accreditation Commission of ABET.

PROGRAM REQUIREMENTS		REQUIRED HOURS
WRITTEN COMMUNICATION		6 HRS.
*ENG 103 English Composition I *ENG 133 Technical Communication		(3) (3)
ORAL COMMUNICATION		3 HRS.
*SP 203 Effective Speaking		(3)
*SOCIAL SCIENCE AND HUMANITIES		12 HRS.
(University General Education restrictions apply.)		(12)
COMPUTER LITERACY		3 HRS.
*CS 1113 Object-Oriented Java Programming		(3)
GENERAL EDUCATION MATHEMATICS AND SCIENCE		32 HRS.
*MA 134 Calculus I *MA 164 Calculus II MA 213 Calculus III MA 233 Differential Equations MA 393 Probability & Statistics MA Advanced Mathematics Elective *CH 104 General Chemistry I *PH 224 University Physics I *PH 234 University Physics II (4)		(4) (4) (3) (3) (3) (3) (4) (4) (4)
ENGINEERING SCIENCE		5 -6 HRS.
(This may not include ES 253, Electrical Science)		
GENERAL ENGINEERING		2 HRS.
GE 101 Introduction to Engineering GE 401 Professional Practice		(1) (1)
ELECTRICAL AND COMPUTER ENGINEERING COMMON CORE		31 HRS.
ECE 103 Prototyping and Projects ECE 211 Circuit Analysis Laboratory ECE 213 Circuit Analysis ECE 231 Discrete Electronics Laboratory ECE 233 Discrete Electronics ECE 243 Analog Signals		(3) (1) (3) (1) (3) (3)

ECE	261	Digital Systems Laboratory	(1)
ECE	263	Digital Systems	(3)
ECE	271	Microcontrollers Laboratory	(1)
ECE	273	Microcontrollers	(3)
ECE	453	Random Processes in ECE	(3)
ECE	4001	Contemporary Issues for Engineers	(1)
ECE	4002	Project Management	(2)
ECE	4003	Design Project	(3)

ELECTRICAL ENGINEERING CONCENTRATION **23 HRS.**

ECE	301	Electrical Machines Laboratory	(1)
ECE	303	Electrical Machines	(3)
ECE	323	Dynamic Electromagnetic Fields	(3)
ECE	481	Instrument Systems Laboratory	(1)
ECE	483	Instrument Systems	(3)
CO/CS/ECE		Elective Courses	(12)

OTHER ELECTIVES **15 HRS.**

Choose other technical or non-technical electives with your advisor's consent to reach 132 hours.

TOTAL IN DEGREE PROGRAM: **132 HRS.**

WADE DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

The Dr. Forrest V. Wade Department of Mechanical & Aerospace Engineering was named in honor of Dr. Forrest V. Wade, a 1930 mechanical engineering graduate. The department offers the following undergraduate degree:

- Bachelor of Science in Biomedical Engineering
- Bachelor of Science in Mechanical Engineering

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

The field of Biomedical Engineering combines knowledge from all of the basic science disciplines: mathematics, chemistry, physics, and biology as well as the engineering sciences. Due to this inter-disciplinary nature and rapidly advancing knowledge in the field of medicine, the curriculum for a Biomedical Engineer must also be adaptive and keep up with current advancements. To incorporate these aspects into a Biomedical Program the coursework must be grounded in the traditional sciences but also be flexible to consider both individual student interests and special topics knowledge of faculty. The Biomedical major integrates well with the mission of the University as well as vision of the Allen School of Engineering stated below:

MISSION

Trine University promotes intellectual and personal development, through professionally focused and formative learning opportunities, preparing students to succeed, lead, and serve.

VISION

Trine will be recognized as a premier private university, characterized as engaged, dynamic, growing, and adding value. Trine Allen School of Engineering & Technology will be nationally recognized for the quality of its graduates.

Program Goals. A graduate of the Bachelor of Science degree in Biomedical Engineering shall be able:

1. To work professionally in applying engineering approaches to solve problems in medicine and/or biology;
2. To design, analyze, and test experimental processes and products for observing and discovering important structural and behavioral properties of physiologic systems, biological materials, or biomaterials;
3. To design, analyze, and test processes and products directed toward the prevention of injury or disease, or to enhance healing and/or quality of healthcare;
4. To clearly and effectively communicate design ideas and test results;
5. To evaluate and implement engineering-oriented research and development in the biomedical sciences.

Program Outcomes:

1. To provide graduates with high quality preparation for the practice of biomedical engineering and related disciplines at the professional level;
2. To offer graduates opportunities to pursue graduate studies, lifelong learning, and to offer services to their professions;

3. To supply technical expertise and engineering education services to industry and the community.

Learning Outcomes:

1. To provide a knowledge base appropriate to the practice of Biomedical Engineering.
2. To provide specific knowledge and technical expertise in basic core skills required of a Biomedical Engineer.
3. To provide an introduction to advanced skills required of a professional Biomedical Engineer.

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING 132 HRS.**PROGRAM REQUIREMENTS****REQUIRED HOURS****COMMUNICATION SKILLS****12 HRS.**

*ENG 103	English Composition I	(3)
*ENG 133	Technical Communication	(3)
EGR 143	Engineering Graphics	(3)
*SP 203	Effective Speaking	(3)

SOCIAL SCIENCE AND HUMANITIES*12 HRS.**

PHL 313	Ethics	(3)
Social Science and Humanities Electives		(9)

Students must choose social science and humanities electives that, with PHL 213, satisfy the University's General Education Requirements. See page 42.

MATHEMATICS*20 HRS.**

MA 134	Calculus I	(4)
MA 164	Calculus II	(4)
MA 213	Calculus III	(3)
MA 233	Differential Equations	(3)
MA 313	Linear Algebra	(3)
MA 393	Probability and Statistics	(3)

BASIC SCIENCE*35 HRS.**

CH 104	General Chemistry I	
or		
CH 104H	Honors General Chemistry I	(4)

CH 114	General Chemistry II	
Or		

CH 114H	Honors General Chemistry II	(4)
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CH 203	Organic Chemistry I	(3)
CH 211	Organic Chemistry I Laboratory	(1)
CH 213	Organic Chemistry II	(3)
CH 221	Organic Chemistry II Laboratory	(1)

CH	234	Quantitative Chemical Analysis	(4)
CH	324	Instrumental Analysis	(4)
PH	224	University Physics I	
or			
PH	224H	Honors University Physics I	(4)
PH	234	University Physics II	
or			
PH	234H	Honors University Physics II	(4)
		Basic Science Elective	(3)

HEALTH SCIENCES			8 HRS.
BIO	254	Human Anatomy	(4)
BIO	354	Human Physiology	(4)

ENGINEERING SCIENCE			15 HRS.
ES	213	Statics	(3)
ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
ES	243	Solid Mechanics	(3)
ES	253	Electrical Science	
Or			
ECE	213	Circuit Analysis	(3)
ES	313	Thermodynamics	(3)
ES	343	Heat Transfer	(3)
ES	382	Engineering Economics	(2)

MECHANICAL, BIOCHEMISTRY OR CHEMICAL ENGINEERING			13 HRS.
Choose 13 hours from the following:			
BIO	434	Biochemistry	
CHE	4173	Bioseparations Process & Lab	
CHE	4073	Bioprocessing & Lab	
MAE	243	Manufacturing Processes and Equipment	
MAE	463	Mechanical Measurements	
MAE	463	Measurement Laboratory	

PROFESSIONAL DEVELOPMENT			2 HRS.
GE	101	Introduction to Engineering	(1)
GE	401	Professional Development	(1)

BIOMEDICAL ENGINEERING			15 HRS.
BME	113	Intro to Biomedical Engineering	(3)
BME	4103	Intro to Biomechanics	(3)
BME	4203	Intro to Biomaterials	(3)
BME	XX1	Senior Design I	(1)
BME	XX3	Senior Design II	(3)

TOTAL IN DEGREE PROGRAM: **132 HRS.**

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Mechanical engineering is, perhaps, the most diverse and general of all the engineering fields. Mechanical engineers can be found working in almost any company. Manufacturing, transportation, health care, and insurance are some of the types of firms that employ mechanical engineers. No other field of engineering provides a better professional base for interdisciplinary activities.

Mechanical engineers design machines of all types, from paper clips to space shuttles. They plan, design, and direct the manufacture, distribution, and operation of these machines. Mechanical engineers also design the power sources needed to operate the machines and provide for the environment in which they function. In fact, mechanical engineering involves all phases of energy production and utilization: engines, power plants, electrical generation, heating, ventilating, and air conditioning.

Those mechanical engineers who choose to specialize in the aerospace area are particularly suited for employment in vehicle design. They may be involved in the design of aircraft, spacecraft, missiles, automobiles, trucks, buses, trains, or ships. Their specialized knowledge of lightweight structures and efficient, low drag design take on added importance as fuel costs increase.

Other mechanical engineers may specialize in the area of metallurgy and focus on the relationships among the structure, properties, processing and performance of metals. These engineers will be involved in product design, process development, and equipment design in addition to material specification, failure analysis, and implementing manufacturing processes.

Due to the diverse nature of the profession, the mechanical engineering education must provide a very broad base of studies. To be successful a mechanical engineer must be able to communicate knowledge and ideas to others; thus communication skills are an important part of the engineer's preparation. Studies in the social sciences and humanities develop an understanding of the relevance and impact of engineering and technology on society. Mathematics provides the engineer with the tools needed to build on the scientific foundations of chemistry and physics. The engineering sciences, common to all engineering disciplines, provide a broad foundation for the design of both thermal and mechanical systems, which are at the core of mechanical engineering.

Engineering creativity cannot be developed by theory alone; an engineer learns by doing. Thus, the laboratory courses stress hands-on work and the project design courses involve real-world problems. Multidisciplinary teams, involving students from business, technology, and/or other engineering programs in the senior design projects prepare students for the team design approach common in industry. A cooperative education program, incorporating alternating periods of full-time work and fulltime school, is available to enhance the education and provide valuable engineering experience. Students are encouraged to participate in this optional program.

The mechanical engineering program is accredited by the Engineering Accreditation Commission of ABET.

MISSION AND OBJECTIVES

The mission of the mechanical engineering program at Trine University is to enable students to become productive mechanical engineers, to advance to leadership roles in the profession, and to provide service to society. To meet these goals the program has established the following educational objectives:

- To provide graduates with high quality preparation for the practice of mechanical engineering and related disciplines at the professional level;
- To offer graduates opportunities to pursue graduate studies, lifelong learning, and to offer services to their professions;
- To supply technical expertise and engineering and education services to industry and the community.

At graduation the mechanical engineering student must have:

- The ability to communicate ideas clearly and effectively in writing, orally, and graphically;
- An awareness of the engineer's social responsibilities with an appreciation of human achievements and insight into human behavior and culture;
- Knowledge of multivariate calculus and differential equations and familiarity with linear algebra and statistics and the ability to apply this knowledge to the solution of engineering problems;
- Fundamental knowledge of natural phenomena and their quantitative expression in chemistry and physics;
- Knowledge of the engineering sciences, including electrical science, and the ability to apply this knowledge creatively;
- The ability to work professionally in the areas of both thermal and mechanical systems design;
- The ability to integrate technical knowledge through tradeoff studies leading to an engineering design;
- Knowledge of contemporary analytical, computational, and experimental practices; and
- Competence in experimental design, data collection, data analysis, and the use of computational tools.

THE MECHANICAL ENGINEERING CURRICULUM

The first year of the mechanical engineering program is devoted to developing knowledge and skills in communication, mathematics, and the natural sciences. Students are introduced to the mechanical engineering profession through the courses "Introduction to Engineering" and "Engineering Graphics." In the second year the fundamental courses in the engineering sciences provide the foundation for engineering design. The design process is formalized in the junior year in the courses "Computer-Aided Machine Design" and "Thermo-Fluid Component Design." The other courses in the third year emphasize engineering analysis and design in the areas of thermal and mechanical systems. The year-long senior design project integrates the previous studies into the design of a machine or system, often resulting in fabrication and testing of a prototype. A professional atmosphere is developed through multidisciplinary teams and industry originated projects in the senior design sequence. In the following curriculum listing, an asterisk (*) indicates that those courses satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING			132 HRS.
PROGRAM REQUIREMENTS			REQUIRED HOURS
COMMUNICATION SKILLS			12 HRS.
*ENG	103	English Composition I	(3)
*ENG	133	Technical Communication	(3)
EGR	143	Engineering Graphics	(3)
*SP	203	Effective Speaking	(3)
*SOCIAL SCIENCE AND HUMANITIES			12 HRS.
ECO	213	Microeconomics	(3)
Social Science and Humanities Electives			(9)
Students must choose social science and humanities electives that, with ECO 213, satisfy the University's General Education Requirements. See page 42.			
*MATHEMATICS			20 HRS.
MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
MA	233	Differential Equations	(3)
MA	313	Linear Algebra	(3)
MA	393	Probability and Statistics	(3)
*SCIENCE			12 HRS.
CH	104	General Chemistry I	
or			
CH	104H	Honors General Chemistry I	(4)
PH	224	University Physics I	
or			
PH	224H	Honors University Physics I	(4)

PH	234	University Physics II
or		
PH	234H	Honors University Physics II

(4)

ENGINEERING SCIENCE **23 HRS.**

ES	213	Statics	(3)
ES	223	Dynamics	(3)
ES	233	Engineering Materials	(3)
ES	243	Solid Mechanics	(3)
ES	253	Electrical Science	(3)
ES	313	Thermodynamics	(3)
ES	343	Heat Transfer	(3)
ES	382	Engineering Economics	(2)

MECHANICAL ENGINEERING CORE **36 HRS.**

MAE	203	Mechanical Engineering Analysis	(3)
MAE	243	Manufacturing Processes and Equipment	(3)
MAE	303	Mechanics of Machinery	(3)
MAE	323	Thermodynamics II	(3)
MAE	3033	Fluid Dynamics for Mechanical Engineers	(3)
MAE	353	Machine Component Design	(3)
MAE	373	Computer-Aided Machine Design	(3)
MAE	413	Thermo-Fluid Component Design	(3)
MAE	453	Mechanical Vibration	
or			
MAE	4023	System Dynamics & Controls	(3)
MAE	463	Measurement Laboratory	(3)
MAE	4053	Mechanical Engineering Design I	(3)
MAE	4063	Mechanical Engineering Design II	(3)

PROFESSIONAL DEVELOPMENT **2 HRS.**

GE	101	Introduction to Engineering	(1)
GE	401	Professional Development	(1)

MECHANICAL ENGINEERING ELECTIVES **9 HRS.**

Electives may be 300-level or higher, for an Architectural or Robotics minor, electives may be selected from other technical discipline.

UNRESTRICTED ELECTIVES 6 HRS.**TOTAL IN DEGREE PROGRAM:** **132 HRS.**

DEPARTMENT OF TECHNOLOGY

The Department of Technology offers the following degree:

- Bachelor of Science in Design Engineering Technology

Modern society demands a variety of skills and educational achievements to cover a wide range of scientific and technological positions. The problems confronting business, industry, and government require large numbers of technicians and technologists, as well as engineers and scientists.

The Department of Technology curricula emphasize many of the underlying principles of component design and the skills required to communicate with the engineer, scientist, and production personnel. Elective course offerings within the academic programs provide the student with the opportunity to minor in areas such as business, management, or finance.

DESIGN ENGINEERING TECHNOLOGY CURRICULUM

The Design Engineering Technology curriculum places an emphasis on the activities of the modern engineering department. The program provides the skills and knowledge to advance in industry to the upper levels of supervision. Knowledge of computers, management, advanced CAD, engineering specifications, and applied engineering design are part of this program. The technologist trained in this area will be able to supervise and develop the technical communications necessary in the engineering and scientific professions. This program is approved and supported by industries in need of professionally trained technologists.

In the degree program descriptions that follow, an asterisk (*) indicates that those courses satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE IN DESIGN ENGINEERING TECHNOLOGY 127 HRS.

DESIGN ENGINEERING TECHNOLOGY MAJOR

PROGRAM REQUIREMENTS

REQUIRED HRS.

WRITTEN COMMUNICATION

6 HRS.

*ENG 103	English Composition I	(3)
*ENG 133	Technical Communication	(3)

ORAL COMMUNICATION

3 HRS.

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES

14 HRS.

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
Humanities Elective		(2)
Electives		(6)

(These hours must also be selected in accordance with the Social Sciences & Humanities section of the University's general education requirements found on page 42.)

COMPUTER LITERACY		3 HRS.
*INF 103	Information Technology Applications	(3)
MATHEMATICS & SCIENCE		25 HRS.
*MA 113	College Algebra	(3)
*MA 123	Trigonometry	(3)
*MA 134	Calculus I	(4)
MA 253	Statistics	(3)
*PH 154	College Physics I	(4)
*PH 164	College Physics II	(4)
*CH 144	Chemistry - Ideas and Applications	(4)
FRESHMAN STUDIES		1 HR.
UE 101	University Experience	(1)
AREA OF CONCENTRATION		48 HRS.
ETD 103	Basic Technical Drawing	(3)
ETD 113	Geometric Dimensioning and Tolerancing	(3)
ETD 123	Manufacturing Materials and Processes	(3)
ETD 163	Environmental Health & Safety	(3)
ETD 173	Computer Aided 3-D Modeling (Solid Works)	(3)
ETD 203	Basic Mechanisms	(3)
ETD 233	Engineering & Manufacturing Systems	(3)
ETD 243	Statics and Strength of Materials	(3)
ETD 253	Dimensional Metrology	(3)
ETD 263	Design, Analysis & Prototyping	(3)
ETD 273	Electrical Fundamentals	(3)
ETD 323	Product Design & Development	(3)
ETD 363	Elements of Machines	(3)
ETD 423	Senior Design Project	(3)
ETD 433	Computer Numerical Control	(3)
EGR 453	Advanced Parametric Design (Unigraphics)	(3)
MANAGEMENT		9 HRS.
MGT 363	Organizational Behavior	(3)
Business electives		(6)
ELECTIVES		18 HRS.
Twelve (12) credit hours must be selected from any 300- or 400-level course offered with approval of the advisor. Six (6) credit hours may be selected from any course offered with approval of the advisor.		
TOTAL IN DEGREE PROGRAM:		127 HRS.

FRANKS SCHOOL OF EDUCATION

Trine University's Franks School of Education includes this department:

- Shevenaugh Department of Elementary Education

Academic programs administered by the school are as follows:

- Bachelor of Science

Majors

Elementary Education

Health/Physical Education

Mathematics Education

Science Education

Social Studies Education

Information presented here is subject to change at any time, depending on actions taken by the Indiana Department of Education/Office of Educator Licensing and Development. Students are responsible for meeting any requirements for licensure that are in effect at the time they seek to be licensed. The requirements may differ from what is presented in this document. Students should remain alert to changes in requirements. Updated information is available from the Franks School of Education.

THE SCHOOL

The Franks School of Education was named in honor of Lawrence A. Franks, a 1959 mechanical engineering graduate and member of the University's Board of Trustees.

Established in 1884 by a group of Angola citizens, the University began as part of the normal school movement that spread throughout much of the United States during the last half of the nineteenth century. The initial course of study at Tri-State Normal College included teacher education and commerce. In 1921, Frances Kain Shevenaugh earned her "teaching certificate" at Tri-State by completing a twelve-week course of study. In June, 2001, the University reorganized its basic structure to make education a visible component. To renew the tradition of serving the needs of public education in the service area and beyond, the School of Education was created.

All education programs are built upon three major components that are deemed necessary for effective and productive teachers—content, communication, and caring. Each is dependent upon the other, and together they describe the knowledge, dispositions, and performances of a knowledgeable, reflective educator.

ACCREDITATION

The Trine University Franks School of Education is accredited by the Indiana Department of Education/Office of Educator Licensing and Development (DOE/OELD) and by the National Council for Accreditation of Teacher Education (NCATE).

MISSION OF THE SCHOOL

The mission of the Franks School of Education at Trine University is to provide an educational atmosphere in which each teacher candidate is challenged to become the best educator he or she can be. Faculty members of the School are committed to helping each future educator achieve his or her potential as a knowledgeable, reflective educator who is committed to and able to provide for the growth of all learners.

PROFESSIONAL COMMITMENTS AND DISPOSITIONS

The Franks School of Education at Trine University adopted the ten principles developed by the Interstate New Teacher Assessment and Support Consortium (INTASC) as program objectives, and two additional objectives specific to the mission of the School.

1. The teacher candidate understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches, and can create learning experiences that make these aspects of subject matter meaningful for students.
2. The teacher candidate understands how children learn and develop, and can provide learning opportunities that support their intellectual, social, and personal development.
3. The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.
4. The teacher candidate understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.
5. The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.
6. The teacher candidate uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.
7. The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
8. The teacher candidate understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the learner.
9. The teacher candidate is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.
10. The teacher candidate fosters relationships with school, colleagues, parents, and agencies in the larger community to support students' learning and well-being.
11. The teacher candidate organizes and implements instruction for students based on an understanding of the caring ethic.

12. The teacher candidate understands and applies interpersonal communication skills that support the caring ethic.

ADMISSION TO TEACHER EDUCATION

Two courses, EDU 111 Freshman Practicum and EDU 211 Sophomore Practicum, may be taken prior to official admission to teacher education. Other courses with EDU prefixes may be taken only after the candidate has applied to and has been accepted into teacher education. A candidate may apply for admission to teacher education (which allows her/him to pursue a teacher education degree in a selected major) after completing the following:

1. earned state of Indiana passing scores on reading, writing, and mathematics sections of Praxis I;
2. completed 12 semester hours of university credit with a cumulative GPA of 2.5 or higher;
3. submitted three positive letters of recommendation supporting the candidate's admission to teacher education;
4. submitted an expanded criminal background check; and
5. submitted appropriate application forms.

Transfer students must meet similar requirements. The Franks School of Education should be contacted for further details (260.665.4121).

APPROVED PROGRAMS

All teacher preparation programs are approved by the Indiana Department of Education/Office of Educator Licensing and Development and the National Council for Accreditation of Teacher Education.

Approved programs include the following:

- Elementary Education (K-6)***
- Health/Physical Education (K-12)***
- Mathematics Education (5-12 or 9-12)***
- Science Education (5-12 or 9-12)***
- Social Studies Education (5-12 or 9-12)***

Science education majors must choose at least one content area from biology, chemistry, or physics.

Social studies education majors must choose at least three content areas from economics, geographical perspectives, government and citizenship, historical perspectives, and/or psychology.

Applicable standards for each program are INTASC general standards, IDEOE/OELD developmental standards, and IDEOE/OELD content standards.

REMAINING IN TEACHER EDUCATION

Once officially admitted, retention in teacher education is contingent upon good academic standing and successful passing of Benchmark requirements. The GPA required for admission is

2.5 overall. Upon admission, if the candidate's GPA falls below 2.5, the candidate will be placed on probation. Education courses may be taken the next semester only with permission of the Teacher Education Committee. If the GPA remains below 2.5 at the completion of the probationary term, the candidate no longer is eligible to take EDU courses and may apply for readmission when a satisfactory GPA is achieved. The candidate must also successfully meet requirements at various checkpoints (Benchmark #1, #2, #3, #4).

TESTING REQUIREMENTS

To be eligible for admission to teacher education, state of Indiana passing scores on Praxis I reading, writing, and mathematics tests must be submitted. To be eligible for student teaching, state of Indiana passing score(s) on required Praxis II content specialty test(s) must be submitted. Information about the PRAXIS Series is available in the Franks School of Education office or online at www.ets.org. The Franks School of Education should always be consulted before a test is taken to ensure most recent testing requirements are met.

STUDENT TEACHING

Student teaching is completed in an area school, generally within 40 miles of the University, as assigned by the dean of the Franks School of Education. The student teacher participates in a classroom with a cooperating teacher for 10-11 full weeks. The GPA requirement for enrollment in student teaching is 2.5 overall, as well as 2.5 in all intended areas of licensure. To be eligible for licensure, the teacher candidate must have earned an overall GPA of 2.5 or higher, a GPA of 2.5 or higher in all areas of licensure, must have successfully completed student teaching with a GPA of 2.5 or higher, and must have met all Benchmark requirements at established levels.

LICENSING ADVISOR

Trine University's licensing advisor is the dean of the Franks School of Education.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE ELEMENTARY EDUCATION (K-6) 124 HRS.

To be eligible for licensure as an elementary teacher in grades K-6, the following program of study must be completed.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)

ORAL COMMUNICATION

3 HRS.

*SP 203 or *COM 163	Effective Speaking Interpersonal Communication	(3)
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SOCIAL SCIENCES & HUMANITIES

31 HRS.

*PSY 113	Principles of Psychology	(3)
*ENG 153	Introduction to Literature	(3)
*ECO 213	Microeconomics	
or		
*ECO 223	Macroeconomics	(3)
*GOV 113	Introduction to Government	(3)
*HIS 103	American History I	(3)
*HIS 113	American History II	(3)
*SOC 323	The Family	(3)
GEO 303	Human Geography	(3)
GEO 323	World Geography	(3)
*ART 252	Art Appreciation	(2)
*MUS 272	Music Appreciation	(2)

MATHEMATICS & SCIENCE

20 HRS.

*MA 184	Math for Elementary Teachers I	(4)
*MA 194	Math for Elementary Teachers II	(4)
*BIO 104	General Biology	(4)
*PH 104	Physical Science	(4)
*AST 201	Astronomy Laboratory	(1)
*AST 203	Astronomy	(3)

HEALTH & PHYSICAL EDUCATION

6 HRS.

EXS 102	Lifetime Wellness	(2)
HPE 232	Physical Education for the Elementary School Teacher	(2)
HPE 342	School and Community Health	(2)

FRESHMAN STUDIES

UE 101 University Experience

1 HR.

(1)

PROFESSIONAL STUDIES REQUIREMENTS (GRADES K-6)

EDU 111	Freshman Practicum	(1)
EDU 211	Sophomore Practicum	(1)
EDU 212	Introduction to Music Fundamentals	(2)
EDU 222	Educational Psychology for Early Childhood/Middle Childhood Teachers	(2)
EDU 301**	Introduction to Teaching Practicum	(1)
EDU 303**	Introduction to Teaching	(3)
EDU 311	Junior Practicum	(1)
EDU 312	Exceptional Children in the Schools	(2)
EDU 323	Foundations of Education	(3)
EDU 342	The Kindergarten Experience	(2)
EDU 353	Children's Literature	(3)
EDU 441**	Teaching of Reading Practicum	(1)
EDU 445**	Teaching of Reading	(5)
EDU 452	Art for the Elementary Teacher	(2)
EDU 454**	Methods of Teaching Mathematics and Science	(4)
EDU 462**	Educational Measurement	(2)
*EDU 463	Educational Media and Technology	(3)
EDU 464**	Methods of Teaching Language Arts and Social Studies	(4)
EDU 470**	Supervised Student Teaching	(10)
EDU 471**	Student Teaching Seminar	(1)

**Course must be taken at Trine University

ELECTIVES**4 HRS.****TOTAL IN DEGREE PROGRAM:****124 HRS.**

In addition to the professional education courses taken to be eligible for licensure at the elementary level (K-6), the following courses must be completed to enable the elementary education student to be eligible for licensure at the middle school level (5-9).

EDU 412	The Middle School	(2)
EDU 422	Middle School Methods	(2)
EDU 472**	Practicum in Teaching—Middle School	(2)

In addition to the courses required as part of the elementary education program, the courses listed below for at least one content area are required for licensure at the middle level.

MATHEMATICS

MATHEMATICS COURSES REQUIRED

IN ELEMENTARY EDUCATION PROGRAM:			8 HRS.
MA 184	Math for the Elementary Teacher I		(4)
MA 194	Math for the Elementary Teacher II		(4)

ADDITIONAL COURSES REQUIRED IN MATHEMATICS: **13 HRS.**

MA 113	College Algebra	(3)
MA 123	Trigonometry	(3)
MA 134	Calculus I	(4)
MA 253	Statistics	(3)

SCIENCE (LIFE SCIENCE)

SCIENCE COURSES REQUIRED IN ELEMENTARY EDUCATION PROGRAM: **12 HRS.**

AST 201	Astronomy Laboratory	(1)
AST 203	Astronomy	(3)
BIO 104	General Biology	(4)
PH 104	Physical Science	(4)
Additional courses required in science:		11 HRS.
BIO 254	Human Anatomy	(4)
CH 144	Chemistry - Ideas and Applications	(4)
GEO 213	Physical Geography	
or		
GLY 273	Geology	(3)

SOCIAL STUDIES

(HISTORICAL PERSPECTIVES) SOCIAL STUDIES COURSES

REQUIRED IN ELEMENTARY EDUCATION PROGRAM:			18 HRS.
GOV 113	Introduction to Government		(3)
HIS 103	American History I		(3)
HIS 113	American History II		(3)
SOC 323	The Family		(3)
GEO 303	Human Geography		(3)
GEO 323	World Geography		(3)

ADDITIONAL COURSES REQUIRED IN SOCIAL STUDIES:			9 HRS.
HIS	203	World Civilization I	(3)
HIS	213	World Civilization II	(3)
GEO	213	Physical Geography	(3)

ENGLISH/LANGUAGE ARTS**ENGLISH/LANGUAGE ARTS COURSES REQUIRED IN**

ELEMENTARY EDUCATION PROGRAM:			22 HRS.
ENG	103	English Composition I	(3)
ENG	113	English Composition II	(3)
ENG	153	Introduction to Literature	(3)
EDU	353	Children's Literature	(3)
EDU	445	Teaching of Reading	(5)
EDU	464	Methods of LA/SS	(2)
SP	203	Effective Speaking	or
COM	163	Interpersonal Communication	(3)

ADDITIONAL COURSES REQUIRED IN ENGLISH/LANGUAGE ARTS:9 HRS.

ENG	363	The English Language	(3)
SP	203	Effective Speaking	
or			
COM	163	Interpersonal Communication	(3)
(course not taken as part of required program)			
COM	203	Media and Communication	(3)

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE HEALTH/PHYSICAL EDUCATION (K-12) 137 HRS.

To be eligible for licensure as a health and/or physical education teacher in grades K-12, the following program of study must be completed.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

- *ENG 103 English Composition I (3)
- *ENG 113 English Composition II (3)

ORAL COMMUNICATION

3 HRS.

- *SP 203 Effective Speaking (3)

SOCIAL SCIENCES & HUMANITIES

18 HRS.

- *PSY 113 Principles of Psychology (3)
- *ENG 153 Introduction to Literature (3)
- *Social Sciences electives (3)
- *Humanities electives (6)
- Choose one of the following HIS courses: (3)
- *HIS 103 American History I
- *HIS 113 American History II
- *HIS 203 World Civilization I
- *HIS 213 World Civilization II

MATHEMATICS & SCIENCE

11 HRS.

- *MA 113 College Algebra
- or
- *MA 153 Finite Mathematics (3)
- *BIO 104 General Biology (4)
- *BIO 254 Human Anatomy (4)

GENERAL EDUCATION ELECTIVES

2 HRS.

- *EXS 102 Lifetime Wellness (2)

FRESHMAN STUDIES

1 HR.

- *UE 101 University Experience (1)

PROFESSIONAL STUDIES REQUIREMENTS (GRADES K-12)

45 HRS.

- EDU 111 Freshman Practicum (1)
- EDU 211 Sophomore Practicum (1)
- EDU 212 Introduction to Music Fundamentals (2)
- EDU 222 Educational Psychology for the Elementary Teacher (2)
- EDU 232 Educational Psychology for Middle Grade
and Secondary Teachers (2)
- EDU 301** Introduction to Teaching Practicum (1)

EDU	303**	Introduction to Teaching	(3)
EDU	311	Junior Practicum	(1)
EDU	312	Exceptional Children in the Schools	(2)
EDU	323	Foundations of Education	(3)
EDU	333**	Reading in the Content Area Health Practicum	(3)
EDU	412	The Middle School	(2)
EDU	422	Middle School Methods	(2)
EDU	432**	Practicum in Teaching—Secondary	(2)
EDU	442**	Special Methods for the Secondary Teacher	(2)
EDU	462**	Educational Assessment	(2)
*EDU	463	Educational Media and Technology	(3)
EDU	470**	Student Teaching	(10)
EDU	471**	Student Teaching Seminar	(1)

**Course must be taken at Trine University

HEALTH & PHYSICAL EDUCATION

49 HRS.

EXS	103	Teaching of Sport Skills I	(3)
EXS	123	Teaching of Sport Skills II	(3)
EXS	131	First Aid	(1)
EXS	243	Athletic Training	(3)
EXS	273	Nutrition	(3)
EXS	332	Drug Education	(2)
EXS	333	Kinesiology	(3)
EXS	353	Exercise Physiology	(3)
EXS	373	Health Problems	(3)
EXS	433	Developing Health Promotion Programs for Adults	(3)
EXS	463	Motor Learning	(3)
HPE	202	Introduction to Adaptive Physical Education	(2)
HPE	212	Adaptive Physical Education	(2)
HPE	223	History of Physical Education and Sport	(3)
HPE	232	Physical Education for Elementary School Teacher	(2)
HPE	342	School and Community Health	(2)
HPE	352	Family Life Education	(2)
SM	253	Risk Management in PE and Sport	(3)
SM	413	Organization and Administration of Physical Education and Athletics	(3)

TOTAL IN DEGREE PROGRAM:

135 HRS.

BACHELOR OF SCIENCE MATHEMATICS EDUCATION (9-12, 5-12) 124-125 HRS.

To be eligible for licensure as a mathematics teacher in grades 9-12 or 5-12, the following program of study must be completed.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking or *COM 163 Interpersonal Communication	(3)
SOCIAL SCIENCES & HUMANITIES	18 HRS.
*PSY 113 Principles of Psychology	(3)
*ENG 153 Introduction to Literature	(3)
*HIS electives	(3)
*Social Sciences electives	(3)
*Humanities electives	(6)
COMPUTER LITERACY	2-3 HRS.
*INF 132 Integrated Development (Visual Basic) or *INF 163 Structured Logic and Design (C programming)	(2-3)
MATHEMATICS & SCIENCE	10 HRS.
*MA 312 Historical Aspects of Mathematics	(2)
Lab Science electives	(4)
Lab Science electives	(4)
GENERAL EDUCATION ELECTIVES	2-3 HRS.
*EXS 102 Lifetime Wellness 1 hour elective chosen from categories above	(2) (0-1)
FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)
PROFESSIONAL STUDIES REQUIREMENTS (GRADES 9-12)	37 HRS.
EDU 111 Freshman Practicum	(1)
EDU 211 Sophomore Practicum	(1)
EDU 232 Educational Psychology for Middle Grade and Secondary Teachers	(2)
EDU 301** Introduction to Teaching Practicum	(1)
EDU 303** Introduction to Teaching	(3)
EDU 311 Junior Practicum	(1)

EDU 312	Exceptional Children in the Schools	(2)
EDU 323	Foundations of Education	(3)
EDU 333**	Reading in the Content Area	(3)
EDU 432**	Practicum in Teaching—Secondary	(2)
EDU 442**	Special Methods for the Secondary Teacher	(2)
EDU 462**	Educational Measurement	(2)
*EDU 463**	Educational Media and Technology	(3)
EDU 470**	Supervised Student Teaching	(10)
EDU 471**	Student Teaching Seminar	(1)

ADDITIONAL PROFESSIONAL STUDIES REQUIREMENTS (GRADES 5-12) 6 HRS.

EDU 412	The Middle School	(2)
EDU 422	Middle School Methods	(2)
EDU 472**	Practicum in Teaching—Middle School	(2)

**Course must be taken at Trine University

MATHEMATICS REQUIREMENTS**32 HRS.**

*MA 134	Calculus I	(4)
*MA 164	Calculus II	(4)
MA 213	Calculus III	(3)
MA 233	Differential Equations	(3)
MA 303	College Geometry	(3)
MA 313	Linear Algebra	(3)
MA 343	Sets and Logic	(3)
MA 373	Abstract Algebra	(3)
MA 393	Probability and Statistics	(3)
MA 473	Graph Theory and Combinatorics	(3)

ELECTIVES

(Electives are determined in consultation with academic advisors and are based on student career objectives.)

Grades 9-12 Licensure 11-12 HRS.

Grade 5-12 Licensure 6 HRS.

TOTAL IN DEGREE PROGRAM:**124-125 HRS.**

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE EDUCATION/LIFE SCIENCES

(BIOLOGY) (9-12, 5-12)

124-130 HRS.

To be eligible for licensure as a life sciences (biology) teacher in grades 9-12 or 5-12, the following program of study must be completed.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

- *ENG 103 English Composition I (3)
- *ENG 113 English Composition II (3)

ORAL COMMUNICATION

3 HRS.

- *SP 203 Effective Speaking or
- *COM 163 Interpersonal Communication (3)

SOCIAL SCIENCES & HUMANITIES

18 HRS.

- *ENG 153 Introduction to Literature (3)
- *PSY 113 Principles of Psychology (3)
- *History elective (3)
- *Humanities electives (6)
- *Social Sciences electives (3)

COMPUTER LITERACY

3 HRS.

- *INF 103 Information Technology Applications (3)

MATHEMATICS & SCIENCE

10 HRS.

- *BIO 114 Principles of Biology I (4)
- *BIO 213 Conservation (3)
- *MA 113 College Algebra (or higher) (3)

HEALTH & PHYSICAL EDUCATION

2 HRS.

- *EXS 102 Lifetime Wellness (2)

FRESHMAN

1 HR.

- UE 101 University Experience (1)

PROFESSIONAL STUDIES REQUIREMENTS (GRADES 9-12)

37 HRS.

- EDU 111 Freshman Practicum (1)
- EDU 211 Sophomore Practicum (1)
- EDU 232 Educational Psychology
for Middle Grade and Secondary Teachers (2)
- EDU 301** Introduction to Teaching Practicum (1)
- EDU 303** Introduction to Teaching (3)
- EDU 311 Junior Practicum (1)

EDU	312	Exceptional Children in the Schools	(2)
EDU	323	Foundations of Education	(3)
EDU	333**	Reading in the Content Area	(3)
EDU	432**	Practicum in Teaching—Secondary	(2)
EDU	442**	Special Methods for the Secondary Teacher	(2)
EDU	462**	Educational Measurement	(2)
*EDU	463**	Educational Media and Technology	(3)
EDU	470**	Supervised Student Teaching	(10)
EDU	471**	Student Teaching Seminar	(1)

ADDITIONAL PROFESSIONAL STUDIES REQUIREMENTS (GRADES 5-12) 6 HRS.

EDU	412	The Middle School	(2)
EDU	422	Middle School Methods	(2)
EDU	472**	Practicum in Teaching—Middle School	(2)

**Course must be taken at Trine University

SCIENCE REQUIREMENTS 44 HRS.

BIO	254	Human Anatomy	(4)
BIO	304	Plant Biology	(4)
BIO	314	Animal Biology	(4)
BIO	324	Microbiology	(4)
BIO	333	Environmental Biology	(3)
BIO	354	Animal Physiology	(4)
BIO	414	Genetics	(4)
CH	104	General Chemistry I	(4)
CH	114	General Chemistry II	(4)
MA	123	Trigonometry	
or			
MA	253	Statistics	(3)
PH	154	College Physics I	(4)
SC	412	Senior Research Seminar	(2)

**TOTAL IN DEGREE PROGRAM GRADES 9-12 LICENSURE 124 HRS.
GRADES 5-12 LICENSURE 130 HRS.**

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE

SCIENCE EDUCATION/CHEMISTRY (9-12, 5-12) 124-130 HRS.

To be eligible for licensure as a chemistry teacher in grades 9-12 or 5-12, the following program of study must be completed.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking or *COM 163 Interpersonal Communication	(3)
SOCIAL SCIENCES & HUMANITIES	18 HRS.
*ENG 153 Introduction to Literature	(3)
*PSY 113 Principles of Psychology	(3)
*History elective	(3)
*Humanities electives	(6)
*Social Sciences electives	(3)
COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	
MATHEMATICS & SCIENCE	10 HRS.
*CH 104 General Chemistry I or *CH 104H Honors General Chemistry I	(4)
*BIO 213 Conservation	(3)
*MA 113 College Algebra (or higher)	(3)
HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)
FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)
PROFESSIONAL STUDIES REQUIREMENTS (GRADES 9-12)	37 HRS.
EDU 111 Freshman Practicum	(1)
EDU 211 Sophomore Practicum	(1)
EDU 232 Educational Psychology for Middle Grade and Secondary Teachers	(2)
EDU 301** Introduction to Teaching Practicum	(1)

EDU	303**	Introduction to Teaching	(3)
EDU	311	Junior Practicum	(1)
EDU	312	Exceptional Children in the Schools	(2)
EDU	323	Foundations of Education	(3)
EDU	333**	Reading in the Content Area	(3)
EDU	432**	Practicum in Teaching—Secondary	(2)
EDU	442**	Special Methods for the Secondary Teacher	(2)
EDU	462**	Educational Measurement	(2)
*EDU	463**	Educational Media and Technology	(3)
EDU	470**	Supervised Student Teaching	(10)
EDU	471**	Student Teaching Seminar	(1)

ADDITIONAL PROFESSIONAL STUDIES REQUIREMENTS (GRADES 5-12) 6 HRS.

EDU	412	The Middle School	(2)
EDU	422	Middle School Methods	(2)
EDU	472**	Practicum in Teaching - Middle School	(2)

**Course must be taken at Trine University

SCIENCE REQUIREMENTS 45-46 HRS.

CH	114	General Chemistry II	
or			
CH	114H	Honors General Chemistry II	(4)
CH	203	Organic Chemistry I	(3)
CH	211	Organic Chemistry I Lab	(1)
CH	213	Organic Chemistry II	(3)
CH	221	Organic Chemistry II Lab	(1)
CH	232	Quantitative Analysis	(2)
CH	351	Physical Chemistry I Lab	(1)
CH	353	Physical Chemistry I	(3)
MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
PH	224	University Physics I	(4)
PH	234	University Physics II	(4)
SC	412	Senior Research Seminar	(2)

At least two of the following courses for a total of 45 or more hours:

(39 + 3 + 3 = 45) or (39 + 3 + 4 = 46)

CH	324	Chemical Instrumental Analysis	(4)
CH	363	Physical Chemistry II	(3)
CH	434	Biochemistry	(4)

**TOTAL IN DEGREE PROGRAM: GRADES 9-12 LICENSURE 125-126 HRS.
GRADES 5-12 LICENSURE 131-132 HRS.**

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE

SCIENCE EDUCATION/PHYSICS (9-12, 5-12)

124-130 HRS.

To be eligible for licensure as a physics teacher in grades 9-12 or 5-12, the following program of study must be completed.

PROGRAM REQUIREMENTS			REQUIRED HOURS
WRITTEN COMMUNICATION			6 HRS.
*ENG	103	English Composition I	(3)
*ENG	113	English Composition II	(3)
ORAL COMMUNICATION			3 HRS.
*SP	203	Effective Speaking	
or			
*COM	163	Interpersonal Communication	(3)
COMPUTER LITERACY			3 HRS.
*INF	103	Information Technology Applications	
SOCIAL SCIENCES & HUMANITIES			18 HRS.
*ENG	153	Introduction to Literature	(3)
*PSY	113	Principles of Psychology	(3)
*History elective			(3)
*Humanities electives			(6)
*Social Sciences electives			(3)
MATHEMATICS & SCIENCE			10 HRS.
*CH	104	General Chemistry I	
or			
*CH	104H	Honors General Chemistry I	(4)
*BIO	213	Conservation	(3)
*MA	113	College Algebra (or higher)	(3)
FITNESS & RECREATIONAL PROGRAMMING			2 HRS.
*EXS	102	Lifetime Wellness	(2)
FRESHMAN STUDIES			1 HR.
UE	101	University Experience	(1)
PROFESSIONAL STUDIES REQUIREMENTS (GRADES 9-12)			37 HRS.
EDU	111	Freshman Practicum	(1)
EDU	211	Sophomore Practicum	(1)
EDU	232	Educational Psychology for Middle Grade and Secondary Teachers	(2)
EDU	301**	Introduction to Teaching Practicum	(1)

EDU	303**	Introduction to Teaching	(3)
EDU	311	Junior Practicum	(1)
EDU	312	Exceptional Children in the Schools	(2)
EDU	323	Foundations of Education	(3)
EDU	333**	Reading in the Content Area	(3)
EDU	432**	Practicum in Teaching—Secondary	(2)
EDU	442**	Special Methods for the Secondary Teacher	(2)
EDU	462**	Educational Measurement	(2)
*EDU	463**	Educational Media and Technology	(3)
EDU	470**	Supervised Student Teaching	(10)
EDU	471**	Student Teaching Seminar	(1)

ADDITIONAL PROFESSIONAL STUDIES REQUIREMENTS (GRADES 5-12) 6 HRS.

EDU	412	The Middle School	(2)
EDU	422	Middle School Methods	(2)
EDU	472**	Practicum in Teaching—Middle School	(2)

**Course must be taken at Trine University

SCIENCE REQUIREMENTS 44 HRS.

CH	114	General Chemistry II	
or			
CH	114H	Honors General Chemistry II	(4)
MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
MA	233	Differential Equations	(3)
PH	224	University Physics I	(4)
PH	234	University Physics II	(4)
PH	303	Modern Physics	(3)
PH	323	Electromagnetism	(3)
PH	333	Mechanics	(3)
PH	343	Mathematical Methods in Physics	(3)
SC	412	Senior Research Seminar	(2)

One of the following:

ECE	211/213	Circuit Analysis and Lab
or		
PH	4004	Special Topics in Physics (4)

TOTAL IN DEGREE PROGRAM:

GRADES 9-12 LICENSURE	124 HRS.
GRADES 5-12 LICENSURE	130 HRS.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE

SOCIAL STUDIES EDUCATION (9-12, 5-12)

126-135 HRS.

To be eligible for licensure as a social studies teacher in grades 9-12 or 5-12, the following program of study must be completed.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

- *ENG 103 English Composition I (3)
- *ENG 113 English Composition II (3)

ORAL COMMUNICATION

3 HRS.

- *SP 203 Effective Speaking
- or
- *COM 163 Interpersonal Communication (3)

SOCIAL SCIENCES & HUMANITIES

18 HRS.

- *PSY 113 Principles of Psychology (3)
- *ENG 153 Introduction to Literature (3)
- *HIS 103 American History I (3)
- *HIS 203 World Civilization I (3)
- *Humanities electives (6)

MATHEMATICS & SCIENCE

10 HRS.

- *MA 113 College Algebra
- or
- *MA 153 Finite Mathematics (3)
- *GEO 213 Physical Geography (3)
- *Lab Science electives (4)

GENERAL EDUCATION ELECTIVES

1 HR.

1 hour elective chosen from categories above

FRESHMAN STUDIES

1 HR.

- UE 101 University Experience (1)

PROFESSIONAL STUDIES REQUIREMENTS (GRADES 9-12)

37 HRS.

- EDU 111 Freshman Practicum (1)
- EDU 211 Sophomore Practicum (1)
- EDU 232 Educational Psychology for Middle Grade and Secondary Teachers (2)
- EDU 301** Introduction to Teaching Practicum (1)
- EDU 303** Introduction to Teaching (3)
- EDU 311 Junior Practicum (1)
- EDU 312 Exceptional Children in the Schools (2)

EDU	323	Foundations of Education	(3)
EDU	333**	Reading in the Content Area	(3)
EDU	432**	Practicum in Teaching - Secondary	(2)
EDU	442**	Special Methods for the Secondary Teacher	(2)
EDU	462**	Educational Measurement	(2)
*EDU	463**	Educational Media and Technology	(3)
EDU	470**	Supervised Student Teaching	(10)
EDU	471**	Student Teaching Seminar	(1)

ADDITIONAL PROFESSIONAL STUDIES REQUIREMENTS (GRADES 5-12) 6 HRS.

EDU	412	The Middle School	(2)
EDU	422	Middle School Methods	(2)
EDU	472**	Practicum in Teaching - Middle School	(2)

**Course must be taken at Trine University

SOCIAL STUDIES REQUIREMENTS**51-54 HRS.**

BREADTH (TAKE ALL OF THESE COURSES.)			15 HRS.
GOV	113	Introduction of Government	(3)
HIS	113	American History II	(3)
HIS	213	World Civilization II	(3)
ECO	223	Macroeconomics	(3)
SOC	103	Principles of Sociology	(3)

DEPTH (CHOOSE THREE OF THE FOLLOWING CONCENTRATIONS.)

ECONOMICS			12 HRS.
ECO	213	Microeconomics	(3)
ECO	363	Comparative Economic Systems	(3)
ECO	383	International Economics	(3)
ECO	393	Economic History of the United States	(3)

GEOGRAPHICAL PERSPECTIVES			12 HRS.
GEO	303	Human Geography	(3)
GEO	313	Geography of North America	(3)
GEO	323	World Geography	(3)
GEO	353	Political Geography	(3)

GOVERNMENT AND CITIZENSHIP			12 HRS.
GOV	313	Comparative Governments	(3)
GOV	333	State and Local Government	(3)
GOV	373	Political Psychology	(3)
GOV	403	American Constitutional Development	(3)

HISTORICAL PERSPECTIVES			15 HRS.
HIS	323	The Contemporary World (W)	(3)
HIS	343	American Political Thought (US)	(3)

HIS	363	United States Foreign Policy (US)	(3)
HIS	423	The United States as a World Power (US)	(3)
HIS	453	Readings in World History (W)	(3)

PSYCHOLOGY **12 HRS.**

PSY	323	Abnormal Psychology	(3)
PSY	333	Psychology of Personality	(3)
PSY	343	Social Psychology	(3)
PSY	353	Child and Adolescent Psychology	(3)

TOTAL IN DEGREE PROGRAM:

GRADES 9-12 LICENSURE **126-129 HRS.**

GRADES 5-12 LICENSURE **132-135 HRS.**

JANNEN SCHOOL OF ARTS & SCIENCES

Trine University's Jannen School of Arts & Sciences includes:

- Department of Criminal Justice, Psychology and Social Sciences
- Department of Health Sciences
- Department of Language and Humanities
- Department of Mathematics and Informatics
- Department of Science
- Music Program
- Academic Support Services
- English Language Center
- Learning Center
- Mathematics Help Sessions
- Study Abroad
- Writing Center

Academic programs administered by the school are as follows:

- Bachelor of Arts

Major

General Studies

- Bachelor of Science

Majors

Biology

Chemistry

Criminal Justice

Exercise Science

Forensic Science

Informatics

Mathematics

Psychology

- Associate in Arts

- Associate in Criminal Justice

- Associate in Science

- Minors in: *SEE PAGE 75*

Athletic Training

Biology

Chemistry

Criminal Justice

History

Humanities

International Studies

Mathematics

Music

Psychology

Pre-Med Professional Track

THE SCHOOL

The Jannen School of Arts and Sciences was named in honor of Robert L. Jannen, a 1950 chemical engineering graduate and member of the University's Board of Trustees, and his wife Dolores.

While Trine University is recognized for its long-standing and highly regarded programs in engineering, business, and teacher education, the Jannen School of Arts and Sciences is becoming known for its career-oriented, challenging, and competitive programs in its five departments. These quality programs prepare graduates to be successful in their careers and to pursue graduate and professional studies.

The Jannen School of Arts and Sciences has a special relationship with the Franks School of Education through secondary education majors in mathematics, science, and social studies. Dedicated faculty in the Jannen School of Arts and Sciences teach the content areas as well as the general education component for secondary education majors.

Faculty members in the Jannen School of Arts and Sciences are committed to providing an excellent foundation for all Trine University students in the areas of written and oral communication; social, historical, and global studies; the humanities; the natural sciences; and the mathematical and computational sciences. Student learning in these disciplines provides the knowledge basis for the University's general education component that complements the professional program courses for all Trine University students.

THE MISSION

In concert with the mission of Trine University, the Jannen School of Arts and Sciences provides students with the cultural, scientific, and academic platform from which to begin their journeys as lifelong learners and active contributors to the development of society.

ARTS & SCIENCES ASSOCIATE DEGREES

Jannen School of Arts & Sciences offers the following Associate degrees:

Associate in Arts

Associate in Criminal Justice

Associate in Science

In the degree program descriptions that follow, an asterisk(*) indicates courses that satisfy the university's General Education Requirements.

ASSOCIATE IN ARTS	65 HRS.
PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	
SOCIAL SCIENCES & HUMANITIES	12 HRS.
*ENG 153 Introduction to Literature	(3)
*Humanities	(3)
*Social sciences	(6)
COMPUTER LITERACY	3 HRS.
*BA 113 Business Computer Applications	
or	
*INF 103 Information Technology Applications	(3)
MATHEMATICS & SCIENCE	7 HRS.
*100 level or higher math	(3 or 4)
*Science elective(s)	(4 or 3)
FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)
ASSOCIATE IN ARTS CORE	9 HRS.
*ENG 253 Readings in World Literature	(3)
COM 213 Business Communication	(3)
*FLM 203 Film Appreciation	
or	
*SP 103 Introduction to Theater	(3)
COMMUNICATION CONCENTRATION	15 HRS.
*COM 163 Interpersonal Communication	(3)
*COM 203 Media and Communication	(3)
COM 223 Theories and Practices in Communication	(3)
*COM 233 Intercultural Communication	(3)
3 additional hours in COM, FLM, SP, or writing/language ENG courses (*ENG 133, *ENG 273, & *ENG 363)	(3)
GENERAL ELECTIVES	9 HRS.
TOTAL IN DEGREE PROGRAM:	65 HRS.

In the degree program descriptions that follow, an asterisk(*) indicates courses that satisfy the university's General Education Requirements.

ASSOCIATE IN CRIMINAL JUSTICE**66 HRS.****PROGRAM REQUIREMENTS****REQUIRED HOURS****WRITTEN COMMUNICATION****6 HRS.**

*ENG 103 English Composition I

(3)

*ENG 113 English Composition II

(3)

ORAL COMMUNICATION**3 HRS.**

*SP 203 Effective Speaking

or

*COM 163 Interpersonal Communication

(3)

SOCIAL SCIENCES & HUMANITIES**15 HRS.**

*ENG 153 Introduction to Literature

(3)

*ECO 213 Microeconomics

or

*ECO 223 Macroeconomics

(3)

*GOV 113 Introduction to Government

(3)

*PSY 113 Principles of Psychology

(3)

*3 hours of humanities electives

(3)

COMPUTER LITERACY**3 HRS.**

*INF 103 Information Technology Applications

(3)

MATHEMATICS & SCIENCE**11 HRS.**

*MA 113 College Algebra

or

*MA 153 Finite Mathematics

(3)

*BIO 104 General Biology

(4)

*CH 144 Chemistry-Ideas & Applications

(4)

LAW ENFORCEMENT**18 HRS.**

LE 103 Introduction to Criminal Justice

(3)

LE 153 Juvenile Justice

(3)

LE 253 Probation, Parole & Community Corrections

(3)

LE 263 Introduction to Criminal Law and Justice

(3)

LE 273 Criminal Procedures and Evidence

(3)

LE 343 Criminalistics and Crime Scene Investigations I

(3)

ADDITIONAL SOCIAL SCIENCES COURSES**9 HRS.**

GOV 333 State and Local Government

(3)

GOV 403 American Constitutional Development

(3)

PSY 383 Forensic Psychology

(3)

FRESHMAN STUDIES**1 HR.**

UE 101 University Experience

(1)

TOTAL IN ASSOCIATE DEGREE PROGRAM:**66 HRS.**

In the degree program descriptions that follow, an asterisk(*) indicates courses that satisfy the university's General Education Requirements.

ASSOCIATE IN SCIENCE	65 HRS.
PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
SP 203 Effective Speaking	
or	
COM 163 Interpersonal Communication	(3)
SOCIAL SCIENCES & HUMANITIES	12 HRS.
*ENG 153 Introduction to Literature	(3)
*Social Sciences or Humanities electives	(9)
Note: Of the 12 hours in Social Sciences & Humanities, 6 hours must be in Social Sciences and 6 hours must be in Humanities.	
COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	(3)
MATHEMATICS & SCIENCE	10 HRS.
*MA 113 College Algebra	(3)
Two science classes, one a lab science	(7)
ADDITIONAL MATHEMATICS OR SCIENCE COURSES	13 HRS.
The student must complete an area of emphasis which includes 20 total hours in either a science discipline or mathematics.	
FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)
GENERAL ELECTIVES	17 HRS.
TOTAL IN ASSOCIATE PROGRAM:	65 HRS.

DEPARTMENT OF CRIMINAL JUSTICE, PSYCHOLOGY, & SOCIAL SCIENCES

The Department of Criminal Justice, Psychology, & Social Sciences' mission is to provide career-oriented higher education and to deliver quality teaching to students seeking to complete the Trine University General Education requirements as well as to meet the social sciences, humanistic, global and American perspectives required by the Common Ground component in General Education. The Department of Criminal Justice, Psychology and Social Sciences provides an educational environment in which students receive individual attention as well as excellence in teaching. The Department offers programs leading to careers in criminal justice, mental health, and social sciences education, as well as a preparation for further professional training in law, public administration, psychology, history, and social service. The Department aims to prepare graduates to be productive early in their professional careers and to assume leadership roles in the public and private sector, while providing service to society.

The Department of Criminal Justice, Psychology, & Social Sciences offers the following degrees:

- Bachelor of Science

Majors

Criminal Justice

Psychology

- Bachelor of Arts

Majors

General Studies

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE— CRIMINAL JUSTICE MAJOR 124 HRS.		
PROGRAM REQUIREMENTS		REQUIRED HOURS
WRITTEN COMMUNICATION		6 HRS.
*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)
ORAL COMMUNICATION		3 HRS.
*SP 203	Effective Speaking	
or		
*COM 163	Interpersonal Communication	(3)
SOCIAL SCIENCES & HUMANITIES		21 HRS.
*ENG 153	Introduction to Literature	(3)
*GOV 113	Introduction to Government	(3)
*HIS 103	American History I and	
*HIS 113	American History II	
or		
*HIS 203	World Civilization I and	
*HIS 213	World Civilization II	(6)
*PSY 113	Principles of Psychology	
or		
*SOC 103	Principles of Sociology	(3)
*Global elective		(3)
*Humanities elective		(3)
COMPUTER LITERACY		3 HRS.
*INF 103	Information Technology Applications	(3)
MATHEMATICS & SCIENCE		10 HRS.
*MA 113	College Algebra	
or		
*MA 153	Finite Mathematics	(3)
*BIO 104	General Biology	(4)
*One additional science or mathematics course		(3)
HEALTH AND PHYSICAL EDUCATION		2 HRS.
*EXS 102	Lifetime Wellness	(2)
FRESHMAN STUDIES		1 HR.
UE 101	University Experience	(1)
CRIMINAL JUSTICE SUBJECT MATTER CONCENTRATION		49 HRS.

GOVERNMENT

GOV	333	State and Local Government	(3)
GOV	403	American Constitutional Development	(3)

LAW ENFORCEMENT

LE	103	Introduction to Criminal Justice	(3)
LE	153	Juvenile Justice	(3)
LE	253	Probation, Parole & Community Corrections	(3)
LE	263	Introduction to Criminal Law and Justice	(3)
LE	273	Criminal Procedures and Evidence	(3)
LE	343	Criminalistics and Crime Scene Investigations I	(3)
LE	473	Law Enforcement Internship I	(3)

PSYCHOLOGY

PSY	383	Forensic Psychology	(3)
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SCIENCE

CH	144	Chemistry—Ideas and Applications	(4)
Select one of the four 15-credit options below:			(15)

OPTION A—LAW ENFORCEMENT

LE	313	Police Administration
LE	353	Criminalistics & Crime Scene Investigation II
LE	423	Criminal Justice Agency Administration
PSY	443	Advanced Forensic Psychology
SOC	323	The Family

OPTION B—FORENSIC AND CORRECTIONAL PSYCHOLOGY

LE	363	Institutional Corrections and Correctional Law
PSY	323	Abnormal Psychology
PSY	413	The Psychology of Addiction
PSY	423	Counseling Theories and Practices
PSY	443	Advanced Forensic Psychology

OPTION C—AGENCY ADMINISTRATION

LE	313	Police Administration
LE	363	Institutional Corrections and Correctional Law
LE	423	Criminal Justice Agency Administration
MGT	313	Human Resources Management
MGT	363	Organizational Behavior

OPTION D—PSYCHOLOGY

PSY	323	Abnormal Psychology
PSY	333	Psychology of Personality
PSY	343	Social Psychology
PSY	353	Child and Adolescent Psychology
PSY	423	Counseling Theories and Practices

ELECTIVES**29 HRS.****TOTAL IN DEGREE PROGRAM:****124 HRS.**

In the degree program descriptions that follow, an asterisk(*) indicates courses that satisfy the University's General Education Requirements.

**BACHELOR OF SCIENCE—PSYCHOLOGY MAJOR
PROGRAM REQUIREMENTS** **124 HRS.
REQUIRED HOURS**

WRITTEN COMMUNICATION **6 HRS.**

- | | | |
|----------|------------------------|-----|
| *ENG 103 | English Composition I | (3) |
| *ENG 113 | English Composition II | (3) |

ORAL COMMUNICATION **3 HRS.**

- | | | |
|----------|-----------------------------|-----|
| *SP 203 | Effective Speaking | |
| or | | |
| *COM 163 | Interpersonal Communication | (3) |

SOCIAL SCIENCES & HUMANITIES **21 HRS.**

- | | | |
|-----------------------|----------------------------|-----|
| *ECO 213 | Microeconomics | |
| or | | |
| *ECO 223 | Macroeconomics | (3) |
| *GOV 113 | Introduction to Government | (3) |
| *HIS 103 | American History I and | |
| *HIS 113 | American History II | |
| or | | |
| *HIS 203 | World Civilization I and | |
| *HIS 213 | World Civilization II | (6) |
| *PSY 113 | Principles of Psychology | (3) |
| *Humanities electives | | (6) |

COMPUTER LITERACY **3 HRS.**

- | | | |
|----------|-------------------------------------|-----|
| *INF 103 | Information Technology Applications | (3) |
|----------|-------------------------------------|-----|

MATHEMATICS & SCIENCE **14 HRS.**

- | | | |
|--|--------------------|-----|
| *MA 113 | College Algebra | |
| or | | |
| *MA 153 | Finite Mathematics | (3) |
| *BIO 104 | General Biology | (4) |
| *Two Math/Science courses (at least one a lab science) | | (7) |

HEALTH AND PHYSICAL EDUCATION **2 HRS.**

- | | | |
|----------|-------------------|-----|
| *EXS 102 | Lifetime Wellness | (2) |
|----------|-------------------|-----|

FRESHMAN STUDIES **1 HR.**

- | | | |
|--------|-----------------------|-----|
| UE 101 | University Experience | (1) |
|--------|-----------------------|-----|

PSYCHOLOGY SUBJECT MATTER CONCENTRATION **45 HRS.**

- | | | |
|--------------|--------------------------|------|
| Primary Core | | (12) |
| PSY 113 | Principles of Psychology | |

PSY 303 Research Methods in Psychology
PSY 453 Clinical Internship
PSY 473 Psychology Capstone Demonstration

Choose two of the following 3-hour clinical courses (6)

PSY 323 Abnormal Psychology
PSY 403 Human Sexuality
PSY 413 The Psychology of Addiction
PSY 423 Counseling Theories and Practices

Choose two of the following 3-hour social core courses (6)

PSY 313 Topics in Psychology
PSY 333 Psychology of Personality
PSY 343 Social Psychology
PSY 373 Political Psychology

Choose one of the following 3-hour developmental core courses (3)

PSY 353 Child and Adolescent Psychology
SOC 323 The Family

Choose 15 hours from any 300 level or higher psychology courses (15)
or SOC 323, SOC 343, excluding subject area concentration courses chosen above.

ELECTIVES**32 HRS.**

Students wishing to pursue graduate training in psychology should take MA 113 College Algebra, MA 253 Statistics.

TOTAL IN DEGREE PROGRAM:

124 HRS.

BACHELOR OF ARTS—GENERAL STUDIES MAJOR 124 HRS.

PROGRAM REQUIREMENTS REQUIRED HOURS

OPTIONS A, B , & C

WRITTEN COMMUNICATION		6 HRS.
*ENG 103 English Composition I		(3)
*ENG 113 English Composition II		(3)
ORAL COMMUNICATION		3 HRS.
*SP 203 Effective Speaking		(3)
SOCIAL SCIENCES & HUMANITIES		24 HRS.
*ECO 213 Microeconomics		
or		
*ECO 223 Macroeconomics		(3)
*ENG 153 Introduction to Literature		(3)
*GOV 113 Introduction to Government		(3)
*HIS 103 American History I		(3)
and		
*HIS 113 American History II		(6)
*PSY 113 Principles of Psychology		(3)
*Humanities electives		(6)
COMPUTER LITERACY		3 HRS.
*INF 103 Information Technology Applications		(3)
MATHEMATICS & SCIENCE		10 HRS.
*MA 113 College Algebra		(3)
*Two science courses (at least one a lab science)		(7)
HEALTH & PHYSICAL EDUCATION		2 HRS.
*EXS 102 Lifetime Wellness		(2)
FRESHMAN STUDIES		1 HR.
UE 101 University Experience		(1)

SELECT ONE OF THE OPTIONS BELOW

OPTION A - PRE-LEGAL STUDIES CONCENTRATION

49 HRS.

SOC	103	Principles of Sociology	(3)
SOC	323	The Family	(3)
COM	213	Business Communication	(3)
COM	363	Persuasion and Argumentation	(3)
ENG	214	American Literature	(4)
GOV	333	State and Local Government	(3)
GOV	403	American Constitutional Development	(3)
PHL	313	Ethics	(3)
PHL	343	Logic	(3)

PSY	373	Political Psychology	(3)
PL	4003	Legal Capstone Experience	(3)
LE	153	Juvenile Justice	
and			
LE	263	Introduction to Criminal Law and Justice	
and			
LE	273	Criminal Procedures and Evidence	
or			
9 hours from BA or LAW.			(9)
6 hours from LE, ENG, PSY, or COM			(6)
ELECTIVES			26 HRS.

OPTION B – GENERAL SOCIAL STUDIES CONCENTRATION **45 HRS.**

15 hours from three of the following:

GOV	300 or higher level courses
HIS	300 or higher level courses
PSY	300 or higher level courses
ECO	300 or higher level courses
GEO	300 or higher level courses

ELECTIVES	30 HRS.
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OPTION C – SELF-DESIGNED STUDIES CONCENTRATION **45 HRS.**

15 TO 30 HOURS MUST BE TAKEN FROM TWO TO THREE DIFFERENT ACADEMIC DEPARTMENTS AT THE 300 LEVEL OR HIGHER

WRITTEN CAPSTONE PROJECT	3 HRS.
GS	4003 Senior Capstone Project
ELECTIVES	(3)
	27 HRS.

TOTAL IN DEGREE PROGRAM **124 HRS.**

PRE-LAW

Admission to an accredited school of law normally requires a bachelor's degree. The Association of American Law Schools does not recommend a specific major, but students will be expected to have a broad academic background, a good scholastic record, and acceptable scores on the law school admission test. Usually that type of preparation is more beneficial for a prospective law student than is the specialized study of subjects closely related to law.

Any degree program that stresses the ability to communicate both verbally and in writing, encourages an understanding of human values, promotes understanding, reasoning and critical thinking, and fosters creativity is an excellent program for a student planning to pursue a law degree after graduation.

The Department of Criminal Justice, Psychology and Social Sciences offers a General Studies major with a Concentration in Pre-Legal Studies which is designed to prepare students for law school and is recommended for students intending to go to law school who do not have a strong interest in another undergraduate discipline. The department stresses that pre-law students should seek frequent, regular advice from their advisors and from the pre-law advisor located in this department.

DEPARTMENT OF HEALTH SCIENCES

The Department of Health Sciences offers the following degree:

- Bachelor of Science
Major
Exercise Science

In the degree program descriptions that follow, an asterisk (*) indicates those courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE—EXERCISE SCIENCE MAJOR 124 HRS.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	
or	
*COM 163 Interpersonal Communication	(3)
SOCIAL SCIENCES & HUMANITIES	18 HRS.
*ENG 153 Introduction to Literature	(3)
*GOV 113 Introduction to Government	(3)
*PSY 113 Principles of Psychology	(3)
*ECO 213 Microeconomics	
or	
*ECO 223 Macroeconomics	(3)
*HIS 103 American History I	
and	
*HIS 113 American History II	
or	
*HIS 203 World Civilization I	
and	
*HIS 213 World Civilization II	(6)
COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	(3)
MATHEMATICS & SCIENCE	11 HRS.
*MA 113 College Algebra	
or	
*MA 153 Finite Mathematics	(3)
*BIO 104 General Biology	(4)
*BIO 254 Human Anatomy	(4)

FRESHMAN STUDIES

BA 101 University Experience

1 HR.
(1)**ADDITIONAL REQUIREMENTS****BUSINESS COURSES**

			13 HRS.
BA	123	Business Concepts	(3)
BA	301	Professional Development & Strategies	(1)
MGT	363	Organizational Behavior	(3)
MKT	303	Marketing	(3)
		Business Elective	(3)

EXERCISE SCIENCE

			61 HRS.
*EXS	102	Lifetime Wellness	(2)
EXS	103	Teaching of Sport Skills I	(3)
EXS	123	Teaching of Sport Skills II	(3)
EXS	131	First Aid	(1)
EXS	243	Athletic Training	(3)
EXS	273	Nutrition	(3)
EXS	332	Drug Education	(2)
EXS	333	Kinesiology	(3)
EXS	353	Exercise Physiology	(3)
EXS	373	Health Problems	(3)
EXS	383	Nutrition Counseling	(3)
EXS	402	Aerobic Leadership	(2)
EXS	433	Developing Health Promotion Programs for Adults	(3)
EXS	452	Fitness Evaluation Assessments	(2)
EXS	463	Motor Learning	(3)
EXS	464	Capstone Experience in Exercise Science	(4)
EXS	474	Internship in Exercise Science	(4)
EXS	493	Personal Training Certification	(3)
SM	253	Risk Management	(3)
SM	313	Principles of Sport & Recreation Management	(3)
SM	393	Sport Psychology	(3)
SM	412	Business Planning in Sport & Recreation	(2)

ELECTIVES (DETERMINED IN CONSULTATION WITH ADVISOR)**8 HRS.****TOTAL IN DEGREE PROGRAM:****124 HRS.**

DEPARTMENT OF MATHEMATICS & INFORMATICS

The Department of Mathematics & Informatics offers the following degree:

- Bachelor of Science

Majors

Mathematics

Informatics

BACHELOR OF SCIENCE—MATHEMATICS MAJOR **124 HRS.**

The mathematics curriculum is a broad-based program designed to advance mathematical reasoning and to develop communication skills. Recent graduates of the mathematics program have pursued graduate degrees while others have found employment as secondary school teachers, computer analysts, actuaries, statisticians with government agencies, quality-control engineers, mathematics consultants for education research companies, and supervisors in industrial plants.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	
or	
*COM 163 Interpersonal Communication	(3)
SOCIAL SCIENCES AND HUMANITIES	18 HRS.
*ENG 153 Introduction to Literature	(3)
*PSY 113 Principles of Psychology	(3)
*History elective	(3)
Social Sciences elective	(3)
Humanities electives	(6)
COMPUTER LITERACY	2-3 HRS.
*INF 132 Integrated Development (Visual Basic)	
or	
*INF 163 Structured Logic and Design (C Programming)	(2-3)
MATHEMATICS & SCIENCE	10 HRS.
*MA 312 Historical Aspects of Mathematics	(2)
Laboratory Science electives	(8)
OTHER	0-1 HR.
(Courses must be chosen from the above categories.)	

HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)
FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)
MATHEMATICS CORE	38 HRS.
(Grade of "C" or higher in all 38 hrs. of mathematics)	
MA 134 Calculus I	(4)
MA 164 Calculus II	(4)
MA 213 Calculus III	(3)
MA 233 Differential Equations	(3)
MA 303 College Geometry	(3)
MA 313 Linear Algebra	(3)
MA 403 Advanced Calculus	(3)
Mathematics electives	(15)
ELECTIVES	43 HRS.
Directed electives	(22-25)
General electives	(18-21)
(Electives are determined in consultation with an advisor and based on student career objectives.)	
TOTAL IN DEGREE PROGRAM:	124 HRS.

BACHELOR OF SCIENCE – INFORMATICS MAJOR

The Informatics program is designed to prepare students for a wide range of endeavors in the information field, including information management and technology, research and information services, interactive system design, human-computer interaction, and information science.

Graduates of the Informatics program will be qualified for jobs in the information and technology industry and in business, public service, and other various professions. Possible job titles include security and performance analyst, web developer, information management specialist, network administrator, product developer, business analyst, usability engineer, database administrator, and many others.

The program also provides strong preparation for graduate studies. Graduates will qualify to be placed in prestigious graduate schools and pursue a variety of programs, including information and management science, information science, biomedical informatics, business and accounting, information technology and technical law.

The mission of this program is to provide students with a broadly based and sophisticated understanding of information and its technology, preparing them for careers in the rapidly emerging field defined as "informatics."

BACHELOR OF SCIENCE – INFORMATICS MAJOR 124 HRS.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

PROGRAM REQUIREMENTS REQUIRED HOURS

WRITTEN & ORAL COMMUNICATION			9 HRS.
*ENG 103	English Composition I		(3)
*ENG 113	English Composition II		
or			
*ENG 133	Technical Communication		(3)
*SP 203	Effective Speaking		(3)

SOCIAL SCIENCES & HUMANITIES 18 HRS.

(Students must choose electives that satisfy the University's General Education Requirements)

*ENG 153	Introduction to Literature	(3)
*PSY 113	Principles of Psychology	(3)
*Humanities elective		(3)
*Social Sciences elective		(3)
*Social Sciences or Humanities elective		(6)

MATHEMATICS & SCIENCE 19-20 HRS.

*MA 103	Business Algebra	
or		
*MA 113	College Algebra	(3)
*MA 173	Applied Math	
or		
*MA 134	Calculus I	(3-4)
*Lab Science Elective		(4)
MA 203	Discrete Mathematics for Information Sciences	(3)

MA	253	Statistics	(3)
MA	323	Operations Research	(3)

HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)

COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	(3)

FRESHMAN STUDIES	1 HR.
*UE 101 University Experience	(1)

INFORMATICS CORE	36 HRS.
CS 1113 Object Oriented Java	(3)
INF 132 Integrated Development (Visual Basic)	(2)
INF 213 Digital Forensic Science I	(3)
INF 223 Digital Multi-Media	(3)
INF 263 Database Concepts and Applications	(3)
INF 303 Network Management	(3)
INF 313 Digital Forensic Science II	(3)
INF 343 Computer Security	(3)
INF 371 Advanced Microcomputers Lab	(1)
INF 373 Advanced Microcomputers	(3)
INF 383 Informatics Web Programming	(3)
INF 403 Advanced Database	(3)
INF 423 Informatics Capstone	(3)

STRAND (COGNATE)	24-27 HRS.
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Informatics students are encouraged to consult with their advisor to choose a minor that is appropriate to their career plan.

ELECTIVES	8-12 HRS.
(Electives are determined in consultation with an advisor and based on student career objectives.)	

TOTAL IN DEGREE PROGRAM:	124 HRS.
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DEPARTMENT OF SCIENCE

The Department of Science offers the following degree:

- Bachelor of Science
 - Majors
 - Biology
 - Chemistry
 - Forensic Science
 - Biology Concentration
 - Chemistry Concentration
 - Pre-Med Professional Track

The Science Department seeks to prepare students for a professional career by providing a science foundation consisting of a body of information and the ability to use this information to solve problems. Important concepts of this information include the theory and practice of modern laboratory procedures, professional ethics, safety, statistical data handling, and scientific report writing.

The Science Department also seeks to provide non-science majors with an understanding of science as it relates to modern society.

Students who transfer into the Department of Science are expected to take at least two 300- or 400-level courses in their science major or primary teaching area in addition to SC 412 Senior Research Seminar and SC 422 Senior Research Project or SC 4004 Science Internship.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE—BIOLOGY MAJOR **124 HRS.**
PROGRAM REQUIREMENTS **REQUIRED HOURS**

WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	
or	
*ENG 133 Technical Communication	(3)

ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	
or	
*COM 163 Interpersonal Communication	(3)

SOCIAL SCIENCES AND HUMANITIES	12 HRS.
*ENG 153 Introduction to Literature	(3)
*PSY 113 Principles of Psychology	(3)
*Global elective	(3)
*American elective	(3)

COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	(3)

MATHEMATICS AND SCIENCE	10 HRS.
*CH 104 General Chemistry I	
or	
*CH 104H Honors General Chemistry I	(4)
*MA 113 College Algebra	(3)
*MA 253 Statistics	(3)

HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)

FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)

SUBJECT AREA REQUIREMENTS	49 HRS.
CH 114 General Chemistry II	
or	
CH 114H Honors General Chemistry II	(4)
BIO 114 Principles of Biology I	(4)
BIO 124 Principles of Biology II	(4)

Choose either the two 2-credit senior research classes or
the 4-credit internship **(2-4)**

SC 412 Senior Research Seminar and
SC 422 Senior Research Project
or
SC 43X Science Internship

One of the following physiology classes: (3-4)

BIO 283 Marine Biology
BIO 304 Plant Biology
BIO 354 Human Physiology
BIO 344 Cell Biology
BIO 404 Embryology

One of the following ecology classes: (3-4)

BIO 143 Conservation
BIO 274 General Ecology
BIO 334 Environmental Biology

One of the following organism classes: (3-4)

BIO 283 Marine Biology
BIO 304 Plant Biology
BIO 314 Animal Biology
BIO 324 Microbiology

Additional BIO courses to bring the total subject area requirements to 49 credit hours. (20-26)

ELECTIVES**38 HRS.**

(Electives are determined in consultation with an advisor and based on student career objectives.)

TOTAL IN DEGREE PROGRAM:

124 HRS.

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE—CHEMISTRY MAJOR **124 HRS.**
PROGRAM REQUIREMENTS **REQUIRED HOURS**

WRITTEN COMMUNICATION	6 HRS.
*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	
or	
*ENG 133 Technical Communication	(3)

ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	
or	
*COM 163 Interpersonal Communication	(3)

SOCIAL SCIENCES AND HUMANITIES	18 HRS.
*ENG 153 Introduction to Literature	(3)
*PSY 113 Principles of Psychology	(3)
*History elective	(3)
*Social sciences elective	(3)
*Humanities electives	(6)

COMPUTER LITERACY	3 HRS.
*INF 103 Information Technology Applications	(3)

MATHEMATICS AND SCIENCE	10 HRS.
*CH 104 General Chemistry I	
or	
*CH 104H Honors General Chemistry I	(4)
*MA 113 College Algebra	(3)
*MA 123 Trigonometry	(3)

HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)

FRESHMAN STUDIES	1 HRS.
UE 101 University Experience	(1)

SUBJECT AREA REQUIREMENTS	59 HRS.
CH 114 General Chemistry II	
or	
CH 114H Honors General Chemistry II	(4)
CH 203 Organic Chemistry I	(3)
CH 211 Organic Chemistry I Laboratory	(1)
CH 213 Organic Chemistry II	(3)

CH	221	Organic Chemistry II Laboratory	(1)
CH	234	Quantitative Chemical Analysis	(4)
CH	244	Inorganic Chemistry	(4)
CH	324	Chemical Instrumental Analysis	(4)
CH	351	Physical Chemistry I Laboratory	(1)
CH	353	Physical Chemistry I	(3)
CH	361	Physical Chemistry II Laboratory	(1)
CH	363	Physical Chemistry II	(3)
CH	434	Biochemistry	(4)
MA	134	Calculus I	(4)
MA	164	Calculus II	(4)
MA	213	Calculus III	(3)
PH	224	University Physics I	
or			
PH	224H	Honors University Physics I	(4)
PH	234	University Physics II	
or			
PH	234H	Honors University Physics II	(4)
Choose either the two 2-credit research classes or the 4-credit internship			(4)
SC	412	Senior Research Seminar and	
SC	422	Senior Research Project	
or			
SC	4004	Science Internship	

ELECTIVES**22 HRS.**

(Electives are determined in consultation with an advisor and based on student career objectives.)

TOTAL IN DEGREE PROGRAM:**124 HRS.**

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

BACHELOR OF SCIENCE - FORENSIC SCIENCE MAJOR -

BIOLOGY CONCENTRATION

126 HRS.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

*ENG 103 English Composition I (3)

*ENG 113 English Composition II (3)

or

*ENG 133 Technical Communication (3)

ORAL COMMUNICATION

3 HRS.

*SP 203 Effective Speaking (3)

SOCIAL SCIENCES AND HUMANITIES

16 HRS.

*ENG 153 Introduction to Literature (3)

LE 273 Criminal Procedures & Evidence (3)

*PSY 113 Principles of Psychology (3)

*Global elective (3)

*American elective (3)

*General elective (1)

COMPUTER LITERACY

3 HRS.

*INF 103 Information Technology Applications (3)

MATHEMATICS

4 HRS.

MA 124 Precalculus (4)

HEALTH & PHYSICAL EDUCATION

2 HRS.

*EXS 102 Lifetime Wellness (2)

ADDITIONAL REQUIREMENTS:

1 HR.

Freshman Studies

UE 101 University Experience (1)

SUBJECT AREA REQUIREMENTS

NATURAL SCIENCE CORE COURSES

39 HRS.

BIO 114 Principles of Biology I (4)

BIO 254 Anatomy (4)

*CH 104 General Chemistry I

or

*CH 104H Honors General Chemistry I (4)

CH 114 General Chemistry II

or

CH 114H Honors General Chemistry II (4)

CH	203	Organic Chemistry I	(3)
CH	211	Organic Chemistry I Laboratory	(1)
CH	213	Organic Chemistry II	(3)
CH	221	Organic Chemistry II Laboratory	(1)
*MA	134	Calculus I	(4)
*MA	253	Statistics	(3)
PH	154	College Physics I	(4)
PH	164	College Physics II	(4)

SPECIALIZED SCIENCE COURSES**12 HRS.**

BIO	414	Genetics	(4)
BIO	434	Biochemistry	(4)
CH	234	Quantitative Analysis	(4)

FORENSIC SCIENCE COURSES**20 HRS.**

BIO	374	Forensic Biology	(4)
FS	203	Principles of Forensic Science I	(3)
FS	223	Principles of Forensic Science II	(3)
FS	423	Forensic Professional Practice	(3)
FS	373	Forensic Comparative Science	(3)
SC	4004	Science Internship	(4)

ADDITIONAL COURSES**20 HRS.**

BIO	324	Microbiology	(4)
BIO	344	Cell Biology	(4)
BIO	443	Pathology	(3)
BIO	454	Molecular Biology	(4)
CH	324	Chemical Instrumental Analysis	(4)
FS	351	Criminalistics and Crime Scene Laboratory	(1)

Background checks similar to those required for law enforcement officers are likely to be a condition of employment.

TOTAL IN DEGREE PROGRAM:**126 HRS.**

In the degree program descriptions that follow, an asterisk (*) indicates courses that satisfy the University's General Education Requirements.

**BACHELOR OF SCIENCE - FORENSIC SCIENCE MAJOR -
CHEMISTRY CONCENTRATION** **129 HRS.**

PROGRAM REQUIREMENTS **REQUIRED HOURS**

WRITTEN COMMUNICATION **6 HRS.**

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	
or		
*ENG 133	Technical Communication	(3)

ORAL COMMUNICATION **3 HRS.**

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES AND HUMANITIES **15 HRS.**

*ENG 153	Introduction to Literature	(3)
LE 273	Criminal Procedures & Evidence	(3)
*PSY 113	Principles of Psychology	(3)
*Global elective		(3)
*American elective		(3)

COMPUTER LITERACY **3 HRS.**

*INF 103	Information Technology Applications	(3)
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MATHEMATICS **4 HRS.**

*MA 124	Precalculus	(4)
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HEALTH & PHYSICAL EDUCATION **2 HRS.**

*EXS 102	Lifetime Wellness	(2)
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ADDITIONAL REQUIREMENTS: **1 HR.**

Freshman Studies		
UE 101	University Experience	(1)

SUBJECT AREA REQUIREMENTS

NATURAL SCIENCE CORE COURSES **42 HRS.**

BIO 114	Principles of Biology I	(4)
*CH 104	General Chemistry I	
or		
*CH 104H	Honors General Chemistry I	(4)
CH 114	General Chemistry II	
or		
CH 114H	Honors General Chemistry II	(4)
CH 203	Organic Chemistry I	(3)
CH 211	Organic Chemistry I Laboratory	(1)
CH 213	Organic Chemistry II	(3)
CH 221	Organic Chemistry II Laboratory	(1)

*MA 134	Calculus I	(4)
MA 164	Calculus II	(4)
*MA 253	Statistics	(3)
MA 213	Calculus III	(3)
PH 224	University Physics I	(4)
PH 234	University Physics II	(4)

SPECIALIZED SCIENCE COURSES**12 HRS.**

CH 234	Quantitative Analysis	(4)
CH 244	Inorganic Chemistry	(4)
CH 434	Biochemistry	(4)

FORENSIC SCIENCE COURSES**20 HRS.**

CH 374	Forensic Chemistry	(4)
FS 203	Principles of Forensic Science I	(3)
FS 223	Principles of Forensic Science II	(3)
FS 423	Forensic Professional Practice	(3)
FS 373	Forensic Comparative Science	(3)
SC 4004	Science Internship	(4)

ADDITIONAL COURSES**21 HRS.**

BIO 364	Toxicology	(4)
CH 324	Chemical Instrumental Analysis	(4)
CH 351	Physical Chemistry I Lab	(1)
CH 353	Physical Chemistry I	(3)
CH 424	Advanced Instrumental Analysis	(4)
CH 474	Advanced Forensic Chemistry	(4)
FS 351	Criminalistics and Crime Scene Laboratory	(1)

Background checks similar to those required for law enforcement officers are likely to be a condition of employment.

TOTAL IN DEGREE PROGRAM:**129 HRS.**

PRE-MED PROFESSIONAL TRACK**32 HRS.**

The Pre-Medical Professional Track is designed for students interested in preparing themselves for a career in the health sciences and can be associated with any major offered at Trine University.

PROGRAM REQUIREMENTS**REQUIRED HOURS**

General chemistry	(8)
Organic chemistry	(8)
Physics	(8)
Biological sciences	(8)

TOTAL IN DEGREE PROGRAM:**32 HRS.**

Also, students must maintain a cumulative GPA of 3.5 or better to stay in the track. They are evaluated during their senior years via benchmark interviews that address the following characteristics of a successful medical school applicant: MCAT preparation; development of personal and professional qualities; medical or graduate school applicants; portfolio comprehensiveness; and community services, research, and leadership experiences.

KETNER SCHOOL OF BUSINESS

Trine University's Ketner School of Business includes two departments:

- Department of Business & Finance
- Department of Sport Management & Public Relations

The Ketner School of Business administers these academic programs:

Bachelor of Arts

 Major

 Communication

Bachelor of Science

 Major

 Communication

Bachelor of Science in Business Administration

 Majors

 Accounting

 Business Administration

 Entrepreneurship

 Finance

 Golf Management

 Management

 Marketing

 Sport Management

- Associate Degrees

 Accounting

 Business Administration

- Minors *SEE PAGE 75

 Accounting

 Business

 Entrepreneurship

 Economics

 Finance

 Golf Management

 Leadership

 Management

 Marketing

THE SCHOOL

Trine University's Ketner School of Business was named in honor of Dr. Ralph W. Ketner, a distinguished alumnus and friend of the University. Dr. Ketner is a co-founder of Food Lion, one of the US's largest supermarket chains.

Courses in accounting and business law date from when the school first opened its doors on June 17, 1884, making the business program the school's oldest continuous course of study.

The Ketner School of Business at Trine University is accredited by the Accreditation Council for Business Schools and Programs (ACBSP), www.acbsp.org, for the following majors: Accounting, Business

Administration, Entrepreneurship, Finance, Golf Management, Management, Marketing, and Sport Management.

MISSION

The mission of the Trine University Ketner School of Business is to prepare students for professional careers in business and related fields and to assist them in personal and professional development.

COURSES OF STUDY

The Ketner School of Business offers the programs of study listed at the beginning of this section. In addition, students may earn minors shown in the programs of study list. A 2.0 cumulative grade point average for all courses in the minor program is required for a minor to be awarded. For transfer students, at least 15 hours of the courses toward a minor must be taken at Trine University. Internship credit of up to six hours can be applied toward a minor, but the internship cannot be double counted (i.e. the hours can be applied to either a major or a minor, but not both).

In cooperation with the School of Engineering, the Ketner School of Business offers a minor in entrepreneurship. The entrepreneurship minor is designed for students who have an interest in owning a business at some point in the future. The entrepreneurship minor is available for all Trine University students regardless of major. Information regarding the entrepreneurship minor is found on page 69 of this catalog.

DEGREE REQUIREMENTS

Each of the bachelor degrees in the Ketner School of Business requires 124 semester hours unless otherwise specified. Associate degrees in the School of Business require 64 semester hours. Students are expected to earn a grade of "C" or better in all courses required for their major.

The requirements for both the bachelor degrees and associate degrees involve the following:

1. A liberal arts and sciences curriculum which serves to enrich the academic program so that it constitutes a basic cultural education. Courses in written and oral communication, humanities, social sciences, natural sciences and mathematics provide basic tools needed for applying knowledge in business administration toward worthwhile goals. The foundation of this curriculum is the general education requirements.
2. A business curriculum that provides the fundamentals through which the entire business enterprise operates.
3. A business specialty curriculum that supplements the business curriculum and allows students to develop a deeper understanding in a specialized area.
4. Business electives that provide for program flexibility and allow students to complement the required credits.

In developing an academic program, each student shall have the assistance of a faculty advisor. The student, however, has the ultimate responsibility for meeting specific degree requirements. Prerequisites for individual courses must be carefully observed.

DOUBLE MAJORS

Ketner School of Business students may receive double majors. To receive a double major (e.g., management and finance), a student must meet all requirements in both majors and have a minimum of

135 semester hours of credit. Business electives may count in only one major; a single business elective cannot meet the elective requirements for two business majors.

However, a required course in one major can count as an elective in another major.

INTERNSHIPS

The Ketner School of Business requires every business student to enter into an internship during his/her course of study at Trine University.

The value of an internship to the student, to the sponsoring entity, and to the University/School of Business is considerable.

- The intern gains by actual work experience in a real-world capacity, thus clearly establishing true expectations of the job and profession;
- The company gains by being exposed early to potential employees and by having a chance to evaluate them; and
- The University gains by brokering potential employees and employers and assisting the community.

Internships are quickly becoming a requirement before a student can be considered for a permanent position by many companies.

A maximum of six semester credit hours can be earned toward degree requirements with a maximum of three hours in any one work session. (Golf Management internships are taken for six semester hours.) Internships can take place during any semester but are especially encouraged during the summer. Prerequisites include a 2.5 GPA or higher, sophomore or above class standing, and recommendation and approval by the Dean of the Ketner School of Business.

PREPARATION PROGRAM FOR NON-BUSINESS MAJORS WHO WISH TO PURSUE A MASTER'S OF BUSINESS ADMINISTRATION (MBA)

Students who would like to enter an MBA program after graduation should consider taking the following courses. Prerequisites as shown in the Course Description section of this catalog must be carefully observed.

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	343	International Business	(3)
ECO	213	Microeconomics	(3)
ECO	223	Macroeconomics	(3)
FIN	303	Managerial Finance	(3)
LAW	203	Business Law I	(3)
MA	253	Statistics	(3)
MGT	353	Designing Operations	(3)
MGT	363	Organizational Behavior	(3)
MKT	303	Marketing	(3)

KETNER SCHOOL OF BUSINESS ASSOCIATE DEGREES

ASSOCIATE IN ACCOUNTING

64 HRS.

The associate in accounting program is designed to prepare students for immediate entry into the accounting field. It combines a concentration in accounting and computer science with business, economics and general education subjects. This program is especially appropriate for positions in businesses that require a small but knowledgeable accounting staff. As all of the credits are fully transferable to the four-year accounting major at Trine University, it serves as an excellent program for students who subsequently plan to seek a Bachelor of Science degree with an accounting major. A specified number of credit hours must be taken in each section described below. Prerequisites as shown in the Catalog Descriptions section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section.

In the degree program descriptions that follow, an asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS

REQUIRED HOURS

WRITTEN COMMUNICATION

6 HRS.

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)

HUMANITIES

2 HRS.

*Any of the humanities courses listed in the General Education Requirements found on page 50.

MATHEMATICS & SCIENCE

7 HRS.

*Must include a minimum of three hours of science and a minimum of three hours of mathematics for a combined minimum of seven hours.

MA 103	Business Algebra	(3)
Science elective		(4)

COMPUTER LITERACY

3 HRS.

*BA 113	Business Computer Applications	
or		
*INF 103	Information Technology Applications	(3)

PROGRAM REQUIREMENTS

10 HRS.

UE 101	University Experience	(1)
COM 213	Business Communication	(3)
*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)

ASSOCIATE BUSINESS CORE

18 HRS.

AC 203	Accounting I	(3)
AC 213	Accounting II	(3)
BA 123	Business Concepts	(3)
LAW 203	Business Law I	(3)
MGT 363	Organizational Behavior	(3)

MK	303	Marketing	(3)
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REQUIRED ACCOUNTING COURSES	15 HRS.
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AC	303	Cost Accounting I	(3)
AC	323	Intermediate Accounting I	(3)
AC	333	Intermediate Accounting II	(3)
AC	373	Accounting Information Systems	(3)
AC	423	Income Tax	(3)

BUSINESS ELECTIVES	3 HRS.
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Students, with approval from their advisors, must select a minimum of three credit hours of electives from courses prefixed by AC, BA, INF, ENT, ECO, FIN, LAW, MGT, or MK.

TOTAL IN DEGREE PROGRAM	64 HRS.
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ASSOCIATE IN BUSINESS ADMINISTRATION **64 HRS.**

The associate in business administration degree program is designed to prepare a person for entry into business with a broad understanding of various business activities and their interrelationships. It combines course work in accounting, finance, marketing, business law, and management. Courses in economics, psychology, mathematics, computer science and communication are all part of this curriculum. Both traditional and non-traditional students will find this program of interest. All credits are transferable to a Trine University four-year business administration degree for those who choose to continue their education. A specified number of credit hours must be taken in each of the following sections. Prerequisites as shown in the Course Descriptions section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section. In the degree program descriptions that follow, an asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS
REQUIRED HOURS
WRITTEN COMMUNICATION
6 HRS.

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)

HUMANITIES
2 HRS.

*Any of the humanities courses listed in the general education requirements found on page 50.

COMPUTER LITERACY
3 HRS.

*BA 113	Business Computer Applications
or	

*INF 103	Information Technology Applications	(3)
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MATHEMATICS AND SCIENCE ELECTIVES
7 HRS.

*Must include a minimum of 3 hours of science and a minimum of 3 hours of mathematics for a combined minimum of 7 hours.

MA 103	Business Algebra	(3)
Science elective		(4)

PROGRAM REQUIREMENTS
10 HRS.

UE 101	University Experience	(1)
COM 213	Business Communication	(3)
*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)

ASSOCIATE BUSINESS CORE
18 HRS.

AC 203	Accounting I	(3)
AC 213	Accounting II	(3)
BA 123	Business Concepts	(3)
LAW 203	Business Law I	(3)
MGT 363	Organizational Behavior	(3)
MKT 303	Marketing	(3)

BUSINESS ELECTIVES
18 HRS.

Students, with approval from their advisors, must select a minimum of 18 hours of electives from courses in business administration, computer science and economics prefixed by AC, BA, INF, ENT, ECO, FIN, LAW, MGT, or MK.

TOTAL IN DEGREE PROGRAM:
64 HRS.

DEPARTMENT OF BUSINESS & FINANCE

The Department of Business & Finance offers the following bachelor degrees:

- Bachelor of Science in Business Administration

Majors

Accounting
Business Administration
Entrepreneurship
Finance
Management

CURRICULUM

A specified number of credit hours must be taken in each section described below. Prerequisites as shown in the course description section of this catalog must be carefully observed. Excess credit hours in a section may not ordinarily be counted toward requirements in another section; excess credit hours may be counted under the non-specified electives category.

BUSINESS CORE, GENERAL EDUCATION, & ELECTIVES 91 HRS.

For all four-year business administration degrees in the Ketner School of Business, students must fulfill the General Education requirements and the business core. Those requirements are presented below.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION—

ACCOUNTING MAJOR 124 HRS.

In the dynamic and increasingly complex business world, students need to acquire a broad education in addition to specialized skills and knowledge of the profession. Accounting education provides the technical skills necessary to function in today's business environment and provides an understanding of all aspects of business.

UNIFORM CERTIFIED PUBLIC ACCOUNTING EXAMINATION CANDIDATES

The state of Indiana and many other states require that a first-time Uniform Certified Public Accounting (CPA) Examination candidate must have at least 150 semester hours of college education, including a baccalaureate or higher degree, with an accounting concentration or its equivalent. An accounting major wishing to meet this requirement should plan an individualized program with his or her advisor.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	9 HRS.

*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
COM 213 Business Communication	(3)

ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	(3)

SOCIAL SCIENCES & HUMANITIES	12 HRS.
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Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY		6 HRS.
*BA 113	Business Computer Applications	(3)
*INF 233	Advanced Spreadsheet for Business	(3)

MATHEMATICS & SCIENCE		12-13 HRS.
Must include a minimum of 3 hours of science and 3 hours of mathematics.		
*MA 103	Business Algebra	(3)
*MA 173	Applied Mathematics	(3)
*MA 253	Statistics	(3)
*Science Elective		(3-4)

*GENERAL EDUCATION ELECTIVES		3 HRS.
ADDITIONAL PROGRAM REQUIREMENTS		

ADDITIONAL PROGRAM REQUIREMENTS		5 HRS.
BA 101	University Experience	(1)
BA 123	Business Concepts	(3)
BA 301	Professional Development and Strategies	(1)

FREE ELECTIVES		10-11 HRS.
In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.		

BUSINESS CORE		30 HRS.
AC 203	Accounting I	(3)
AC 213	Accounting II	(3)
BA 343	International Business	(3)
BA 311X	Business Internship	(3)
FIN 303	Managerial Finance	(3)
LAW 203	Business Law I	(3)

MGT	353	Designing Operations	(3)
MGT	363	Organizational Behavior	(3)
MGT	453	Strategic Management	(3)
MKT	303	Marketing	(3)

ACCOUNTING AND FINANCE**33 HRS.**

AC	303	Cost Accounting	(3)
AC	323	Intermediate Accounting I	(3)
AC	333	Intermediate Accounting II	(3)
AC	373	Accounting Information Systems	(3)
AC	403	Advanced Accounting	(3)
AC	423	Income Tax	(3)
AC	463	Auditing	(3)
FIN	313	Corporate Finance	(3)
FIN	343	International Finance	(3)
FIN	353	Personal Finance	(3)

Electives from 300- or 400-level courses
prefixed by AC, BA, ENT, INF, FIN, LAW, MGT, MK

(3)

TOTAL IN DEGREE PROGRAM**124 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION—
BUSINESS ADMINISTRATION MAJOR 124 HRS.**

The Bachelor of Science in Business Administration prepares capable students for responsible positions in business, industry, and public service. A student who does not choose to follow a major/concentration track will take all General Education courses and all Business Core courses. The remaining credit hours will be determined by the student and their advisor with all major business courses at the 300 and 400 level.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	9 HRS.

*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
COM 213 Business Communication	(3)

ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	(3)

SOCIAL SCIENCES & HUMANITIES	12 HRS.
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Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213 Microeconomics	(3)
*ECO 223 Macroeconomics	(3)
*PSY 113 Principles of Psychology	(3)
*Foreign Language	(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY	6 HRS.
*BA 113 Business Computer Applications	(3)
*INF 233 Advanced Spreadsheet for Business	(3)

MATHEMATICS & SCIENCE	12-13 HRS.
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Must include a minimum of 3 hours of science and 3 hours of mathematics.

*MA 103	Business Algebra	(3)
*MA 173	Applied Mathematics	(3)
*MA 253	Statistics	(3)
*Science Elective		(3-4)

***GENERAL EDUCATION ELECTIVES** **3 HRS.**

ADDITIONAL PROGRAM REQUIREMENTS			5 HRS.
BA 101	University Experience		(1)
BA 123	Business Concepts		(3)
BA 301	Professional Development and Strategies		(1)

FREE ELECTIVES **10-11 HRS.**

In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.

BUSINESS CORE			30 HRS.
AC 203	Accounting I		(3)
AC 213	Accounting II		(3)
BA 343	International Business		(3)
BA 311X	Business Internship		(3)
FIN 303	Managerial Finance		(3)
LAW 203	Business Law I		(3)
MGT 353	Designing Operations		(3)
MGT 363	Organizational Behavior		(3)
MGT 453	Strategic Management		(3)
MKT 303	Marketing		(3)

PROGRAM OF STUDY (DEVELOPED UNDER THE GUIDANCE OF ADVISOR) **33 HRS.**

TOTAL IN DEGREE PROGRAM **124 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION—
ENTREPRENEURSHIP MAJOR 124 HRS.**

The entrepreneurship major is ideal for students wanting to acquire sound business knowledge and understand the art and science of small of self-employment. This major is for students wishing to own or run their own business. KSB provides students with a working knowledge of business ownership and focuses on innovating, visioning, venture creation, effective leadership and risk taking.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS	REQUIRED HOURS
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WRITTEN COMMUNICATION 9 HRS.

*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
COM 213 Business Communication	(3)

ORAL COMMUNICATION 3 HRS.

*SP 203 Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES 12 HRS.

Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213 Microeconomics	(3)
*ECO 223 Macroeconomics	(3)
*PSY 113 Principles of Psychology	(3)

*Foreign Language	(3)
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Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY 6 HRS.

*BA 113 Business Computer Applications	(3)
*INF 233 Advanced Spreadsheet for Business	(3)

MATHEMATICS & SCIENCE 12-13 HRS.

Must include a minimum of 3 hours of science and 3 hours of mathematics.

*MA 103 Business Algebra	(3)
*MA 173 Applied Mathematics	(3)
*MA 253 Statistics	(3)

*Science Elective (3-4)

***GENERAL EDUCATION ELECTIVES** **3 HRS.**

ADDITIONAL PROGRAM REQUIREMENTS **5 HRS.**

BA 101	University Experience	(1)
BA 123	Business Concepts	(3)
BA 301	Professional Development and Strategies	(1)

FREE ELECTIVES **10-11 HRS.**

In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.

BUSINESS CORE **30 HRS.**

AC 203	Accounting I	(3)
AC 213	Accounting II	(3)
BA 343	International Business	(3)
BA 311X	Business Internship	(3)
FIN 303	Managerial Finance	(3)
LAW 203	Business Law I	(3)
MGT 353	Designing Operations	(3)
MGT 363	Organizational Behavior	(3)
MGT 453	Strategic Management	(3)
MK 303	Marketing	(3)

ENTREPRENEURSHIP **33 HRS.**

AC 353	Tax and Legal Issues for Small Business	(3)
ENT 303	Entrepreneurship Leadership	(3)
ENT 323	Engineering Concepts	(3)
ENT 413	Creativity – Product/Service Development	(3)
ENT 423	Entrepreneurship Venture Planning	(3)
ENT 463	Internship	(3)
FIN 433	Venture Finance	(3)
MGT 333	Supervision	(3)
MK 463	Applied Market Research	(3)

Elective Courses - choose two of the courses (6)

AC 303	Cost Accounting
AC 423	Income Tax
FIN 323	Money and Banking
FIN 353	Personal Finance
MK 313	Retail Management
MGT 313	Human Resource Management
MGT 443	Managing Operations
MK 363	Buyer Behavior
MK 423	Personal Selling

TOTAL IN DEGREE PROGRAM: **124 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS
ADMINISTRATION—FINANCE MAJOR**
124 HRS.

The finance major provides students with a working understanding of the financial decision-making process, how financial markets function, and the acquisition and management of capital. Students may elect course concentrations in investment analysis and portfolio management, financial institutions and services, or corporate financial management. Students will be prepared for a variety of careers in business and in the government sector in areas such as financial analysis, capital budgeting, banking, mergers and acquisitions, cash management, financial planning, investment analysis and portfolio management, brokerage, real estate and insurance. A major in finance is also excellent preparation for graduate study in finance, business administration, or corporate and securities law.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS
REQUIRED HOURS
WRITTEN COMMUNICATION
9 HRS.

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)
COM 213	Business Communication	(3)

ORAL COMMUNICATION
3 HRS.

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES
12 HRS.

Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY
6 HRS.

*BA 113	Business Computer Applications	(3)
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*INF	233	Advanced Spreadsheet for Business	(3)
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MATHEMATICS & SCIENCE **12-13 HRS.**

Must include a minimum of 3 hours of science and 3 hours of mathematics.

*MA	103	Business Algebra	(3)
*MA	173	Applied Mathematics	(3)
*MA	253	Statistics	(3)
*Science Elective			(3-4)

GENERAL EDUCATION ELECTIVES** **3 HRS.*ADDITIONAL PROGRAM REQUIREMENTS** **5 HRS.**

BA	101	University Experience	(1)
BA	123	Business Concepts	(3)
BA	301	Professional Development and Strategies	(1)

FREE ELECTIVES **10-11 HRS.**

In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.

BUSINESS CORE **30 HRS.**

AC	203	Accounting I	(3)
AC	213	Accounting II	(3)
BA	343	International Business	(3)
BA	311X	Business Internship	(3)
FIN	303	Managerial Finance	(3)
LAW	203	Business Law I	(3)
MGT	353	Designing Operations	(3)
MGT	363	Organizational Behavior	(3)
MGT	453	Strategic Management	(3)
MKT	303	Marketing	(3)

FINANCE AND ACCOUNTING **33 HRS.**

AC	303	Cost Accounting	(3)
AC	423	Income Tax	(3)
FIN	313	Corporate Finance	(3)
FIN	323	Money and Banking	(3)
FIN	343	International Finance	(3)
FIN	353	Personal Finance	(3)
FIN	403	Investments	(3)
FIN	473	Finance Technologies	(3)
Finance electives			(6)

Choose any 300- and 400-level courses
prefixed by AC, BA, INF, ENT, FIN, LAW, MGT or MK

TOTAL IN DEGREE PROGRAM **124 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS
ADMINISTRATION—MANAGEMENT MAJOR** **124 HRS.**

Management pervades all facets of a business organization. Operations management studies the manufacturing and service processes where many new quantitative techniques are applied. Human resources involves the study of the human factor in business organizations. Students who select this major are preparing themselves for positions in firms regardless of size or organizational structure.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS **REQUIRED HOURS**

WRITTEN COMMUNICATION **9 HRS.**

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)
COM 213	Business Communication	(3)

ORAL COMMUNICATION **3 HRS.**

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES **12 HRS.**

Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY	6 HRS.
*BA 113	Business Computer Applications
*INF 233	Advanced Spreadsheet for Business

MATHEMATICS & SCIENCE **12-13 HRS.**

Must include a minimum of 3 hours of science and 3 hours of mathematics.

*MA 103	Business Algebra	(3)
*MA 173	Applied Mathematics	(3)

*MA 253	Statistics	(3)
*Science Elective		(3-4)

*GENERAL EDUCATION ELECTIVES	3 HRS.
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ADDITIONAL PROGRAM REQUIREMENTS	5 HRS.
BA 101	University Experience (1)
BA 123	Business Concepts (3)
BA 301	Professional Development and Strategies (1)

FREE ELECTIVES	10-11 HRS.
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In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.

BUSINESS CORE	30 HRS.
AC 203	Accounting I (3)
AC 213	Accounting II (3)
BA 343	International Business (3)
BA 311X	Business Internship (3)
FIN 303	Managerial Finance (3)
LAW 203	Business Law I (3)
MGT 353	Designing Operations (3)
MGT 363	Organizational Behavior (3)
MGT 453	Strategic Management (3)
MK 303	Marketing (3)

MANAGEMENT	33 HRS.
BA 403	Business and Public Policy (3)
ENT 303	Entrepreneurial Leadership (3)
MGT 313	Human Resources Management (3)
MGT 343	Human Resource Development (3)
MGT 413	Management of Quality (3)
MGT 443	Managing Operations (3)
MK 363	Buyer Behavior (3)
MK 423	Personal Selling (3)
Management electives	(3)
Any 300- and 400-level courses prefixed by AC, BA, INF, ENT, FIN, LAW, MGT or MK	(6)

TOTAL IN DEGREE PROGRAM	124 HRS.
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DEPARTMENT OF

SPORT MANAGEMENT & PUBLIC RELATIONS

The Sport Management & Public Relations offers the following degrees:

- Bachelor of Arts
Major
Communication
- Bachelor of Science
Major
Communication
- Bachelor of Science in Business Administration
Majors
Golf Management
Marketing
Sport Management

The Sport Management & Public Relations faculty has identified its mission as providing students a well-rounded preparation for a successful career in a variety of professions, including public relations, management, corporate communication, journalism and broadcasting.

The faculty fosters individual attention designed to support students with a multidisciplinary approach to problem solving and critical thinking required to translate what is learned into effective action. Three Communication options or tracks are available (Public Relations/Journalism, Corporate Communication and Applied Communication) with each designed for students to acquire leadership skills necessary to attain career goals and excel in various forms of electronic and print media.

We believe a student's education is the responsibility of all members of the campus community and is accomplished in a variety of ways, including Communication Department assignments with campus radio station, newspaper, yearbook, Trine University's marketing department, athletic department, and a variety of internships with professional organizations throughout the region.

In the degree program descriptions that follow, an asterisk (*) indicates those courses that satisfy the University's General Education Requirements.

BACHELOR OF ARTS—COMMUNICATION MAJOR 124 HRS.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS REQUIRED HOURS
WRITTEN COMMUNICATION 6 HRS.

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)

ORAL COMMUNICATION 3 HRS.

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES 12 HRS.

*COM 233	Intercultural Communication	(3)
*ENG 153	Introduction to Literature	(3)
*PSY 113	Principles of Psychology	(3)
Choose one of the four following courses:		(3)
*ECO 213	Microeconomics	
*ECO 223	Macroeconomics	
*GOV 113	Introduction to Government	

COMPUTER LITERACY 3 HRS.

*BA 113	Business Computer Applications	
Or		
*INF 103	Information Technology Applications	(3)

MATHEMATICS & SCIENCE 10 HRS.

Ten (10) hours must include a minimum of three (3) hours of science and 3 hours of mathematics; MA 253 Statistics is recommended for students with the math prerequisites.

GENERAL EDUCATION ELECTIVES 9 HRS.

FLM 203	Film Appreciation	(3)
COM 203	Media and Communication	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

FRESHMAN STUDIES

UE	101	University Experience	1 HR.
			(1)

COMMUNICATION—SUBJECT MATTER CONCENTRATION**46 HRS.**

*COM	123	Introduction to Electronic Media	(3)
COM	153	Principles of Public Relations	(3)
*COM	163	Interpersonal Communication	(3)
COM	213	Business Communication	(3)
COM	263	Theories and Practices in Communication	(3)
*COM	363	Persuasion and Argumentation	(3)
Three (3) hours in Communication Practica (from COM 101, COM 301, and/or COM 422)			(3)

Choose one of the three tracks below

PUBLIC RELATIONS AND JOURNALISM TRACK**(25 HRS)**

BA	113	Business Computer Applications	
COM	183	Writing for the Media	(3)
COM	253	Sports Media and Promotion	(3)
COM	353	Public Relations Writing and Production	(3)
COM	413	Corporate and Organizational Communication	(3)
COM	453	Public Relations Planning and Campaigns	(3)

Public Relations Capstone: project or internship must be related to public relations or journalism
COM 4281 Senior Communication Project Proposal

and

COM 4292 Senior Communication Project

or

COM 4013 Senior Capstone Internship in Communication (3)

Choose at least seven hours from the following courses: (7)

COM 253 Sports Media and Promotion

COM 283 Sports Writing

COM 301 Campus Media Internship (any hours beyond the core requirement)

COM 323 Business of Electron Media

COM 373 Topics in Communication

COM 422 Campus Media Management (any hours beyond the core requirement)

COM 400X Internship in Communication varies (1-3 hours)

COM 410X Independent Studies in Communication

INF 273 Video Editing I

MA 253 Statistics

MK 303 Marketing

MK 323 Integrated Marketing Communications

MK 433 Personal Selling

MK 463 Marketing Research

PSY 343 Social Psychology

SM 313 Principles of Sport and Recreation Management

The MK courses are recommended for careers in Public Relations and Integrated Marketing Communications.

Public Relations and Journalism students are encouraged to minor in Marketing. At least three hours of internship in COM 400X or COM 4013, and preferably the maximum of six hours of internship in COM 400X and COM 4013 combined, are highly recommended.

OR

CORPORATE AND ORGANIZATIONAL COMMUNICATION TRACK (25 HRS)

COM 353	Public Relations Writing and Production	(3)
COM 413	Corporate and Organizational Communication	(3)
COM 453	Public Relations Planning and Campaigns	(3)
MGT 313	Human Resources Management	(3)
MGT 363	Organizational Behavior	(3)

Corporate and Organizational Communication Capstone: project or internship must be related to Corporate and Organizational Comm.

COM 4281 Senior Communication Project Proposal

and

COM 4292 Senior Communication Project

or

COM 4013 Senior Capstone Internship in Communication (3)

Choose at least seven hours from the following courses: (7)

BA 113 Business Computer Applications

COM 183 Writing for the Media

COM 301 Campus Media Internship (any hours beyond core requirement)

COM 373 Topics in Communication

COM 422 Campus Media Management (any hours beyond core requirement)

COM 400X Internship in Communication varies (1-3 hours)

COM 410X Independent Studies in Communication

INF 273 Video Editing I

ENT 303 Entrepreneurship Leadership

ENT 313 Business Concepts

MGT 313 Human Resources Management

MGT 343 Human Resource Development

PSY 343 Social Psychology

Corporate and Organizational Communication students are encouraged to minor in Management or Psychology. At least three hours of internship in COM 400X or COM 4013, and preferably the maximum of six hours of internship in COM 400X and COM 4013 combined, are highly recommended.

OR

APPLIED COMMUNICATION TRACK (25 HRS)

(for students considering careers in electronic media, technical communication, and numerous other alternatives)

COM 183	Writing for the Media	(3)
COM 353	Public Relations Writing and Production	(3)

Choose at least one of the following courses: (3)

COM 413	Corporate and Organizational Communication
COM 453	Public Relations Planning and Campaigns

Applied Communication Capstone: project or internship should be related to student's career plans and filed program plan

COM 4281	Senior Communication Project Proposals and	
COM 4292	Senior Communication Project or	
COM 4013	Senior Capstone Internship in Communication	(3)

Choose thirteen (13) hours of Communication-related electives consistent with a program plan filed at the end of the sophomore year. (13)

Applied Communication students are encouraged to consult with their advisor to choose a minor or coherent set of electives that is appropriate to their career plans. A relevant internship is highly recommended.

ELECTIVES **34 HRS.**
TOTAL IN DEGREE PROGRAM **124 HRS.**

BACHELOR OF SCIENCE—COMMUNICATION MAJOR 124 HRS.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS**REQUIRED HOURS****WRITTEN COMMUNICATION****6 HRS.**

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)

ORAL COMMUNICATION**3 HRS.**

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES**15 HRS.**

*COM 203	Media and Communication	(3)
*COM 233	Intercultural Communication	(3)
*FLM 203	Film Appreciation	(3)
*PSY 113	Principles of Psychology	(3)

Choose one of the four following courses:

(3)

*ECO 213	Microeconomics
*ECO 223	Macroeconomics
*GOV 113	Introduction to Government

COMPUTER LITERACY**3 HRS.**

*BA 113	Business Computer Applications
or	
*INF 103	Information Technology Applications (3)

MATHEMATICS & SCIENCE**13 HRS.**

Thirteen (13) hours must include a minimum of four (4) hours of science (including at least one lab science) and three (3) hours of mathematics; MA 253 Statistics is recommended for students with the math prerequisites.

ADDITIONAL GENERAL EDUCATION ELECTIVES**3 HRS.**

*Foreign Language	(3)
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Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)

COMMUNICATION—SUBJECT MATTER CONCENTRATION	46 HRS.
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COMMUNICATION CORE	21 HRS.
*COM 123 Introduction to Electronic Media	(3)
COM 153 Principles of Public Relations	(3)
*COM 163 Interpersonal Communication	(3)
COM 213 Business Communication	(3)
COM 263 Theories and Practices in Communication	(3)
*COM 363 Persuasion and Argumentation	(3)
Three (3) hours in Communication Practica (from COM 101, COM 301, and/or COM 422)	(3)

Choose one of the three tracks below

PUBLIC RELATIONS AND JOURNALISM TRACK	(25 HOURS)
COM 183 Writing for the Media	(3)
COM 253 Sports Media and Promotion	(3)
COM 353 Public Relations Writing and Production	(3)
COM 413 Corporate and Organizational Communication	(3)
COM 453 Public Relations Planning and Campaigns	(3)

Public Relations Capstone: project or internship must be related to public relations or journalism

COM 4281 Senior Communication Project Proposal and COM 4292 Senior Communication Project or COM 4013 Senior Capstone Internship in Communication	(3)
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Choose at least seven hours from the following courses: (7)

BA 113 Business Computer Applications	
COM 283 Sports Writing	
COM 301 Media Practicum (any hours beyond core requirement)	
COM 323 The Business of Electronic Media	
COM 373 Topics in Communication	
COM 422 Media Management Practicum (any hours beyond core requirement)	
COM 400X Internship in Communication varies (1-3 hours)	
COM 410X Independent Studies in Communication	
ENG 273 Creative Writing	
ENT 313 Business Concepts for Non-Business Majors	
HPE 313 Principles of Sport & Recreation Management	
INF 273 Video Editing I	
MA 253 Statistics	

MK	303	Marketing
MK	323	Integrated Marketing Communications
MK	433	Personal Selling
MK	463	Marketing Research
PSY	343	Social Psychology

The MK courses are recommended for careers in Public Relations and Integrated Marketing Communications.

Public Relations and Journalism students are encouraged to minor in Marketing. At least three hours of internship in COM 400X or COM 4013, and preferably the maximum of six hours of internship in COM 400X and COM 4013 combined, are highly recommended.

OR

CORPORATE AND ORGANIZATIONAL COMMUNICATION TRACK (25 HOURS)

BA	113	Business Computer Applications	
COM	353	Public Relations Writing and Production	(3)
COM	413	Corporate and Organizational Communication	(3)
COM	453	Public Relations Planning and Campaigns	(3)
MGT	313	Human Resources Management	(3)
MGT	363	Organizational Behavior	(3)

Corporate and Organizational Communication Capstone: project or internship must be related to Corporate and Organizational Communication.

COM	4281	Senior Communication Project Proposal	
and			
COM	4292	Senior Communication Project	
or			
COM	4013	Senior Capstone Internship in Communication	(3)

Choose at least seven hours from the following courses: (7)

COM	183	Writing for the Media	
COM	301	Media Practicum (any hours beyond core requirement)	
COM	323	The Business of Electronic Media	
COM	373	Topics in Communication	
COM	422	Media Management Practicum (any hours beyond core requirement)	
COM	400X	Internship in Communication varies (1-3 hours)	
COM	410X	Independent Studies in Communication	
ENT	303	Entrepreneurial Leadership	
ENT	313	Business Concepts for Non-Business Majors	
INF	273	Video Editing I	
MGT	313	Human Resources Management	
MGT	343	Human Resource Development	
PSY	343	Social Psychology	

Corporate and Organizational Communication students are encouraged to minor in Management or Psychology. At least three hours of internship in COM 400X or COM 4013, and preferably the maximum of six hours of internship in COM 400X and COM 4013 combined, are highly recommended.

OR**APPLIED COMMUNICATION TRACK****(27 HOURS)**

(for students considering careers in electronic media, technical communication, and numerous other alternatives)

COM 183 Writing for the Media (3)

COM 353 Public Relations Writing and Production (3)

Choose at least one of the following courses: (3)

COM 413 Corporate and Organizational Communication

COM 453 Public Relations Planning and Campaigns

Applied Communication Capstone: project or internship should be related to student's career plans and filed program plan

COM 4281 Senior Communication Project Proposal

and

COM 4292 Senior Communication Project

or

COM 4013 Senior Capstone Internship in Communication (3)

Choose thirteen (13) hours of Communication-related electives consistent

with a program plan filed at the end of the sophomore year. (13)

Applied Communication students are encouraged to consult with their advisor to choose a minor or coherent set of electives that is appropriate to their career plans. A relevant internship is highly recommended.

ELECTIVES**34 HRS.****TOTAL IN DEGREE PROGRAM****124 HRS.**

**BACHELOR OF SCIENCE IN BUSINESS
ADMINISTRATION—MARKETING MAJOR** **124 HRS.**

Marketing encompasses the functions of creating and satisfying the demands of consumers. It is the study of the organizations and systems involved in the rendering of personal services to the consumer and the physical distribution of goods from the producer to the consumer. The marketing major will discover career opportunities in the fields of sales management, advertising, market research, retailing, brand/product management, merchandising, and marketing management.

BUSINESS CORE, GENERAL EDUCATION, & ELECTIVES **91 HRS.**

For all four-year business administration degrees in the Ketner School of Business, students must fulfill the General Education requirements and the business core. Those requirements are presented below.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS **REQUIRED HOURS**

WRITTEN COMMUNICATION **9 HRS.**

*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)
COM 213	Business Communication	(3)

ORAL COMMUNICATION **3 HRS.**

*SP 203	Effective Speaking	(3)
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SOCIAL SCIENCES & HUMANITIES **12 HRS.**

Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements.

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY	6 HRS.
*BA 113 Business Computer Applications	(3)
*INF 233 Advanced Spreadsheet for Business	(3)

MATHEMATICS & SCIENCE	12-13 HRS.
Must include a minimum of 3 hours of science and 3 hours of mathematics.	
*MA 103 Business Algebra	(3)
*MA 173 Applied Mathematics	(3)
*MA 253 Statistics	(3)
*Science Elective	(3-4)

*GENERAL EDUCATION ELECTIVES	3 HRS.
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ADDITIONAL PROGRAM REQUIREMENTS	5 HRS.
BA 101 University Experience	(1)
BA 123 Business Concepts	(3)
BA 301 Professional Development and Strategies	(1)

FREE ELECTIVES	10-11 HRS.
In addition, business students must take an additional 10-11 hours of electives. These courses may be chosen from among all offerings in the University catalog.	

BUSINESS CORE	30 HRS.
AC 203 Accounting I	(3)
AC 213 Accounting II	(3)
BA 343 International Business	(3)
BA 311X Business Internship	(3)
FIN 303 Managerial Finance	(3)
LAW 203 Business Law I	(3)
MGT 353 Designing Operations	(3)
MGT 363 Organizational Behavior	(3)
MGT 453 Strategic Management	(3)
MK 303 Marketing	(3)

MARKETING	33 HRS.
BA 403 Business and Public Policy	(3)
ENT 303 Entrepreneurial Leadership	(3)
MK 323 Integrated Marketing Communications	(3)
MK 363 Buyer Behavior	(3)
MK 423 Personal Selling	(3)
MK 433 Marketing Management	(3)
MK 463 Marketing Research	(3)
MK 483 Senior Seminar in Marketing	(3)
Marketing electives	(6)
Any 300- and 400-level courses prefixed by AC, BA, INF, ENT, FIN, LAW, MGT or MK	(3)

TOTAL IN DEGREE PROGRAM	124 HRS.
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BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION – SPORT MANAGEMENT MAJOR 124 HRS.

The Bachelor of Science in Business Administration Sport Management degree program was developed to meet the growing demand in collegiate and professional sports for business professionals who possess an extensive knowledge of sports and an understanding of the concerns and needs of athletes. Graduates of this program will work with personnel and marketing professionals to promote, regulate, and administer collegiate and professional sport programs.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS		REQUIRED HOURS
WRITTEN COMMUNICATION		9 HRS.
*ENG 103	English Composition I	(3)
*ENG 113	English Composition II	(3)
COM 213	Business Communication	(3)
ORAL COMMUNICATION		3 HRS.
*SP 203	Effective Speaking	(3)
SOCIAL SCIENCES & HUMANITIES		15 HRS.
*ECO 213	Microeconomics	(3)
*ECO 223	Macroeconomics	(3)
*GOV 113	Introduction to Government	(3)
*PSY 113	Principles of Psychology	(3)
*Foreign Language		(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY		3 HRS.
*BA 113	Business Computer Applications	(3)
MATHEMATICS & SCIENCE		13 HRS.
*MA 103	Business Algebra	(3)
*MA 173	Applied Mathematics	(3)

*MA	253	Statistics	(3)
*BIO	104	General Biology	(4)

HEALTH & PHYSICAL EDUCATION	2 HRS.
*EXS 102 Lifetime Wellness	(2)

FRESHMAN STUDIES	1 HR.
UE 101 University Experience	(1)

BUSINESS	37 HRS.
AC 203 Accounting I	(3)
AC 213 Accounting II	(3)
BA 123 Business Concepts	(3)
BA 213 Advanced Spreadsheets for Business	(3)
BA 343 International Business	(3)
BA 401 Professional Development and Strategies	(1)
FIN 303 Managerial Finance	(3)
LAW 203 Business Law I	(3)
MGT 353 Designing Operations	(3)
MGT 363 Organizational Behavior	(3)
MGT 453 Strategic Management	(3)
MK 303 Principles of Marketing	(3)
MK 323 Integrated Marketing Communications	(3)

HEALTH & PHYSICAL EDUCATION	36 HRS.
HPE 223 History of Physical Education and Sport	(3)
HPE 404 Advanced Topics in Sport Management	(4)
HPE 413 Organization & Administration of Physical Education and Athletics	(3)
HPE 453 Facility Planning	(3)
SM 253 Risk Management in Physical Education and Sport	(3)
SM 313 Principles of Sport and Recreation Management	(3)
SM 323 Leadership in Sport and Recreation	(3)
SM 363 Contemporary Issues in Sport	(3)
SM 393 Sport Psychology	(3)
SM 412 Business Planning in Sport and Recreation	(2)
SM 416 Internship in Sport Management	(6)

FREE ELECTIVES	5 HRS.
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TOTAL IN DEGREE PROGRAM:	124 HRS.
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**BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION—
GOLF MANAGEMENT MAJOR 124 HRS.**

The Bachelor of Science in Business Administration Golf Management major prepares students to become trained professionals ready for immediate employment in the expanding golfing industry. The program incorporates a business administration core with a concentration in golf management course work, including golf course promotion, turf management and marketing strategies.

An asterisk (*) indicates courses that fulfill the University's General Education Requirements.

PROGRAM REQUIREMENTS	REQUIRED HOURS
WRITTEN COMMUNICATION	9 HRS.

*ENG 103 English Composition I	(3)
*ENG 113 English Composition II	(3)
COM 213 Business Communication	(3)

ORAL COMMUNICATION	3 HRS.
*SP 203 Effective Speaking	(3)

SOCIAL SCIENCES & HUMANITIES	12 HRS.
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Must include a minimum of two hours in social sciences and two hours in humanities, selected in accordance with the Social Sciences & Humanities section of the general education requirements found on page 42.

*ECO 213 Microeconomics	(3)
*ECO 223 Macroeconomics	(3)
*PSY 113 Principles of Psychology	(3)
*Foreign Language	(3)

Candidates for all KSB degrees must complete one 3-credit hour course in a second language which, in turn, meets a portion of the General Education requirements of the University with respect to humanities. If the second language requirement has been met upon entry into the Ketner School of Business by Advanced Placement Exam or testing out, a term of study in a foreign country, or a 3-credit humanities course with a non-U.S. or comparative international content or prospective, may be taken to fulfill this requirement.

The Ketner School of Business believes that studying other languages, literatures, and cultures is an inseparable component of higher education. Beyond personal enrichment, the ability to speak another language and to understand another culture is a distinctive asset in business careers.

One semester of foreign language will fulfill the humanities elective and a second semester will count towards fulfilling the general education electives requirement (see below).

COMPUTER LITERACY	6 HRS.
*BA 113 Business Computer Applications	(3)
BA 213 Advanced Spreadsheets for Business	(3)

MATHEMATICS & SCIENCE	13 HRS.
Must include a minimum of 3 hours of science and 3 hours of mathematics.	

*MA 103	Business Algebra	(3)
*MA 173	Applied Mathematics	(3)
*MA 253	Statistics	(3)
*Science Elective		(4)

GENERAL EDUCATION ELECTIVES **3 HRS.**

ADDITIONAL PROGRAM REQUIREMENTS			5 HRS.
UE 101	University Experience (maybe program specific)		(1)
BA 123	Business Concepts (required for all incoming freshman)		(3)
BA 301	Professional Development and Strategies		(1)

FREE ELECTIVES **8 HRS.**

In addition, business students must take an additional eight (8) hours of electives. These courses may be chosen from among all offerings in the University catalog.

BUSINESS CORE			27 HRS.
AC 203	Accounting I		(3)
AC 213	Accounting II		(3)
BA 343	International Business		(3)
FIN 303	Managerial Finance		(3)
LAW 203	Business Law I		(3)
MGT 353	Designing Operations		(3)
MGT 363	Organizational Behavior		(3)
MGT 453	Strategic Management		(3)
MK 303	Marketing		(3)

GOLF MANAGEMENT			38 HRS.
BA 403	Business and Public Policy		(3)
ENT 303	Entrepreneurial Leadership		(3)
GM 101	Introduction to Golf Management		(1)
GM 201	Golf Course Architecture		(1)
GM 203	Golf Shop Management		(3)
GM 213	Club Design, Repair and Fitting		(3)
GM 223	Promotion/Marketing of Golf Facilities		(3)
GM 302	Teaching the Short Game		(2)
GM 323	Teaching the Golf Swing		(3)
GM 411	Food and Beverage Management		(1)
GM 436	Internship		(6)
MK 363	Buyer Behavior		(3)
MK 423	Personal Selling		(3)
SM 253	Risk Management		(3)

TOTAL IN DEGREE PROGRAM: **124 HRS.**

COURSE DESCRIPTIONS

KEY TO COURSE PREFIXES

AC	Accounting
ARC	Architecture
ART	Art
AS	Air Science (ROTC)
AST	Astronomy
BA	Business Administration
BIO	Biology
BME	Biomedical Engineering
CE	Civil Engineering
CH	Chemistry
CHE	Chemical Engineering
CHN	Chinese
CO	Cooperative Employment
COM	Communication
COV	Community Volunteer
CS	Computer Science
EAS	Earth Science
ECE	Electrical & Computer Engineering
ECO	Economics
EDU	Education
EGR	Engineering Graphics
ENG	English
ENT	Entrepreneurship
ES	Engineering Science
ESL	English as a Second Language
ETD	Engineering Technology
EXS	Exercise Science
FIN	Finance
FIT	Fitness
FLM	Film
FRN	French
FS	Forensic Science
GE	General Engineering
GEO	Geography
GER	German
GLY	Geology
GM	Golf Management
GS	General Studies
GOV	Government
HIS	History
HNR	Honors Seminar
HOS	Hospitality and Tourism
HPE	Health and Physical Education
HUM	Humanities

INF	Informatics
LAW	Law
LDR	Leadership
LE	Law Enforcement
MA	Mathematics
MAE	Mechanical & Aerospace Engineering
MGT	Management
MK	Marketing
MUS	Music
PH	Physics
PHL	Philosophy
PL	Pre-Legal Studies
PSY	Psychology
SA	Study Abroad
SC	Science
SM	Sport Management
SOC	Sociology
SP	Speech
SPN	Spanish
UE	University Experience
WS	Women's Studies

COURSE NUMBERING SYSTEM

Course numbers are found at the beginning of the course description immediately following the course prefix.

Courses numbered 000: preparatory, non-credit

Courses numbered 100: freshman-level courses

Courses numbered 200: sophomore-level courses

Courses numbered 300: junior-level courses

Courses numbered 400: senior-level courses

Courses numbered 500: graduate-level courses

Courses numbered 600: graduate-level courses

EXAMPLE OF COURSE PREFIX AND NUMBER

CE 3203: This course prefix and number means that this is a civil engineering junior level course.

COURSE TITLE

The course title follows the course prefix and number.

SERIES OF THREE NUMBERS FOLLOWING THE COURSE TITLE

First digit: indicates the number of class hours per week.

Second digit: indicates the number of laboratory hours per week.

Third digit: indicates the number of semester hours of credit.

Thus, a course name followed by 3-4-5 indicates three class hours each week, four laboratory hours each week, and five semester hours of credit.

COURSE LEVEL REQUIREMENTS

Courses at the 100 level within the student's major may not be taken in the senior year without permission of the department chair of the student's major.

ACCOUNTING

AC 203 ACCOUNTING I 3-0-3

This course is a study of the accounting process and the use of accounting information in business decisions. Topics include the processing of accounting information, income measurement, accrual accounting and accounting for assets, liabilities and equity in the corporate environment. The complete accounting cycle for a service and merchandising business and software applications are included.

Prerequisite: MA 103

AC 213 ACCOUNTING II 3-0-3

This course includes the accumulation and use of accounting information by management in planning, control and decision-making. Topics include product costing, budgeting, cost-volume-profit relationships, variable costing and statement of cash flows. Software applications are included.

Prerequisite: AC 203

AC 303 COST ACCOUNTING 3-0-3

Managerial accounting concepts, objectives, techniques, and systems are examined to provide information about financial and non-financial performance measurement. Cost accumulation, allocation, and variance analysis are studied in the context of performance evaluation and responsibility accounting in an organization. Emerging cost concepts and systems are also examined. The course uses computer applications.

Prerequisite: AC 213

AC 323 INTERMEDIATE ACCOUNTING I 3-0-3

This course introduces comprehensive accounting theory and practice with emphasis on financial statement preparation and analysis. Current problems of corporate accounting and reporting are thoroughly covered, including cash, inventories, fixed assets, intangible assets, and marketable securities. The course uses computer applications.

Prerequisite: AC 213

AC 333 INTERMEDIATE ACCOUNTING II 3-0-3

This is a continuation of Intermediate Accounting I. Areas covered include contingent liabilities, capital structure, leases, revenue recognition, earnings per share, pensions, and income taxes. This course uses computer applications.

Prerequisite: AC 323

AC 353 TAX AND LEGAL ISSUES FOR SMALL BUSINESS 3-0-3

This course covers tax and legal topics pertinent to small businesses, including; forming of a business organization, creating or acquiring a small business, tax planning, benefit and retirement plans, personal asset protection, and estate and succession planning.

Prerequisite: AC 213

AC 373 ACCOUNTING INFORMATION SYSTEMS 3-0-3

This course is designed to provide a working knowledge of accounting information system concepts. The course will emphasize designing and/or evaluating accounting systems in terms of both system controls and meeting internal control objectives. The course uses computer applications.

Prerequisites: BA 113, FIN 303

AC 403 ADVANCED ACCOUNTING 3-0-3

This course covers specialized topics in accounting including branches, segment reporting, business combinations, consolidated financial statement preparation and accounting for partnerships. This course uses computer applications.

Prerequisite: AC 333

AC 413 GOVERNMENTAL AND NOT-FOR-PROFIT ACCOUNTING 3-0-3

This course introduces fund accounting and covers the theory and accounting process for governmental and not-for-profit organizations. The accounting for estates and trusts is also included. This course uses computer applications.

Prerequisite: AC 333

AC 423 PERSONAL INCOME TAX 3-0-3

This course introduces basic concepts of tax law with the emphasis on the underlying concepts common to all entities as they relate to everyday economic life. Special emphasis is placed on taxation of individuals and corporations. Computerized income tax preparation and research are included.

Prerequisite: AC 213

AC 433 CORPORATE INCOME TAX 3-0-3

This course includes specialized topics including taxation of partnerships and other conduit entities. Property transactions, specialized topics and tax research are covered. Computerized preparation of tax returns for various entities is included.

Prerequisite: AC 423

AC 463 AUDITING 3-0-3

Auditing theory, objectives, and procedures leading to the auditor's opinion on the financial statements are studied. Internal control and its evaluation, auditing standards, and the use of statistical sampling in the audit process are covered in depth. This course uses auditing software applications.

Prerequisite: AC 323

AC 473 CPA TOPICS 3-0-3 (EXTRA FEES APPLY)

This course is designed for those accounting majors planning to sit for the CPA exam. It includes the solving of practical accounting problems, advanced topics such as current statements of the Financial Accounting Standards Board, current statements on auditing procedures, and tax topics. This course uses software applications.

Prerequisite: AC 333

AC 493 SELECTED TOPICS IN ACCOUNTING 3-0-3

This course treats specific or current accounting issues and problems in depth.

Prerequisite: Permission of the instructor

ARCHITECTURE

ARC 293 ARCHITECTURE APPRECIATION 2-0-3

An introduction to the built environment, prehistoric to modern, focusing on public/reverential, commercial and residential architecture. Students will be introduced to terminology, some construction techniques, socio-legal implications of high-rise structures, and architectural styles from ancient to postmodern. Structures from around the world will be viewed and discussed.

ART

ART 253 ART APPRECIATION 2-0-3

Designed as an introduction to the arts, this course develops aesthetic-critical responses and seeks to enhance the enjoyment of works of art. Painting, sculpture, architecture and other types of art are analyzed in terms of the elements of art, subject, function, medium, organization, style and aesthetic response.

AIR SCIENCE (ROTC)

AS 100 AIR FORCE LEADERSHIP LABORATORY I (0 HRS.)

A study on Air Force customs and courtesies, drills and ceremonies. Also includes studying the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 101

AS 101 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE I (1 HR.)

A survey course designed to introduce students to the United States Air Force and Air Force ROTC. Featured topics include: mission of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, and an introduction to communication skills.

AS 110 AIR FORCE LEADERSHIP LABORATORY II (0 HRS.)

A study on Air Force customs and courtesies, drills and ceremonies. Also includes studying the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 111

AS 111 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE II (1 HR.)

Additional study of the organizational structure of the Air Force, with emphasis on leadership and communication skills.

AS 200 AIR FORCE LEADERSHIP LABORATORY III (0 HRS.)

Further study on Air Force customs and courtesies, drill and ceremonies, and military commands. Also includes additional emphasis on the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers. **Corequisite:** AS 201

AS 201 THE EVOLUTION OF USAF AIR AND SPACE POWER I (1 HR.)

A course designed to examine general aspects of air and space power through a historical perspective. Utilizing the perspective, the course covers a time period from the first balloons and dirigibles through the Korean War and into the Cold War era.

AS 210 AIR FORCE LEADERSHIP LABORATORY IV (0 HRS.)

Further study on Air Force customs and courtesies, drill and ceremonies, and military commands. Also includes additional emphasis on the environment of an Air Force officer and learning about areas of opportunity available to commissioned officers.

Corequisite: AS 211

AS 211 THE EVOLUTION OF USAF AIR AND SPACE POWER II (1 HR.)

Further study from the Vietnam War to the space-age global positioning systems of the Persian Gulf War. Effective communication techniques are also emphasized.

AS 300 AIR FORCE LEADERSHIP LABORATORY V (0 HRS.)

Activities classified as leadership and management experiences involving the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 303

AS 303 AIR FORCE LEADERSHIP STUDIES I (3 HRS.)

A study leadership, management fundamentals, professional knowledge, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied.

AS 310 AIR FORCE LEADERSHIP LABORATORY VI (0 HRS.)

Activities classified as leadership and management experiences involving the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 313

AS 313 AIR FORCE LEADERSHIP STUDIES II (3 HRS.)

Further study of Air Force personnel and evaluation systems, leadership ethics and additional communication skills.

AS 400 AIR FORCE LEADERSHIP LABORATORY VII (0 HRS.)

Further activities classified as leadership and management experiences. They involve the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 403

AS 403 NATIONAL SECURITY AFFAIRS/PREPARATION FOR ACTIVE DUTY I (3 HRS.)

An examination of the national security process, regional studies, advanced leadership ethics, and Air Force doctrine.

AS 410 AIR FORCE LEADERSHIP LABORATORY VIII (0 HRS.)

Further activities classified as leadership and management experiences. They involve the planning and controlling of military activities of the cadet corps, and the preparation and presentation of briefings and other oral and written communications. Also include interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

Corequisite: AS 413

AS 413 NATIONAL SECURITY AFFAIRS/PREPARATION FOR ACTIVE DUTY II (3 HRS.)

An examination of the national security process, regional studies, advanced leadership ethics, and Air Force doctrine.

ASTRONOMY

AST 201 ASTRONOMY LABORATORY 0-1-1

An introductory laboratory study of basic observational astronomy and the tools of astronomy as students explore the sky. The stars, the planets and the universe of galaxies are observed and measured by observation or computer simulation.

Corequisite or Prerequisite: AST 203

AST 203 ASTRONOMY 3-0-3

An introduction to the field of astronomy, this course is a study of the planets and the stars and their formation and life cycles. The history of the Milky Way Galaxy and the history of the cosmos are studied, with an emphasis on the solar system and methods of observation and measurement.

BUSINESS ADMINISTRATION

BA 113 BUSINESS COMPUTER APPLICATIONS 3-0-3

This course emphasizes predominant software packages in word processing, spreadsheets, presentation graphics, database management, and e-mail usage, with an eventual goal of the student gaining certification in those areas.

BA 123 BUSINESS CONCEPTS 3-0-3

A survey course designed to introduce the student to business issues and practices in the United States. All major functions of business are included (management, marketing, law, finance, economics, operations, accounting, information technology) as well as issues facing the business person (ethics, globalization, motivation, etc.) Suitable for students considering a career in business as well as for non-business majors who will interact with the business enterprises (e.g., educators, engineers).

BA 213 ADVANCED SPREADSHEETS FOR BUSINESS 3-0-3

Concepts including raw data management, business analysis and reporting. Other concepts include: collaboration and workbook security, using tables to analyze and report data, integrating and manipulating data from external sources, creating and auditing complex formulas, automation features, advanced data analysis, using charts to analyze and communicate business information.

Prerequisite: INF 103 or BA 113

BA 301 PROFESSIONAL DEVELOPMENT & STRATEGIES 1-0-1

This is a practical course to assist the student in the development of a professional job search portfolio (i.e. resume, cover letter, follow-up letters). The course includes self-appraisal and career goal setting, job interview techniques, and familiarization with employment resources. Professional strategies are emphasized in the areas of business attire, etiquette and protocol, ethics, human relations, and corporate culture.

Prerequisites: Business major, junior or senior standing or permission of the instructor

BA 311X BUSINESS INTERNSHIP VARIES (1-3 HRS.)

The course involves a meaningful work experience related to the student's field of study or other functional areas of business in an approved company. The assignment and company must be approved by the School of Business Internship Coordinator. A maximum of 6 semester credit hours can be counted toward degree requirements, with a maximum of 3 credit hours for any one work session.

Prerequisites: Sophomore or above class standing, adhering to the guidelines set by the School of Business Internship Coordinator, and permission of the advisor

BA 313 INSURANCE 3-0-3

This course includes the fundamental principles and practices as they relate to life, compensation, fire, marine, and automobile insurance.

Prerequisites: LAW 203, MK 303 or permission of the instructor.

BA 323 REAL ESTATE 3-0-3

This course is the study of problems of buying and leasing real property for residence or investment purposes, including the principal commercial and financial transactions involved.

Prerequisites: LAW 303, MK 303, or permission of the instructor

BA 333 SOCIAL MEDIA FOR BUSINESS 3-0-3

Concepts include using digital and social media in a business/industry setting. Concepts include setting up and using wikis, blogs, Facebook, MySpace, Twitter, YouTube, Linkedin, Ning, Flickr, and other online modalities as a way to increase business, marketing, research, and customer service opportunities. Group work at local businesses will be required. **Prerequisite: BA 113**

BA 343 INTERNATIONAL BUSINESS 3-0-3

This course discusses economic principles of trade as applied to international business, world international trade environment and trends, world geography and culture as it impacts international trade, knowledge of the operation of importing and exporting, aspects of manufacturing and marketing in foreign markets, and the application of the functions of business to an international business operation.

Prerequisites: ECO 213, ECO 223 or concurrent with ECO 223

BA 403 BUSINESS AND PUBLIC POLICY 3-0-3

This course includes an analysis of the legal, political, and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business.

Prerequisites: MGT 363, ECO 223, LAW 203, MK 303, or permission of the instructor (same as ECO 453)

BA 400X INDEPENDENT RESEARCH IN BUSINESS VARIES (1-3 HRS.)

Independent research under the direction of an individual instructor can be taken. A research paper is required. (Research may be done in any business major.)

Prerequisites: Senior standing, permission of the instructor or Department Chair, and the Dean of the Ketner School of Business

BIOLOGY

BIO 104 GENERAL BIOLOGY 3-2-4

An introduction to the basic principles of biology with an emphasis on: biological chemistry, cell biology, metabolism, genetics, diversity of organisms, evolution, and ecology. A background in high school chemistry is strongly recommended. **Open to non-science majors only. This course cannot be substituted for BIO 114 for either science or engineering majors.**

BIO 114 PRINCIPLES OF BIOLOGY I 3-2-4

Five basic topics are discussed in some detail: biological chemistry, cell biology, metabolism, genetics, and animal organization and homeostasis. Laboratory exercises designed to introduce the student to scientific investigation and the structure and function of biological systems are an essential part of the course.

BIO 124 PRINCIPLES OF BIOLOGY II 3-2-4

A continuation of Biology 114, including evolutionary principles, examination of diversity of living things, diversity, structure and function of plants, animal behavior, populations, communities, ecosystems, the biosphere, and the conservation of each. **Prerequisite: BIO 114**

BIO 200X INTERNSHIP IN NATIVE PLANT PROPAGATION (VARIES 1-2 CREDIT HOURS)

Work with local plant grower propagating plants and seeds. Fall semester will involve seed collection, processing, and storage for propagation or marketing. Spring semester will involve growing of plants in greenhouses, with some possible installation into seed production beds. Either semester may include seed bed maintenance. May be repeated once in alternative semester. **Prerequisite: BIO 114**

BIO 203 OCEANOGRAPHY 2-2-3

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea.

Prerequisites: A laboratory science and MA 113 (Same as EAS 203 and GEO 203)

BIO 211 CONSERVATION LAB 0-2-1

The lab focuses on communities and small populations by using GIS, GPS, computer modeling and the design, management and restoration practices of natural areas. Includes a variety of field trips to natural areas and implementation of hands-on management and restoration practices, including seed collection and processing, wildlife management and controlled burning.

Corequisite/Prerequisite: BIO 213

BIO 213 CONSERVATION 3-0-3

A study of biodiversity, including the negative impact of human society and what can be done to preserve it. Topics include measurement of biodiversity, ecosystem function, extinction, habitat destruction, fragmentation, degradation, over-exploitation, invasive species, climate change, conservation planning and priorities, fire, human interaction with the environment, human-modified landscapes and experimental design. Meets Ecology requirement for Biology majors.

Corequisite/Prerequisite: BIO 213

BIO 222 FIELD TRIP IN ECOLOGY I 0-4-2

Trips to various sites to observe plants and animals in a variety of habitats. Open to non-science majors. **Prerequisite: BIO 104 or BIO 114**

BIO 254 HUMAN ANATOMY 3-2-4

The anatomical features of each organ system are identified. Microstructure observation and detailed dissection in the laboratory. **Prerequisite: BIO 104 or BIO 114**

BIO 274 GENERAL ECOLOGY 3-2-4

A study of the interactions of organisms and environments, this course focuses on individuals, populations, communities, ecosystems, landscapes and cycling of matter within energy systems. Investigations focus on techniques to gauge interactions between the biological and physical environments, field and conceptual sampling methods, statistical analysis, population models, and an exploration of emerging technologies in ecology. **Prerequisites: BIO 114, MA 253**

BIO 281 MARINE BIOLOGY LAB 0-3-1

A laboratory class to accompany BIO283. Application of identification, sampling and analytical techniques to aquatic organisms and their habitats of local lakes and possibly one of the Great Lakes. Analysis of remotely sensed data. Includes three all-day or overnight required field trips. Requires snorkeling equipment. May provide opportunity to become SCUBA certified for an additional fee. **Prerequisite: BIO 283**

BIO 283 MARINE BIOLOGY 3-3-3

An introduction to organisms and processes in the marine environment, including function, biodiversity, and ecology of organisms. Topics include: the chemical and physical environment; the ecology of pelagic and benthic organisms, including those from rocky coasts, unconsolidated shores, and coral reefs; benthic plants and phytoplankton; zooplankton and nekton; marine invertebrates, fishes; marine productivity and fisheries; marine pollution and conservation.

Prerequisite: BIO 104 or BIO 114

BIO 304 PLANT BIOLOGY 3-3-4

The structure and function of the major plant phyla are studied. Methods of classification are illustrated. The physiology and evolutionary relationships are explained.

Prerequisite: BIO 114

BIO 314 ANIMAL BIOLOGY 3-2-4

The structure and function of the major animal phyla are studied. Methods of classification are illustrated. The behavioral, physiological, and evolutionary relationships are explained.

Prerequisite: BIO 114

BIO 324 MICROBIOLOGY 3-2-4

The isolation, growth, structure, function, heredity, and identification of microorganisms with emphasis on their relationship to humans. **Prerequisites: BIO 254 or CH 114**

BIO 334 ENVIRONMENTAL BIOLOGY 3-2-4

A study of the impacts and interactions of human society and the environment including ethics, risk management, economics, policy making, population growth, energy, pollution, land use planning, soils, agriculture, and water, and their consequences. Labs include field trips to assess environmental conditions and hazards, public perception, and human impacts to the environment.

Prerequisite: BIO 114

BIO 344 CELL BIOLOGY 3-2-4

Understanding of cell biology has grown rapidly over the past two decades along with the development of genetics, biochemistry, and molecular biology. This course will introduce students to this unifying discipline which explores organization and function of the cell including structure of cellular organelles, membrane transport, cellular communication, flow of genetic material, and cell division.

Prerequisite: BIO 114

BIO 354 HUMAN PHYSIOLOGY 3-2-4

The fundamental physical chemical bases of osmoregulation, circulation, respiration (both at organism and cell levels), nerve and muscle function, nutrition and endocrine function are studied. Laboratories include electromechanical studies of isolated muscle and nerve preparations, osmoregulation in decapods, and the electrical activity of the heart. **Prerequisites: BIO 254, CH 114**

BIO 364 TOXICOLOGY 3-3-4

The methods and design of both acute and chronic toxicity tests will be surveyed. Probits of percent mortality versus log dose and other appropriate statistical methods of toxin analysis are applied to laboratory data. Emphasis will be given to mechanisms of action and metabolic detoxification and elimination. Federal regulations involving manufacture use categories and proper disposal are reviewed. **Prerequisites: BIO 114, CH 114**

BIO 374 FORENSIC BIOLOGY 3-2-4

This course will introduce students to basic scientific principles and their application in professional practice of Forensic Biology. The lecture and laboratory portions will provide students with a scientific grounding to understand the application of the science of biology to legal investigations. Students will learn the principles and analytical methods over a variety of fields such as pathology,

entomology, animal biology, anatomy and physiology, microbiology, serology, and molecular biology as they apply to forensic biology. Laboratory safety, quality assurance, and quality control are also discussed. **Prerequisite: BIO 104 or BIO 114**

BIO 404 EMBRYOLOGY 3-3-4

Study of structural, physiological, and molecular levels of development processes. A descriptive and experimental analysis of developing systems with emphasis on ordates.

Prerequisite: BIO 314

BIO 413 ENTOMOLOGY 2-2-3

Integrated studies of the principal morphological, physiological, ecological and systematic relationships of insects. **Prerequisite: BIO 114**

BIO 414 GENETICS 3-3-4

This course provides the principles of classical and molecular genetics. Topics include Mendelian inheritance, chromosome function, linkage and recombination mapping, cellular processing of biological information, new genetic tools, evolutionary genetics, and genomics. Quality assurance is also discussed. The course will mainly consist of lectures, chromosome level experiments, and problem sets that students will solve and return. **Prerequisite: BIO 114**

BIO 423 ENVIRONMENTAL TOXICOLOGY 2-2-3

How biological and chemical mechanisms are related to risk assessment of heavy metals, pesticides, food additives and environmental pollutants. Laboratory data will be used to predict possible environmental hazards. **Prerequisites: CH 203, BIO 211, BIO 213**

BIO 434 BIOCHEMISTRY 3-3-4

A study of the chemistry, kinetics, energetics, and metabolic pathways of biological molecules such as carbohydrates, lipids, proteins, nucleic acids and enzymes are discussed and supported by laboratories that illustrate biochemical reactions, separations, enzyme kinetics, and analysis.

Prerequisites: CH 211, CH 213 (Same as CH 434)

BIO 443 PATHOLOGY 3-3-3

The course is an introduction to pathology, which is the study of disease. An overview of a variety of diseases will be discussed including cardiovascular disease, asthma, infection, cancer, epilepsy, multiple sclerosis, rheumatoid arthritis, Crohn's disease, anemia, leukemia, and Alzheimer's dementia. The subspecialty of forensic pathology will also be discussed.

Prerequisites: BIO 114, junior or senior science major

BIO 454 MOLECULAR BIOLOGY 3-3-4

This course provides a comprehensive overview of the key concepts in molecular biology. Topics to be covered include nucleic acid structure and functions, biochemistry of DNA, chromosome structure, regulation of gene expression in prokaryotes and eukaryotes. Extended topics will include biotechnology methods, genetic engineering, gene therapy, protein functions, cellular communication, and programmed cell death.

Prerequisites: BIO 114, CH 211, CH 213

BIO 400X SPECIAL ASSIGNMENTS IN BIOLOGICAL SCIENCES VARIES (1-4 HRS.)

Directed reading, independent study, or research, supervised laboratory or field work. The number of credit hours will be determined by the scope of the assignment.

Prerequisite: Permission of department chair

BIOMEDICAL ENGINEERING

BME 113 INTRODUCTION TO BIOMEDICAL ENGINEERING 3-0-3

An introduction or overview of biology, chemistry (including organic chemistry), and physiology as they relate to biomedical engineering.

Prerequisites: CH 104, MA 134

BME 4103 INTRODUCTION TO BIOMECHANICS 3-0-3

An introduction to the kinematic geometry of human motion and the kinematics of individual human joints. Quantitative and qualitative descriptions of the action of muscles in relation to human and animal movement. Muscle models, receptors, and reflexes with application to control of multi-joint movement. Forward and inverse dynamics of multi-joint, muscle-driven systems..

Prerequisites: CH 104, BME 113, and ES 233

BME 4203 INTRODUCTION TO BIOMATERIALS 3-0-3

introduction to the study of both biological materials (bone, muscles, etc.) and materials for medical applications. Topics include structure-property relationships for skin, bone, ligaments, tendons, muscle, and organs; the effects of pathology and age on material properties of tissues and organs; interactions between biological tissues and biomaterials; biocompatibility; design constraints, failure modes, and manufacturing limitations, ASTM and ISO standards for biomaterial.

Prerequisites: CH 104, BME 113, and ES 233

BME 5003 PRINCIPLES OF BIOMEDICAL ENGINEERING 3-0-3

An introduction to the fundamental and interdisciplinary aspects of biomedical engineering, integrating principles of anatomy, physiology, biology, and engineering. Topics include principles of problem definition, team design, engineering inventiveness, information access, communication, scientific integrity and ethics, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology, and scientific record keeping. **Prerequisite:** Graduate standing in biomedical engineering or consent of instructor.

BME 5013 APPLIED ANATOMY AND PHYSIOLOGY FOR ENGINEERS 3-0-3

A quantitative approach to human physiology from the biomedical engineering perspective with an emphasis on systems physiology described using mechanical properties. Topics include the physiological and mechanical behavior of the heart, blood vessels, lungs, kidney, muscles, and bones. **Prerequisite:** Graduate standing in biomedical engineering, or college-level biology course or consent of instructor.

BME 5023 BIOMEDICAL MEASUREMENTS AND INSTRUMENTATION 2-2-3

Physiological signals, origin of biopotentials (ECG, EMG, EEG), biomedical transducers and electrodes. Biomedical signal detection, amplification, and filtering. Analog front-ends of biomedical instruments. Electrical safety in medical environment. Basic concepts of instrumentation include design criteria and operational analysis, including principles of transduction and signal processing. Practical experience is gained through use of hands-on design, construction, and testing of biomedical devices.

Prerequisite: PH 234 and ES 253 or equivalent; graduate standing in biomedical engineering or consent of instructor.

BME 5043 FINITE ELEMENT ANALYSIS 3-0-3

The course provides a balanced discussion of the theory and applications of the Finite Element Method using the ANSYS software package. The theoretical development of one-dimensional, two-dimensional, and three-dimensional elements is discussed. Applications of the method in the static and dynamic design of frame, thin-walled, and solid structures are presented. The course provides students with hands-on experience using ANSYS. **Prerequisite: Senior or graduate standing; ES 213 and ES 243 or equivalent; MAE 373 may be helpful, but is not required.**

BME 5103 MUSCULOSKELETAL BIOMECHANICS 3-0-3

The application of classical solid mechanics methods to evaluate the mechanical behavior of skeletal tissues, whole bones, bone-implant systems, and diarthroidal joints. Topics include mechanical behavior of tissues (anisotropy, viscoelasticity, fracture, and fatigue), structural properties of whole bones and implants (composite and asymmetric beam theories), and mechanical function of joints (contact mechanics, lubrication, and wear). Normal, healing, and degenerative states will be examined.

Prerequisite: ES 243; prerequisite or corequisite; BME 5013; graduate standing in biomedical engineering or consent of instructor.

BME 5113 KINEMATICS OF HUMAN MOTION 2-2-3

An introduction to the kinematic geometry of human motion and the kinematics of individual human joints. Quantitative and qualitative descriptions of the action of muscles in relation to human movement. Introduction to rigid body dynamics and dynamics of multi-link systems using Newtonian and Lagrangian approaches. Muscle models, receptors, and reflexes with application to control of multi-joint movement. Forward and inverse dynamics of multi-joint, muscle-driven systems.

Prerequisite: BME 5013; Corequisite: BME 5103; graduate standing in biomedical engineering or consent of instructor.

BME 5203 INTRODUCTION TO BIOMATERIALS 3-0-3

Introduction to the study of both biological materials (bone, muscle, etc.) and materials for medical applications. Topics include structure-property relationships for skin, bone, ligaments, tendons, muscle, and organs; the effects of pathology and age on material properties of tissues and organs; interactions between biological tissues and biomaterials; biocompatibility; design constraints, failure modes, and manufacturing limitations; ASTM and ISO standards for biomaterials.

Prerequisite: ES 233, ES 243; prerequisite or corequisite; BME 5013; graduate standing in biomedical engineering or consent of instructor.

BME 600X BIOMEDICAL ENGINEERING DESIGN PROJECT (VARIES 1-6 HRS.)

A design or capstone project, with industrial or real-world application, producing all necessary and appropriate documentation, and if applicable, models, and prototypes. The project should entail a minimum of 3 hours of work per week per credit hour. Students should choose the number of credits each semester based on the amount of time they expect to spend on the project. **Prerequisite:** Graduate standing in Mechanical Engineering or consent of department chair.

CIVIL ENGINEERING

CE 1021 COMPUTER TOOLS FOR CIVIL ENGINEERING 1-0-1

This course is required for all freshmen civil engineering students. Its purpose is to introduce students to computer software that can assist them in engineering problem solving. Basic programming skills will also be introduced, allowing students to customize software to meet the unique needs of specific civil engineering problems. A wide variety of problem solving approaches will be highlighted throughout the class, including iteration, optimization, and database manipulation.

CE 2001 BASIC SURVEYING LABORATORY 0-2-1

Field work component of the basic surveying course. Some of the field work will include the use of automatic and laser levels, total station instruments and data collectors, and basic GPS devices.

Corequisite: CE 2003

CE 2003 BASIC SURVEYING 3-0-3

An introductory course in the theory and practice of basic land surveying. Course topics include measurements of angles, directions, and distances; traverse computations; simple vertical and horizontal curves; earthwork and GP. **Corequisites:** MA 134, CE 2001

CE 2013 FLUID MECHANICS 3-0-3

Fundamental properties of fluids; fluid statics; kinematics of fluid motion; conservation of mass, energy and momentum as applied to compressible and incompressible fluids; similitude; Introduction to laminar and turbulent boundary layers.

Prerequisite: Grade of "C" or better in ES 213; **Corequisite:** MA 213

CE 3101 ENVIRONMENTAL ENGINEERING LABORATORY (AQUEOUS) 0-2-1

Standard methods for analysis of water and wastewater; measurement of fundamental properties and characteristics of dissolved and particulate constituents in water; sampling techniques and preservation of samples; presentation and interpretation of analytical data.

Corequisite: CE 3103

CE 3103 ENVIRONMENTAL ENGINEERING (AQUEOUS) 3-0-3

Environmental engineering issues, fundamentals, and applications including hydrology, water treatment, water quality management, and wastewater treatment. Laboratory portion of the course covers common environmental experiments and field trips pertaining to the aforementioned topics.

Prerequisite: CH 114; **Corequisites:** ES 323 or equivalent, CE 3101

CE 3201 CIVIL ENGINEERING MATERIALS LABORATORY 0-2-1

Testing and evaluation of physical and mechanical properties of engineering materials such as steel, portland cement, concrete, masonry, asphaltic concrete, and timber.

Corequisite: CE 3203

CE 3203 CIVIL ENGINEERING MATERIALS 3-0-3

Testing and evaluation of physical and mechanical properties of engineering materials. Origin, manufacture, and structural applications of metals, aggregates, bituminous materials (including superpave), portland cement, and concrete. **Corequisite:** CE 3291; ES 243

CE 3301 HYDRAULIC ENGINEERING LABORATORY 0-2-1

Flow measurement; energy losses in pipe networks; momentum of jet; Bernoulli's Equation; water surface profiles and controls; hydraulic jumps, specific energy in open channels. **Corequisite:** CE 3303

CE 3303 HYDRAULIC ENGINEERING 3-0-3

Fundamental principles and design of water and wastewater supply, storm water and sanitary sewer systems and their components, including pipes, pumps, storage facilities, detention basins, open-channels, and culverts.

Prerequisite: Grade of "C" or better in ES 323; **Corequisite:** CE 3301

CE 3501 STRUCTURAL ANALYSIS LAB 0-2-1

Classification of structures; Force and deflection analysis of statically determinate beams, frames, and trusses by classical methods; Analysis of statically indeterminate beams and frames using the moment distribution method; Computer modeling and analysis of structures; Load effects, tributary loads, load paths, and ASCE load combinations; Construction of shear and moment envelopes using influence diagrams.

Prerequisite: Grade of "C" or better in ES 243; **Corequisite:** CE 3503

CE 3503 STRUCTURAL ANALYSIS 3-0-3

Classification of structures; Force and deflection analysis of statically determinate beams, frames, and trusses by classical methods; Analysis of statically indeterminate beams and frames using the moment distribution method; Computer modeling and analysis of structures; Load effects, tributary loads, load paths, and ASCE load combinations; Construction of shear and moment envelopes using influence diagrams.

Prerequisite: Grade of "C" or better in ES 243; **Corequisite:** CE 3501

CE 3513 STRUCTURAL STEEL DESIGN 3-0-3

Analysis and design of structural steel members. Column buckling and lateral stability of beams. Codes and specifications.

Prerequisite: CE 3503; **Corequisite:** CE 3203

CE 3521 STRUCTURAL DESIGN LABORATORY 0-2-1

Introduction analysis and design of reinforced concrete, structural steel, and timber members subjected to tension, compression, and flexural loads. Application codes and specifications.

Prerequisite: Grade of "C" or better in CE 3503; **Corequisite:** CE 3523

CE 3521 STRUCTURAL DESIGN LABORATORY 0-2-1

Introduction analysis and design of reinforced concrete, structural steel, and timber members subjected to tension, compression, and flexural loads. Application codes and specifications.

Prerequisite: Grade of "C" or better in CE 3503; Corequisite: CE 3523

CE 3523 INTRODUCTION TO STRUCTURAL DESIGN 3-0-3

Introduction analysis and design of reinforced concrete, structural steel, and timber members subjected to tension, compression, and flexural loads. Application codes and specifications.

Prerequisite: Grade of "C" or better in CE 3503; Corequisite: CE 3521

CE 3533 REINFORCED CONCRETE DESIGN 3-0-3

Material properties. Analysis, design and serviceability of reinforced concrete flexural members and columns. Design and development of reinforcement. Codes and specifications.

Prerequisite: CE 3503; Corequisite: CE 3203

CE 3603 TRANSPORTATION ENGINEERING (3-0-3)

An introduction to the basic design, operation, control, and planning of highway transportation.

Topics include an overview of project phases and the history of transportation as well as the fundamentals of traffic operations, user characteristics, capacity, and level of service, geometrics, traffic signal timing, and transportation planning. Lessons are supplemented with a Lab, in-class design and a term project. **Prerequisite: MA 164**

CE 3613 HIGHWAY GEOMETRIC DESIGN (3-0-3)

This course will provide students with an understanding of the basic principles and techniques of geometric design of highways and streets. The primary goal of geometric design is to provide safety and comfort service for road users with due regard to social, economic and environmental constraints. This course will include the dimensions and layout of visible features of the highway such as alignment, sight distance and intersection etc. Although there are recommended national design standards and controls criteria for specific designs to follow, the applications of those design codes is determined on case-by-case scenario. The objective of this course is to illustrate the practical application of scientific knowledge to the planning and designing of roadway elements. **Prerequisite: CE 3613**

CE 3701 SOIL MECHANICS LABORATORY 0-2-1

Students typically perform the following laboratory tests: Atterberg Limits, sieve and hydrometer analyses, Proctor compaction, hydraulic conductivity, 1-D consolidation, direct shear, and unconfined compression. In-situ sampling and visual classification of soils will also be performed.

Corequisite: CE 3703

CE 3703 SOIL MECHANICS 3-0-3

The course serves as an introduction to geotechnical engineering and provides an overview of the fundamental properties and behavior of soils. Topics to be presented include index properties, soil classification, phase relationships, compaction, subsurface exploration, seepage, shear strength bearing capacity, and consolidation.

Prerequisite: ES 243; Corequisite: CE 3701

CE 4103 ENVIRONMENTAL ENGINEERING (NON-AQUEOUS) 3-0-3

Environmental engineering issues, fundamentals, and applications including air pollution, noise pollution, solid waste management, hazardous waste management, and ionizing radiation.

Prerequisite: CH 114

CE 4113 HAZARDOUS WASTE ENGINEERING 3-0-3

A study of hazardous waste regulation, treatment, disposal, and remediation of contaminated sites. Evaluation of unit operations and processes of importance in the treatment and disposal of common organic and inorganic hazardous wastes. Students conduct group design projects and presentations.

Prerequisite: CE 4103 or CE 3103

CE 4123 WATER TREATMENT PRINCIPLES AND DESIGN 3-0-3

Design of water treatment plants by application of basic and engineering sciences, hydraulics, chemistry, and physics. Plant layouts as well as the design of the elements of the plants and their operations are covered. Students conduct group design projects and presentations.

Prerequisite: CE 3103

CE 4133 WASTEWATER TREATMENT PRINCIPLES AND DESIGN 3-0-3

Design of wastewater treatment plants by application of basic and engineering sciences, hydraulics, chemistry, biology, and physics. Plant layouts as well as the design of the elements of the plants and their operation are covered. Students conduct group design projects and presentations.

Prerequisite: CE 3103

CE 4303 OPEN CHANNEL HYDRAULICS 3-0-3

Advanced topics in open-channel hydraulics, including design of hydraulic structures, uniform flow, rigid and loose boundary channel design, gradually varied flow, unsteady flow, and flood routing techniques. **Prerequisite:** CE 3303

CE 4323 ENGINEERING HYDROLOGY 3-0-3

Fundamental processes in the hydrologic cycle including precipitation, infiltration, evapotranspiration, and runoff. Quantitative approaches for engineering hydrology to estimate flows for a variety of design problems, including routing through detention basins and river reaches.

Prerequisite: ES 323, **CE 3303 Corequisite:** MA 393

CE 4333 DESIGN OF WATER DISTRIBUTION SYSTEMS AND SEWERS 3-0-3

Theory of pipe networks with application to the analysis and design of municipal water distribution systems, infiltration and inflow. Wastewater flows and design of storm, sanitary and combined sewers. **Prerequisite:** CE 3303

CE 4553 TIMBER DESIGN 3-0-3

Analysis, proportioning, and connection of structural members in timber. Lateral wind force resisting systems in timber structures. Specifications and codes. **Prerequisite:** CE 3503

CE 4563 BRIDGE ENGINEERING 3-0-3

Application of CE 3513 and CE 3533 to the design of bridges. AASHTO load specifications. Design of single span bridges and continuous beam bridges

Prerequisites: CE 3513 and CE 3533 or permission of the instructor

CE 4603 HIGHWAY GEOMETRIC DESIGN

Basic principles and techniques of geometric design of highways and streets. Safety and comfort for road users with due regard to social, economic and environmental constraints. Dimensions and layout of visible highway features such as alignment, sight distance and intersection. Applications of national design standards and controls criteria. **Prerequisite:** CE 3603

CE 4703 SPECIAL TOPICS IN GEOTECHNICAL ENGINEERING 3-0-3

Special topics frequently encountered in geotechnical practice. Topics may include soil and site improvement using deep dynamic compaction, vibroflotation, wick drains and geosynthetics; slope stability analyses; retaining wall design and geo-environmental concerns, such as environmental site assessments and waste liner/cover systems. Other topics may include special concerns in engineering geology. **Prerequisite:** CE 3703

CE 4713 FOUNDATION ENGINEERING 3-0-3

Evaluation of subsurface conditions in order to select appropriate foundations for structures. Topics include subsurface exploration program, evaluation of bearing capacity and settlement shallow foundations, the design of driven piles, auger-cast piles, drilled shaft foundations, and the analysis/design of intermediate foundations, such as pin piles and geopiers. **Prerequisite:** CE 3703

CE 4723 PAVEMENT DESIGN 3-0-3

Design of flexible and rigid highway and airport pavements. Topics include traffic quantity estimates, subgrade testing and properties, pavement materials testing and properties, AASHTO, Asphalt Institute, and PCA design methods, reinforced subbase design, permeable pavement design, and rigid and flexible overlays. **Corequisites:** CE 3203, CE 3703

CE 490X SPECIAL PROBLEMS IN CIVIL ENGINEERING (VARIES 1-4 HRS.)

To be offered to students who have demonstrated superior ability. Course content to be arranged for the individual student according to his/her interest and aptitudes. Library research or independent study may be included.

Prerequisites: Senior standing and permission of Department Chair

CE 4912 CIVIL AND ENVIRONMENTAL ENGINEERING DESIGN SEMINAR 2-0-2

Project selection and initial scope of work development for major design experience which integrates fundamental concepts of basic sciences, engineering sciences, engineering design, and communication skills. The first of a two semester senior project design sequence.

Prerequisite: 3 of 4 from the following courses: CE 3103, CE 3301, CE 3503, CE 3703

CE 4914 CIVIL AND ENVIRONMENTAL ENGINEERING DESIGN 0-4-4

An integrated approach to the design of civil engineering facilities, from inception, feasibility, planning, socioeconomic considerations, environmental impact, safety, and engineering analysis and design to a final project report. The second of a two semester senior project design sequence.

Prerequisite: Must have taken CE 4912 the previous semester

CE 5103 SPECIAL TOPICS IN WATER AND WASTEWATER TREATMENT 3-0-3

Special topics regarding the design of water and wastewater treatment plants by application of engineering sciences, hydraulics, chemistry, biology, and physics. Water treatment topics include membrane filtration, reverse osmosis, chemical oxidation processes, and water sludge treatment. Wastewater treatment topics include chemical precipitation of phosphorus, biological nutrient removal, ultraviolet disinfection, and wastewater sludge treatment.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5113 ENVIRONMENTAL ENGINEERING CHEMISTRY 3-0-3

Chemical principles and applications needed to develop advanced problem-solving techniques involved with many water/wastewater treatment processes and natural systems. Topics include applied thermodynamics, environmental organic chemistry, and problem solving for acid/base, complexation, precipitation/dissolution, and redox.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5123 SOLID WASTE MANAGEMENT 3-0-3

Design and operation of solid waste treatment, storage, disposal and control process will be covered. Design and regulatory requirement of solid waste landfills and other solid waste management facilities will be discussed in detail. Soil and groundwater contamination and remediation at the disposal sites will also be discussed.

Prerequisite: CE 4103 and/or permission of the instructor.

CE 5303 ADVANCED HYDROLOGIC AND HYDRAULIC MODELING 3-0-3

Application of fundamental principles to develop mathematical models of watershed and river systems. Major topics include governing equations and process descriptions, numerical methods and programming, and application of state-of-the-art models to watershed and river systems.

Prerequisite: Graduate standing and/or permission of the instructor

CE 5313 GROUNDWATER HYDROLOGY AND CONTAMINANT TRANSPORT 3-0-3

Introduction to energy concepts and governing equations in groundwater hydrology, estimation of aquifer properties, well and well-field design, artificial recharge, and modeling of groundwater flow and contaminant transport.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5503 ADVANCED STRUCTURAL ANALYSIS 3-0-3

Computer modeling and analysis of structures using flexibility and stiffness methods. Applications include 2- and 3-dimensional models of buildings, bridges, and industrial facilities.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5513 STRUCTURAL DYNAMICS 3-0-3

Analysis of structural systems subjected to time-varying demands (e.g., seismic, wind, blast, fluid, moving loads, machines, etc.). Solutions by classical and numerical methods. Applications to earthquake engineering and collapse analysis.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5523 FINITE ELEMENT METHODS 3-0-3

An introduction to the finite element method from both engineering and mathematical points of view. The mathematical foundations of the method are presented along with their physical interpretations. Applications are focused on but not limited to structural mechanics. Standard procedures taken in developing stand-alone finite element computer codes or applying larger public domain or commercial finite element software packages to analyze particular problems are also presented.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5533 ADVANCED SOLID MECHANICS 3-0-3

Extension of one-dimensional, linear problems conventionally treated in undergraduate solid mechanics courses into more general, multi-dimensional problems. Topics include the motion and deformation of a continuous body, various stress measures, nonlinear constitutive modeling, nonlinear geometry, Lagrangian and Eulerian formulations. Additional topics may include indicial notation, linear elastic fracture mechanics, stability, and fatigue.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5543 PRESTRESSED CONCRETE DESIGN 3-0-3

Analysis and design of pre-stressed concrete members. Pretensioned and post-tensioned methods or prestressing. Design of precast elements. **Prerequisite: CE 3533 and permission of instructor or graduate standing**

CE 5553 STRUCTURAL DESIGN LOADS 3-0-3

In-depth application and interpretation of structural design loads for civil engineering structures. Topics include an overview of the background and history of design codes and load standards, design formats, selection of code specifications, snow, wind, and seismic load calculations. Course includes hands-on case studies and projects. Loads for other applications may also be included such as renovation, historic preservation, or forensic engineering applications. **Prerequisite: Graduate standing and/or permission of the instructor.**

CE 5563 STRUCTURAL SYSTEMS 3-0-3

Study of different types of structural systems used in the building environment and how the various components of the structure work together as a whole. The course focuses on the behavior and design of moment frames, braced frames, shear walls, and combined systems. Additional topics may include staggered braces, outriggers, and tall buildings.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5573 ADVANCED CONCRETE DESIGN 3-0-3

Continuation of CE 3533. Design of concrete systems related to buildings. Emphasis on slab-beam-girder system design. Torsion, continuity and length effects in reinforced concrete. One way slab systems, continuous beams, and slender columns. Design philosophies of codes and standards.

Prerequisite: Graduate standing and/or permission of the .

CE 5583 ADVANCED STEEL DESIGN 3-0-3

Continuation of CE 3513. The theory and design of steel framed structures, design philosophies, stability, composite design, and connections. **Prerequisites: CE 3513 and permission of instructor, or graduate standing**

CE 5593 SPECIAL TOPICS IN STRUCTURES 3-0-3

Special topics frequently encountered in structural engineering practice. Topics selected to match interests of students and instructor. May include advanced structural mechanics, collapse modeling, structural renovation, forensic engineering, earthquake engineering, condition evaluation and inspection, structural reliability, and numerical methods.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 5703 ADVANCED SOIL MECHANICS 3-0-3

Advanced topics in soil mechanics and their applications to practical topics encountered by a geotechnical engineer. Some concepts/topics include: clay mineralogy and expansive soils, shear strength and foundation design, consolidation and settlement, and soil dynamics and liquefaction.

Prerequisite: Graduate standing and/permission of the instructor.

CE 5713 GEOTECHNICAL EARTH STRUCTURES 3-0-3

Design and construction of earth structures including: embankments, levees, and dams. Earth retention systems are also presented which includes braced excavations, soil nails and retaining structures. Soil exploration and soil property evaluation are reviewed at the beginning of the course.

Prerequisite: Graduate standing and/or permission of the instructor.

CE 590X INDEPENDENT CE PROJECT (VARIES 1-6 HRS.)

In-depth, practice-driven, design or research project conducted under the supervision of a civil engineering faculty advisor. The project offers the student the opportunity to integrate theory and course work with practice.

Prerequisite: Graduate standing and permission of the project faculty advisor.

CHEMISTRY

CH 104 GENERAL CHEMISTRY I 3-3-4

Fundamentals of chemistry with emphasis on atomic structure, stoichiometry, thermochemistry, properties of solution, properties of matter. The laboratory is quantitative in nature.

Prerequisite: MA 113

CH 104H HONORS GENERAL CHEMISTRY I 3-3-4

Fundamentals of chemistry will be reviewed and specific topics discussed in-depth in a student-centered atmosphere. The course is geared towards collaborative learning and traditional lectures will be kept to a minimum. Topics include, but are not limited to, atomic structure, stoichiometry, thermochemistry, properties of solution, properties of matter.

Prerequisite: MA 113 and admission into the Honors Program, or permission of the instructor.

CH 114 GENERAL CHEMISTRY II 3-3-4

A continuation of CH 104. Emphasis is on chemical equilibria, thermodynamics, kinetics, acid-base reactions, electrochemistry, and organic chemistry. Includes laboratory time.

Prerequisite: CH 104

CH 114H HONORS GENERAL CHEMISTRY II 3-3-4

A continuation of CH 104H. The course will be structured similarly to CH 104H with collaborative, student-centered learning emphasized. Topics include, but are not limited to, chemical equilibria, thermodynamics, kinetics, acid-base reactions, electrochemistry and organic chemistry.

Prerequisite: CH 104H or permission of the instructor

CH 144 CHEMISTRY — IDEAS AND APPLICATIONS 3-2-4

An integrated view of organic and biological chemistry for non-science majors, emphasizing the importance of chemistry to daily living and chemical principles related to everyday experiences. Simulated chemical problems in the laboratory. This course cannot be substituted for CH 104 or CH 114 for either science or engineering majors.

CH 203 ORGANIC CHEMISTRY I 3-0-3

A study of the methods of preparation, structure, and characteristic reactions of the more important type of aliphatic compounds, including industrial uses and methods of synthesis.

Prerequisite: CH 114

CH 211 ORGANIC CHEMISTRY I LABORATORY 0-3-1

Laboratory synthesis and experiments illustrative of the methods used in working with organic compounds. **Corequisite: CH 203**

CH 213 ORGANIC CHEMISTRY II 3-0-3

A continuation of CH 203 with a study in a similar manner of aromatic compounds.

Prerequisite: CH 203

CH 221 ORGANIC CHEMISTRY II LABORATORY 0-3-1

The laboratory work illustrates the synthesis and reaction of aromatic compounds.

Prerequisite: CH 211; Corequisite: CH 213

CH 232 QUANTITATIVE ANALYSIS 1-3-2

Principles of volumetric, spectrophotometric, and electrochemical analysis are stressed in the laboratory; whereas, the lecture material will emphasize the approach and solution to problems dealing with stoichiometry of mixtures, ionic equilibrium, electrochemical processes, and other material related to quantitative analysis. **Prerequisite: CH 114**

CH 234 QUANTITATIVE CHEMICAL ANALYSIS 3-3-4

A quantitative treatment of analytical chemistry with a focus on the approach to solving problems. Topics of discussion include: the recognition and evaluation of error, critical and statistical analysis of data, further studies of equilibrium (acid/base, buffers, solubility and electrochemistry), and the principles of chemical separation and spectroscopy. The laboratory portion reinforces material learned in the classroom by providing practical experience in the areas of volumetric, gravimetric, spectrophotometric, and chromatographic processes. **Prerequisite: CH 114**

CH 244 INORGANIC CHEMISTRY 3-3-4

An introduction to inorganic chemistry, including the study of coordination compounds, bonding in transition metals, symmetry, descriptive chemistry of elements, and complex ions.

Prerequisite: CH 114

CH 324/324L CHEMICAL INSTRUMENTAL ANALYSIS 3-3-4

This course focuses on the principles and applications of modern instrumental methods of analysis. Topics include spectroscopy, chromatography, and mass spectrometric methods of analysis. Selected topics in the area of electrochemical, thermal and surface analytical techniques may also be explored. In the laboratory, students will gain practical hands-on instrumental experience reinforcing the concepts covered in the lecture. **Prerequisite: CH 213, CH 234**

CH 351 PHYSICAL CHEMISTRY I LABORATORY 0-3-1

Laboratory experiments included in the areas studied in CH 353.

Prerequisite: CH 232; Corequisite: CH 353

CH 353 PHYSICAL CHEMISTRY I 3-0-3

An in-depth study in real gases, thermodynamics, kinetics, chemical and physical equilibrium, and electrochemistry.

Prerequisites: CH 114, MA 213, PH 224

CH 361 PHYSICAL CHEMISTRY II LABORATORY 0-3-1

Laboratory experiments included in the areas studied in CH 363.

Prerequisite: CH 353; Corequisite: CH 363

CH 363 PHYSICAL CHEMISTRY II 3-0-3

Fundamentals of quantum theory of atoms and molecules, and spectroscopy.

Prerequisite: CH 353

CH 374 FORENSIC CHEMISTRY 3-2-4

The course includes a general discussion of the important relationships between chemistry and forensic science in today's and historical contexts. Basic statistical methods, data handling, and quality control procedures are discussed. The quality control and quality assurance sections focus on the responsibilities of the analyst, the laboratory, and the certification requirements. An introduction to the instruments and techniques involved in forensic chemical analysis include thin layer and paper chromatography, gas chromatography-mass spectrometry, FT-infrared and differential scanning calorimetry. Many of these instruments are used by students in the laboratory to analyze drug surrogates, accelerants, colorants and pigments, inks and paints, and polymers and fibers.

Prerequisite: CH 232 and CH 203

CH 424 ADVANCED INSTRUMENTAL ANALYSIS 3-2-4

Theory and practice of modern instrumental methods of analysis. Fundamental principles, applications, and limitations of various instrumental methods will be discussed. Particular emphasis will be placed on detection limits, sources of "noise", and the methods used to reduce noise and enhance signal strength.

Prerequisite: CH 324

CH 434 BIOCHEMISTRY 3-2-4

The chemical and physical behavior of biologically important compounds such as carbohydrates, lipids, proteins, nucleic acids, and enzymes are discussed. The various metabolic pathways are discussed in light of their organic mechanisms. **Prerequisite: CH 211, CH 213 (same as BIO 434)**

CH 400X SPECIAL ASSIGNMENTS IN CHEMISTRY VARIES (1-6 HRS.)

Directed readings, independent study, or research.

Prerequisite: Permission of the Department Chair

CH 474 ADVANCED FORENSIC CHEMISTRY 3-3-4

The course includes a discussion of the analytical, quantitative and qualitative chemical procedures required for preparation of circumstantial evidence from laboratory analysis for prosecution of court cases. Statistical methods, particularly proper sampling, data handling, and quality control procedures are discussed. Quality assurance (QA), quality control (QC), and total quality management (TQM) are explored in some detail. Laboratory procedures will include wet chemistry and spot testing as well as use of thin layer chromatography, gas chromatography with mass spectrometry and nitrogen/phosphorous detectors, FT-infrared (ATR) and Raman spectroscopy, polarizing microscopy, and other instrumental techniques. The instruments are used by the students to analyze materials typical of the case load of forensic laboratories: drug surrogates, accelerants, colorants and pigments, inks and paints, and polymers, fibers and plant materials.

Prerequisite: CH 324 and CH 374

CHEMICAL ENGINEERING

CHE 122 INTRODUCTION TO CHEMICAL & BIOLOGICAL ENGINEERING 2-0-2

An introduction to the field of Chemical Engineering & Biological Engineering. The tools of Chemical Engineering are introduced including mobile computational devices and Computer applications. Chemical production facilities will be included. Basic Biological Principles are reviewed including - The monomers and polymers of biological substances as well as cell structure and function will be introduced. The Central Dogma of biology will be introduced and explained.

CHE 203 MATERIAL BALANCES 3-0-3

This course is an introduction to the practice of chemical engineering. Fundamental principles are applied to chemical engineering problems involving conservation of mass. Stoichiometry is also reviewed. Process flow diagrams and piping and instrumentation diagrams will be presented.

Prerequisite: C or better in both CH104 and CH 114; Corequisite: PH 224

CHE 212 ENERGY BALANCES 2-0-2

This course is a continuation of CHE 203 with an emphasis on problems involving the conservation of mass and energy

Prerequisite: C or better in CHE 203; Corequisite: CHE 222 and CHE 242

CHE 222 SUSTAINABILITY AND PROCESS PROCESS MEASUREMENT LABORATORY 1-3-2

This laboratory introduces students to the process of writing laboratory reports. The laboratory includes the measurement of process variable and the reinforcement of fundamental concepts related to conservation principles. Statistical analysis of data is included. Safety and sustainability is also covered.

Corequisite: CHE 212

CHE 252 INTRODUCTION TO STATISTICAL AND COMPUTATIONAL METHODS IN CHEMICAL ENGINEERING 2-0-2

Spreadsheets and mathematical worksheets, both computer and mobile application based, will be used extensively for the calculation and analysis of chemical processes. Statistics will be introduced in the context of chemical process and product analysis.

Corequisite: CHE 212

CHE 303 CHEMICAL ENGINEERING FLUID DYNAMICS 3-0-3

Fluid mechanics applied to chemical processes will be introduced. Topics include fluid statics, rheological properties of fluids, laminar and turbulent flow in compressible and incompressible systems. Transfer equipment will also be introduced as well as the concept of net positive suction head. Fluid transport system design will be included.

Prerequisite C or better in both ChE 203 and ChE 212

CHE 313 CHEMICAL ENGINEERING THERMODYNAMICS I 3-0-3

This course will review the laws of thermodynamics and introduce students to thermodynamic cycles and systems. Equations of state for single component systems are introduced. Estimation of physical and thermodynamic properties will be covered

Prerequisite: MA 213 and a C or better in CHE 212

CHE 333 UNIT OPERATIONS LABORATORY I 2-3-3

A laboratory course to study both heat transfer and fluid flow. Identification prevention and mitigation of laboratory and industrial hazards will be covered. Statistics and technical writing are required.

Prerequisite: CHE 222, CHE 242, CHE 303, and CHE 373

CHE 372 CHEMICAL ENGINEERING THERMODYNAMICS II 2-0-2

Phase and Chemical Reaction equilibrium will be covered in this course. Emphasis is placed on multi-component non-ideal systems.

Prerequisite: CHE 313

CHE 373 CHEMICAL ENGINEERING HEAT TRANSFER 3-0-3

Heat transfer will be studied and applied to chemical processes. Heat transfer coefficient prediction with and without phase change will be included. Commercially available heat transfer equipment will be studied. Radiation heat transfer, evaporation as well as unsteady state heat transfer will be studied. A design project involving heat transfer equipment will be included in this class.

Prerequisite: C or better in both CHE 203 and 212

CHE 383 MASS TRANSFER 3-0-3

This course will study the phenomena of mass transfer as it relates to chemical separation processes. Diffusion coefficients and mass transfer coefficients will be introduced and estimated. Rate based separation calculations will be studied. Applications include absorption and cooling water towers. **Prerequisite: CHE 373 and CHE 313**

CHE 393 STAGEWISE SEPARATIONS 3-0-3

The design and characterization of stage-wise and continuous separation processes are covered in this course. Both graphical and rigorous numerical techniques are used. Applications include distillation, absorption, stripping and liquid-liquid extraction

Corequisite: CHE 372 and CHE 383

CHE 3103 PLASTICS AND CORROSION 3-0-3

An introduction to the engineering properties of plastics and the fundamentals of corrosion. The effect of the environment on the corrosion of metals, weathering and the deterioration of plastics are examples of some of the topics covered.

Prerequisites: CH 104, PH 224

CHE 412 APPLIED NUMERICAL METHODS 2-0-2

Advanced engineering mathematics will be introduced. Numerical techniques will be discussed and applied to chemical engineering problems.

Prerequisite: CHE 453

CHE 433 UNIT OPERATIONS LABORATORY II 2-3-3

This is a laboratory course devoted to the study of mass transfer and chemical reaction kinetics. Statistical techniques will be integrating into these experiments along with statistical design of experiments. **Prerequisite: CHE 333 and CHE 393**

CHE 453 CHEMICAL ENGINEERING KINETICS 3-0-3

A study of chemical reaction processes with applications to equipment design.

Prerequisites: CHE 373, CHE 383

CHE 463 CHEMICAL PROCESS DYNAMICS AND CONTROL 2-3-3

An introduction to process dynamics and the application of control systems.

Prerequisite: MA 233

CHE 473 CHEMICAL PROCESS DESIGN I 3-0-3

Economic design of commonly used chemical process components such as piping systems, pumps, process vessels, heat exchangers, fired heaters, and distillation columns. Methods employed for design include shortcut calculations and computer methods.

Prerequisite: CHE 312, CHE 373 and CHE 383

CHE 483 CHEMICAL PROCESS DESIGN II 3-0-3

Capstone design experience unifying the principles of previous course work. Comprehensive projects that incorporate appropriate engineering standards and multiple realistic constraints.

Prerequisites: CHE 453, CHE 473, and ES 382

CHE 400X SPECIAL PROBLEMS IN CHEMICAL ENGINEERING VARIES (1-4 HRS.)

Course content arranged according to the student's abilities and with the permission of the chair of the department. No student may pursue this course off campus during his or her last semester prior to graduation.

CHE 4043 AIR ENVIRONMENTAL CONTROL 3-0-3

Air pollution control regulations and the equipment that is used to monitor and control air pollution are studied. Characterization of particulate and gases and vapors are included. Control technologies such as cyclones, ESP, bag houses, incinerators, and adsorption are presented.

Prerequisite: Junior standing

CHE 4073 BIOCHEMICAL ENGINEERING 2-3-3

Microbiological and biochemical phenomena are treated from an engineering standpoint. Course topics include an overview of basic biological concepts along with the modern techniques of biotechnology. Mathematical models of enzyme and whole cell systems are derived and discussed. Commercial and laboratory reactors, as well as separation techniques, are studied.

Prerequisite: MA 233

CHE 4083 PLANT MANAGEMENT 3-0-3

A comprehensive overview of the factors and issues which must be considered for the successful management and operation of a chemical plant. Typical areas addressed include process evaluation and optimization, maintenance operations and planning, environmental pollution control and hazardous waste management, manufacturing economics, plant safety, labor relations, community relations, and regulatory compliance.

Prerequisite: Junior standing

CHE 4173 BIO-SEPARATION PROCESSES 2-3-3

This course will examine the fundamentals of separation processes used to isolate and purify biochemical products such as whole cells, enzymes, food additives, and pharmaceuticals. Topics to be discussed include cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation processes. The laboratory portion of the course will include experiments covering the above topics.

Prerequisites: CHE 303, CHE 373 or permission of instructor

CHE 4193 HIGH POLYMER PROCESSES 2-3-3

The chemical and engineering aspects of high-polymers, structure, property, and relationships. Physical methods of characterizing high polymers, basic chemistry and kinetics of polymerization reactions, industrial polymerization processes. Compounding and processing of plastics and elastomers, molding, extrusion, and other polymer-manipulation techniques.

Prerequisites: CH 203

CHE 4223 SELECTED TOPICS IN THE ENGINEERING SCIENCES 3-0-3

This course is divided into three modules, each five weeks long. The first module will cover basic electricity and circuit analysis, as well as process measurement and instrumentation. The second module will introduce statics and strengths of materials while the final module will introduce the properties of materials and material science.

Prerequisite: PH 224

CHE 4273 PHARMACEUTICAL PROCESSES 2-3-3

The objective of this course is to provide students with an overview of the pharmaceutical process industry from an engineering standpoint. Special emphasis will be given to biologically derived pharmaceuticals. Topics in the course include the drug discovery, drug development, and drug manufacturing processes, including cGMP. The course also covers fermentation selection, operation and control, and unit operations associated with recovery and purification. The course concludes with finished product preparation and packaging. The laboratory time will be used to tour pharmaceutical production facilities.

Prerequisites: CHE 303, CHE 373 or permission of instructor

CHINESE**CHN 113 CHINESE I 3-0-3**

An introduction to the Mandarin Chinese language and Chinese culture. Pronunciation, alphabet, and basic grammar skills are emphasized. No previous study of Chinese is required.

CHN 123 CHINESE II 3-0-3

Continued study of pronunciation and basic grammar skills are emphasized. Review of basic grammatical features and alphabetic system.

Prerequisite: CHN 113 or by placement

COOPERATIVE EMPLOYMENT**CO 050 CO-OP EMPLOYMENT**

For cooperative education (Co-op) students only. Co-op employment in a professional environment with emphasis on training oriented to students who are majoring in an engineering, environmental science, or computer science program. Co-op students must pre-register for this course before each semester's work assignment. The final cooperative education (Co-op) work assignment must be within the calendar year prior to graduation. While enrolled in this course, a student is considered a full-time Trine University student.

Prerequisite: Sophomore standing with a minimum GPA of 2.4

CO 453 CO-OP WORK EXPERIENCE 3 CREDITS

To obtain cooperative education endorsement on the degree, the student must register for this course. While enrolled in this course, the student must complete a formal report on his/her co-op work experience. The report must be completed by the eighth week of the semester.

Prerequisites: Senior standing, minimum of three semesters of CO 050 Co-op Employment

COMMUNICATION**COM 101 FRESHMAN MEDIA PRACTICUM 0-2-1**

Individual participation in work at WEAX, The Triangle, or The Modulus, involving at least 30 hours of work during the semester.

Prerequisite: Communication major or minor

COM 123 INTRODUCTION TO ELECTRONIC MEDIA 3-0-3

This course addresses the development and use of radio, television and new electronic/digital media in American society. It also explores the technical basis of inventions as well as pioneers who fueled growth and direction of broadcasting, cable and emerging electronic media systems throughout the U.S. leading to a myriad of programming choices and employment opportunities.

COM 153 PRINCIPLES OF PUBLIC RELATIONS 3-0-3

Role of public relations as a communication device within organizations including theory, identification of audiences, sophisticated techniques, planning and execution of public relations programs and evaluation of effects. The course introduces students to various communications tools with special emphasis given to methods that practitioners use to promote their products and organizations, including the development of new technologies that are rapidly replacing conventional mass media.

COM 163 INTERPERSONAL COMMUNICATION 3-0-3

Communication concepts and principles are pragmatically applied to interpersonal communication in work, college, dating, family, and social settings. Communication exercises, role plays, and case studies enable students to analyze communication dynamics and improve communication skills employing language, nonverbal communication, listening, perception of self and others, relationship development, and assertiveness. Extensive training in conflict management skills and analysis.

COM 183 WRITING FOR THE MEDIA 3-0-3

Provides a brief introduction to the principles, practices, and professional requirements of the journalism profession, but the focus is on discussion and application of reporting and writing techniques for print and electronic media. Work on The Triangle, The Modulus, and/or WEAX is required.

Prerequisite: ENG 113 or 133

COM 203 MEDIA AND COMMUNICATION 3-0-3

Provides an introductory historical and expository survey of key mass media and popular art forms (including books, newspapers, magazines, radio, film, television, photography, music, advertising, and the Internet). Emphasizes, through exercises in becoming "media literate," the persuasive, often insidious, power of society's "consuming images," both visual and aural.

Prerequisite: ENG 113 or ENG 133

COM 213 BUSINESS COMMUNICATION 3-0-3

Emphasis on effective research, writing, and document design in project management, including proposals, periodic and progress reports, formal completion reports, and correspondence. Also considers communication in meetings, the employment process, and presentations using PowerPoint.

Prerequisite: ENG 113 or 133

COM 233 INTERCULTURAL COMMUNICATION 3-0-3

Considers interrelationships between communication and culture, the diversity between and within cultures, and both the challenges and the richness of communication posed by such diversity, including within U.S. culture. Topics include cultural patterns, worldview and perception, cultural identity, verbal and nonverbal communication, listening, family and relationships, and business.

COM 253 SPORTS MEDIA AND PROMOTION 3-0-3

Examines the various publicity, promotion and public relations responsibilities, duties and challenges aspiring professionals seeking careers in college and professional sports promotion and information will face. The course also includes development of aspects involved in the staging of a major sports-oriented community event.

Prerequisite: COM 153 or sophomore standing

COM 263 THEORIES AND PRACTICES IN COMMUNICATION 2-2-3

An introduction to the disciplines and professions of communication. Considers quantitative, qualitative, and humanistic research and theories for understanding language, nonverbal communication, listening, persuasion/rhetoric, and communication context. Indicates how communication knowledge, research techniques, and skills are employed in various professions and considers professional preparation strategies such as communication portfolio development.

COM 283 SPORTS WRITING 3-0-3

Techniques, instruction and practice in news gathering, evaluation, reporting, writing and editing local, regional and national sports news. Topics will include research, style, interviewing skills, how newsroom decisions are made for sports stories and features. Each student will be required to submit articles to the Triangle and other local media for possible publication.

Prerequisites: ENG 113, COM 183

COM 301 MEDIA PRACTICUM 0-2-1

Practical media experience through work at WEAX, the Triangle, or the Modulus. Requires a minimum 30 hours of work for the semester and written mid-semester and final reports. May be repeated, but for no more than a total of three credit hours. Any alternate supervised media experience requires department chair approval. **Prerequisite: COM 101**

COM 323 THE BUSINESS OF ELECTRONIC MEDIA 3-0-3

This course examines how electronic media organizations throughout the U.S. are dealing with today's competitive pressures, new technologies, and financial strains. Discuss how radio and television programming...practices that once galvanized families during respective golden ages of radio/TV...to the explosion of electronic media choices that are currently available to audiences and advertisers. **Prerequisite: Junior standing or permission of instructor**

COM 353 PUBLIC RELATIONS WRITING AND PRODUCTION 3-0-3

Application of persuasive writing and communication principles and of document and visual design principles to public relations writing and production formats, such as backgrounders, news releases, media advisories, newsletters, brochures, direct mail, op-ed pieces, media kits, web pages, persuasive speeches, PSAs, and audio (ANR) and video (VNR) news releases. Assignments include developing potential client content for WEAX, the Triangle, and/or the Modulus, as well as use of the digital video editing lab to produce electronic PR media.

Prerequisites: COM 213 OR ENG 133

COM 363 PERSUASION AND ARGUMENTATION 2-2-3

Knowledge of concepts and principles of persuasion, rhetoric, and argumentation is applied through debate and other exercises designed to improve skill in reasoning, argumentation, persuasion, planning, and rational decision-making. Students develop skill in analyzing and planning worthy and effective oral, written, and mediated persuasive communication.

Prerequisite: SP 203

COM 373 TOPICS IN COMMUNICATION 3-0-3

Detailed survey of one of the major areas within the discipline of communication. The course changes each time it is offered, with the specific topic announced in the class schedule.

Prerequisite: Junior standing or permission of instructor

COM 400X ELECTIVE INTERNSHIP VARIES (1-3 HRS.)

Elective internship with variable credit of from one to three hours, with a minimum of 40 hours of work per credit hour. May be repeated for credit, but the total credit hours of elective and/or capstone internship may not exceed six hours total.

Prerequisites: Communication major or minor, 2.5 G.P.A

COM 4013 SENIOR CAPSTONE INTERNSHIP IN COMMUNICATION (3 HRS.)

An internship including capstone requirements, such as submission of a proposal and of written and oral final reports, and requiring a minimum of 90 hours of work.

Prerequisites: Must not have taken more than three credits of COM 400X, senior Communication major, 2.5 G.P.A.

COM 410X INDEPENDENT STUDIES IN COMMUNICATION VARIED (1-4 HRS.)

An individualized reading and research project in the communication discipline.

Prerequisite: Permission of the Department Chair

COM 413 CORPORATE AND ORGANIZATIONAL COMMUNICATION 3-0-3

Principles and skills for effective communication within task-oriented teams, nonprofit organizations, and corporations. Considers communication techniques to improve meetings, problem-solving, decision-making, and communication climate, while fostering cohesiveness and productivity. Also considers the role of communication consultants and trainers and of internal media such as newsletters, brochures, and electronic communication. Team projects apply techniques and refine communication skills essential for internal contexts. Teams conduct a client-based communication audit or ethnography of an organization or corporate office. Participation in development of content for the Triangle, the Modulus, and/or WEAX is also required. **Prerequisite:** COM 213 or ENG 133

COM 422 CAMPUS MEDIA MANAGEMENT 0-4-2

Experience in assuming substantial student management responsibilities at WEAX, The Triangle, or The Modulus. **Prerequisite:** COM 101 and COM 301

COM 4281 SENIOR COMMUNICATION PROJECT PROPOSAL 1-2-2

Application of communication principles and skills by planning and developing a formal proposal for a capstone communication campaign or project. **Prerequisite:** Senior Communications major

COM 4292 SENIOR COMMUNICATION PROJECT 0-4-2

Application of communication principles and skills by implementing and evaluating a capstone communication campaign or project. **Prerequisite:** COM 4281

COM 453 PUBLIC RELATIONS PLANNING AND CAMPAIGNS 3-0-3

Knowledge and skills needed in the public relations planning, decision-making, and problem-solving process of research, objectives, programming, and evaluation. Case studies and problems apply planning and execution of PR campaigns and relations with a variety of publics: media, employees, members, communities, government and the public, investors, consumers, international, and special groups. Includes crisis and emergency PR and PR aspects of integrated marketing communications. Individuals develop oral and written client-based campaign proposals to solve problems or to utilize opportunities, while teams develop and execute a short term PR campaign for a campus or community client. **Prerequisites:** COM 213 or ENG 133

COMMUNITY VOLUNTEER

COV 101 COMMUNITY VOLUNTEER 0-2-1

Students perform volunteer work assisting and advancing adult literacy in Steuben County under the direction of the Steuben County Literacy Coalition. The course is graded on a pass/fail basis and may be taken twice.

COMPUTER SCIENCE

CS 1113 OBJECT-ORIENTED JAVA PROGRAMMING 3-0-3

An introduction to programming. We begin with a history of computing, and then keep an eye on software-engineering issues including design/test, tools, and risks as we introduce: objects and classes; variables, types and assignment; message passing; inheritance; control structures; the concept of, and properties of, algorithms, including recursion; arrays and strings; collections and iteration; APIs; and object-oriented design.

Corequisite: MA 103 or higher

CS 1123 C++ AND OBJECT-ORIENTED DESIGN 3-0-3

This course introduces the programming language C++ with emphasis placed on object-oriented design. Students should be able to: Use pointers and arrays; use header files; overload operators; use functions of the standard library; determine a plan for testing a piece of software; organize a program to determine classes and objects; design a graphical user interface.

Prerequisite: CS 1113 with a grade of "C" or above

CS 1303 INTRODUCTION TO THE WORLD WIDE WEB 3-0-3

Introduction to computer science through the World Wide Web, focusing on the techniques of web-page creation.

CS 2103 ALGORITHM DESIGN AND ANALYSIS 3-0-3

The theory of programming, reinforced with practical activities, such as animations and demonstrations of the time requirements of different algorithms. We investigate proof techniques, time-space analysis of algorithms, classic strategies like greedy search and branch-and-bound, trees and graphs, automata, and applications. Before enrolling in this course, Java programming is required, but further experience in programming is prudent.

Prerequisites: CS 1123

CS 2213 ARCHITECTURE AND OPERATING SYSTEMS 3-0-3

The course reviews digital logic, and investigates the machine representations of data, assembly-level machine organization, memory architecture, and functional control including pipelines. Other topics include the functions of operating systems, and examines processes, interrupts, and kernel modes; concurrency, and scheduling; and memory management.

Prerequisite: CS 1123

CS 2503 SOFTWARE ENGINEERING 3-0-3

This course introduces software engineering from requirements definitions and documents, through system modeling, specification, and design, to verification and validation. It examines project management, software cost estimation, software maintenance, configuration management, documentation, and software quality assurance. This course also examines human-centered development and evaluation and human performance models. It involves students in graphical user interface design and implementation. The course introduces groupware, on-line communities and intelligent agents. **Prerequisite:** CS 1123

CS 2613 ARTIFICIAL INTELLIGENCE AND INFORMATION 3-0-3

This course introduces the basic terms and issues of artificial intelligence. It describes knowledge representation and search methods, and learning systems like genetic algorithms and neural networks. The course describes information models and systems, database systems, data modeling, and both relational databases and query languages.

Prerequisite: CS 1123

CS 3223 NETWORK ARCHITECTURE 3-0-3

Topics include distributed algorithms Interfacing and communication; multiprocessing architectures; LAN, WAN, and ISO/OSI; concurrency; scheduling; real-time issues; fault-tolerance; system performance measurement; scripting.

Prerequisite: CS 2213

CS 3303 NET-CENTRIC COMPUTING 3-0-3

Communication and networking: the ISO 7-layer model; client/servers on the web; building web applications; network management: security, firewalls, quality-of-service; compression and decompression; multimedia technologies and capacity issues; wireless and mobile computing protocols, LANs, and performance, and extending client/server ideas to mobile computing.

Prerequisite: CS 3223

CS 3933 SOFTWARE ANALYSIS AND DESIGN 3-0-3

Teaches the code development process to students who can use an object-oriented computer language. Students will: identify activities of software project engineering; write a formal requirements document; perform object-oriented analysis of client requirements; use UML class and sequence diagrams to support object-oriented design; apply some software design patterns; implement your designed software in a team supported by a version-control tool; use a professional-caliber GUI library to advantage; and follow coding standards. **Prerequisite: CS 2503**

CS 4013 COMPUTER GRAPHICS 3-0-3

This course includes both two and three dimensional computer graphics. Topics include windows and view-ports; geometric transformations, hidden surfaces, and file formats. It introduces standard libraries such as VCL.

Prerequisite: ECE 263

CS 4023 COMPILER CONSTRUCTION 3-0-3

This course introduces compiler design for procedural languages. Topics include formal grammar, lexical, syntax, and semantic analysis, parsing, code generation and optimization, and compiler writing tools. **Prerequisite: CS 2213**

CS 4033 SPECIAL TOPICS 3-0-3

Addresses advanced topics that vary by year. **Prerequisite: consent of instructor**

CS 4903 CAPSTONE PROJECT 3-0-3

A team project that requires interaction with users and formal reporting. A student who intends to pursue graduate study and who can demonstrate team work from other experience may be assigned a solo research project. **Prerequisite: CS 2503**

EARTH SCIENCE

EAS 203 OCEANOGRAPHY 2-2-3

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea included. **Prerequisite: A lab science and MA 113 (Same as BIO 203 and GEO 203)**

EAS 213 PHYSICAL GEOGRAPHY 3-0-3

An analysis of the spatial and functional relationships among landforms, climates, soils, water, and the living world. This course also addresses the connections between environmental processes and human activity, such as human impact on the environment. **(Same as GEO 213)**

EAS 253 WEATHER & CLIMATE 3-0-3

Elementary description of the atmosphere: its motion systems, thermal characteristics, clouds and precipitation, weather map interpretation and analysis; climates of the United States. The course conveys meteorological concepts in a visual, practical, and non-mathematical manner.

EAS 273 GEOLOGY 3-0-3

An introduction to the field of geology. Study of minerals and rocks and their formation, within the context of the earth's geologic history. Emphasis on soils, running water, and groundwater. Plate tectonics, glaciers, volcanoes, erosion, and weathering are also covered. Non-lab science only. (Same as GLY 273)

ELECTRICAL AND COMPUTER ENGINEERING

ECE 103 PROTOTYPING AND PROJECTS 2-2-3

An introduction to electrical and computer engineering which includes a strong experimental and project component. This course introduces the principles of electrical phenomena, the mathematics used to describe power and signals, Boolean logic and its implementation, including Programmable Logic Controllers.

ECE 211 CIRCUITS LABORATORY 0-2-1

The laboratory supports the Circuits class through the experimental characterization of passive circuits and their response prediction using component models. Students will learn how to use typical electronics-laboratory test equipment for circuit characterization, how to write an experimental logbook, and how to model electrical components to better predict a circuit's actual response. Students will learn how to measure time response, frequency response, and impedance.

Corequisite: ECE 213

ECE 213 CIRCUIT ANALYSIS 3-0-3

This course prepares students for all subsequent circuits-based courses. Linear circuit analysis is studied by placing emphasis on the modified nodal admittance matrix method and circuit transformations. Students will learn how to formulate a solution for any circuit containing terminally-defined resistors, capacitors, inductors, coupled inductors, ideal transformers, dependent and independent sources. Students will learn how to use professional software to simulate circuits and to facilitate computations and mathematical operations.

Prerequisite: MA 134; PH 164 or ECE 103

ECE 231 DISCRETE ELECTRONICS LABORATORY 0-2-1

This laboratory provides a comprehensive hands-on opportunity to implement electronic design concepts. The pn junction diode, and MOS transistors and their biasing techniques are extensively introduced to teach operational perspectives and circuit design. Students will work in a team environment to perform and solve technical problems; understand load lines and design transistors to operate in different regions; design rectifiers, filters; multipliers and clampers using pn junction diodes; design circuits using TINA simulation software; implement the design in proto board.

Corequisite: ECE 233

ECE 233 DISCRETE ELECTRONICS 3-0-3

The student shall be able to explain the basic operation of junction diodes; BJT's; FET's, including major limitations; analyze the operation of circuits using practical device models; use SPICE-based software as both an analysis and design tool for electronic circuits; and design practical circuits using these devices

Corequisite: ECE 231; Prerequisite: ECE 213

ECE 243 ANALOG SIGNALS 3-0-3

This course bridges the gap between the device-based topics of circuits and the signals-and-systems topics of DSP, Controls, and Communications. Mathematical concepts relating to complex numbers and matrices are developed, frequency domain analysis is discussed in depth, and these ideas will be applied to the design of analog filters. Students should be able to: calculate with complex numbers; analyze continuous time circuits in the time domain, phasor domain, and frequency domain, and decide the appropriate domain to use for analysis; design first and second order analog filters using resistors, capacitors, and inductors; design filters by cascade and parallel combinations of lower order filters. **Prerequisites:** MA 164, ECE 213 with a grade of "C" or above, ECE 263 with a grade of "C" or above

ECE 261 DIGITAL SYSTEMS LABORATORY 0-2-1

The lab provides a comprehensive hands-on opportunity to implement digital design concepts. Logic gates, logic tools, Hardware Description Language (HDL) and Field Programmable Gate Array (FPGA) design boards are extensively introduced to provide different variations of digital design. Students will be able to: Work in a team environment; solve technical problems; Understand switch-bounce problems and design a de-bounced switch; Design adders, comparators, multiplexers, tri-state buffers and decoders using AND/OR/NOT/NAND/NOR logic gates; Design memory cells, BCD-7-segment decoders, flip-flops and counters using logic gates and HDL; Implement the design in an FPGA board.

Corequisite: ECE 263

ECE 263 DIGITAL SYSTEMS 3-0-3

This course covers and explores the introductory concepts of digital systems using combinational and sequential logic circuits. Digital design automation tools and Hardware Description Language (HDL) are also introduced. Students will be able to demonstrate that they: understand number systems and Boolean algebra; understand and can design combinational logic circuits including multiplexers, comparators, decoders, and adders; understand and can design sequential logic circuits including latches, flip-flops and counters; can design combinational and sequential circuits using HDL and can perform timing analysis; understand the memory hierarchy, ROMs, RAMs and FLASH memories; understand Programmable Logic Devices (PLDs), CPLDs and FPGAs.

Corequisite: ECE 261

ECE 271 MICROCONTROLLERS LAB 0-2-1

This course teaches students to implement and test inexpensive hardware-software systems that offer a user interface, a digital signal generator, a sampled feedback controller, and subsystem interfacing. Students will: test a feedback system using experiments they design, and determine if project goals are met; design and implement a working feedback controller for a real physical system; team-up on most labs and on one formal report; solve the problem posed in the feedback project; report findings in formal written documents; use lab bench tools to develop and debug code.

Prerequisite: ECE 261; **Corequisite:** ECE 273

ECE 273 MICROCONTROLLERS 3-0-3

This course teaches students to design inexpensive hardware-software systems that offer a user interface, a digital signal generator, a sampled feedback controller, and subsystem interfacing. Students will analyze a microcontroller system for timing; solve problems written in prose by showing a hardware/software system that addresses the problem; empathize with stakeholders of a medical device; teach themselves to use an unfamiliar on-chip peripheral from the manufacturer's data sheet; address power consumption/battery life; use a compiler/assembler/simulator to develop correctly working code; use the UML to aid design work; respect the IEEE code of ethics.

Prerequisite: ECE 263 and CS 1113 or equivalent; Corequisite: ECE 271

ECE 301 ELECTRICAL MACHINES LABORATORY 0-2-1

This laboratory supports the machines class through experimental work with a disectible machine. This machine is used to build, test, and model a variety of AC and DC generators and motors. Students will learn how to assemble and test commutator machines, synchronous machines, and induction machines. Students will learn how to characterize machine performance in terms of regulation, efficiency and power; how to carry out tests to determine a machine's lumped-element model parameters. **Corequisite: ECE 303**

ECE 303 ELECTRICAL MACHINES 3-0-3

This course completes the power sequence of courses. Rotating electrical machinery is studied from the magnetic-field interaction viewpoint. Machine operating principles are studied in detail and electrical circuit models are used to quantify machine/power system interactions. Students will learn how to calculate the power-torque-speed performance of various DC and AC machines; how to select a machine to best meet the desired performance objectives considering electrical supply and environmental issues.

Prerequisite: ECE 213 or ES 253; Corequisite: ECE 301

ECE 313 ELECTRICAL POWER 3-0-3

Introduction to three-phase power generation, transmission, distribution, and utilization. Steady-state power system performance measures: efficiency, ratings, voltage regulation, static stability, and reactive power control are used as unifying concepts across a study of the main power system components. Students learn how to calculate transmission line capacity, generator capability limits, transformer regulation, and load power consumption.

Prerequisite: ECE 213 or ES 253

ECE 323 DYNAMIC ELECTROMAGNETIC FIELDS 3-0-3

This class discusses electromagnetic fields and calculations involving Maxwell's equations. Students should be able to: apply Maxwell's equations in integral and differential form to calculate electromagnetic fields; calculate transmission line fields; calculate potentials; and describe how plane waves propagate in free space and in other uniform materials. The course may also cover antennas.

Prerequisite: MA 233, PH 234

ECE 333 ANALOG ICs 3-0-3

The student shall be able to design circuits that include analog integrated circuits such as operational amplifiers, ADCs and DACs, and modulation or demodulation devices; to analyze frequency-domain and time-domain characteristics of analog systems that include filtering, feedback, modulation, rectification, and sampling; to simulate, implement and test such circuits. The student shall be able to

explain the basic operation of op-amps, including major limitations; analyze the operation of circuits using practical device models; use SPICE-based software as both an analysis and design tool for electronic circuits; and design practical circuits using these devices. **Prerequisite: ECE 213**

ECE 351 CMOS VLSI DESIGN LAB 0-2-1

This lab provides an extensive opportunity to implement CMOS VLSI design concepts. VLSI design tools are used for design projects on inverters, multiplexers, comparators, oscillators, and flip flops.

Corequisite: ECE 353

ECE 353 CMOS VLSI DESIGN 3-0-3

The design of special purpose digital systems using VLSI technology is investigated using CMOS technology. MOSFET modeling, dynamic power dissipation, clocking strategies and transistor delays are considered. Students will: understand MOS Device modeling and DC transfer characteristics; understand parasitic R,L,C and delay estimation and transistor sizing; understand sequential circuits and clocking strategies; design static and dynamic CMOS VLSI circuits; understand dynamic power dissipation and low power VLSI design techniques; use VLSI tools to simulate and produce technical reports. **Prerequisites: ECE 233, ECE 263; Corequisite: ECE 351**

ECE 361 LOGIC & COMPUTER DESIGN LAB 0-2-1

The lab provides an opportunity to implement digital design concepts in Altera Field Programmable Gate Arrays (FPGAs) and Complex Programmable Logic Devices (CPLDs). The lab serves a twofold purpose. In the first half of the semester, students will: complete assigned design projects using HDL and schematic tools, and implement completed design projects using Altera FPGAs and CPLDs. In the second half of the semester, students will work in a group setting to come up with a challenging project. The students will then work on their respective design, implement it on the design board and make a group presentation. **Corequisite: ECE 363**

ECE 363 LOGIC & COMPUTER DESIGN 3-0-3

The course builds on the Digital Systems class and provides an in-depth analysis of digital design and computer architecture. Core topics include Finite State Machine (FSM) controllers and pipeline design using Hardware Description Language (HDL). Students will: understand and design sequential circuits and perform timing analysis; understand and design FSM controllers and next state decoders; understand and design pipelined processors and cache memories; design of an onboard 32x32 register file; work in a group setting to come up with innovative ideas to design and implement an FSM, a controller and a cache memory.

Prerequisite: ECE 263, ECE 233; Corequisite: ECE 361

ECE 371 EMBEDDED SYSTEMS LABORATORY 0-2-1

In support of ECE 373, this lab puts students in small teams to explore isolated subsystems from the course project in the usual lab format, and then provides structured time to achieve and demonstrate progress in the project. Students will work in small teams; will show that they can use the tools and techniques of modern embedded systems to implement their designs; will assume responsibility for designing the tests or experiments needed to verify their work; and will demonstrate communication skills in formal reports and demonstrations.

Corequisite: ECE 373

ECE 373 EMBEDDED SYSTEMS 3-0-3

Building on ECE 273 (Microcontrollers), this course focuses on real-time multitasking and RTOS and includes a design project to explore these ideas, and the course also looks at enabling techniques such as mixed C and assembly, control of linking, external memory, self-programming, and fail-safety. Students will be able to explain and apply real-time multitasking concepts; design and implement an embedded system; design recovery from exceptional conditions; incorporate into their work complex peripherals like PWM-capable timers.

Prerequisite: ECE 273; **Corequisite:** ECE 371

ECE 403 DIRECT GENERATION TECHNIQUES 3-0-3

The direct electrical energy conversion and storage methods are studied in depth. Direct conversion involves the conversion of energy directly to electrical form with no electromechanical interface. These technologies include heat transfer, chemical cells, solar arrays, and fuel cells. The course also investigates the current and future trends in energy storage techniques. **Prerequisite:** ECE 213 or ES 253

ECE 441 COMMUNICATION SYSTEMS LABORATORY 0-2-1

A lab to investigate means of and results of moderate-frequency signal processing in the service of communications, using both integrated circuits and simulated components. Students will be able to determine bandwidth and bands of interest, identify distortion and aliasing, and apply lab tools to moderate-frequency designs. **Corequisite:** ECE 443

ECE 443 COMMUNICATION SYSTEMS 3-0-3

The course investigates ways of processing a signal both to prepare it for effective transmission through some medium or media that may be carrying other signals, and to reconstruct the original signal at the receiving end. After this course, students will be able to analyze and design basic communication systems using block-diagram models of filters, samplers, and modulators; compare and contrast multiple-access communication techniques including AM, FM, coding and keying; calculate the basic quantities such as channel capacity, probability of error, and bandwidth needed to transmit analog or digital signals in base-band or in pass-band.

Prerequisite: ECE 233, ECE 243; **Corequisite:** ECE 441

ECE 453 RANDOM PROCESSES IN ELECTRICAL AND COMPUTER ENGINEERING 3-0-3

In this course, concepts of random processes are applied to electrical and computer engineering applications. In addition to the mathematical topics described below, each student will present on a particular application which may include: oversampling A/D, queuing inside a computer processor, quality control, voice recognition, and interferometric measurements. Students should be able to: Describe a random process by a probability density and probability distribution; identify whether a process is stationary and ergodic; compute the auto-correlation, cross-correlation, spectral density and cross-spectral density of a random process.

Prerequisite: MA 393

ECE 461 DIGITAL SIGNAL PROCESSING LAB 0-2-1

MATLAB is used to demonstrate concepts from digital signal processing. Students should be able to: Sample and filter audio signals; filter images; demonstrate effects of insufficient sampling, aliasing, rounding, or instability; design digital filters.

Corequisite: ECE 463

ECE 463 DIGITAL SIGNAL PROCESSING 3-0-3

This course emphasizes analysis and design of systems for processing digital signals using frequency domain techniques. Students should be able to: analyze signals in the frequency domain; describe digital systems in the frequency domain; sample, quantize, and reconstruct signals; design digital filters.

Prerequisite: ECE 243; Corequisite: ECE 461

ECE 481 INSTRUMENT SYSTEMS LABORATORY 0-2-1

This course discusses data acquisition of both analog and digital signals. Students should be able to: Process input data from sensors; Read data into a computer using multiple methods; characterize signal noise; Use Labview for data acquisition and analysis.

Corequisite: ECE 483

ECE 483 INSTRUMENT SYSTEMS 3-0-3

This course discusses theoretical and practical ideas related to data acquisition of both analog and digital signals. Students should be able to: Analyze input data from sensors; characterize signal noise; compare GPIB, USB, and other data buses for instrumentation systems; use Labview or Matlab for data acquisition and analysis. **Corequisite: 481; Prerequisite: ECE 213**

ECE 4001 CONTEMPORARY ISSUES FOR ENGINEERS 1-0-1

This is a seminar-based weekly course covering global perspective on business and engineering, and effects and responsibilities of engineers in society. Students will be able to; understand sustainability and diversity and develop a broader perspective necessary to understand the impact of engineering solutions in an environmental, and societal context; Understand the complex global economy.

Prerequisite: Senior standing

ECE 4002 PROJECT MANAGEMENT 2-1-2

The student shall be able to work with a team to identify or elicit details of end-user needs; produce and present a project proposal; identify and assign responsibilities to team members based on an accepted proposal; work across disciplines to deliver a product or service to a client; explain both highly-structured and more agile engineering design processes.

Prerequisite: Advisor's consent

ECE 4003 DESIGN PROJECT 3-0-3

The student shall be able to: design and prototype a product; work with team members from other disciplines to collectively solve engineering problems; obtain and utilize information sources outside the university setting to solve engineering problems; consider the perspective of stakeholders as an integral part of the design process; identify economic, environmental, social, ethical, and safety implications of the design; demonstrate communication skills necessary for successful teamwork; write a formal report that documents the entire design-cycle, from initial concept to a functioning prototype; and give an oral report presenting the final product.

Prerequisite: EE Majors: ECE 4002, ECE 243, ECE 483; CpE Majors: ECE 243, ECE 373, ECE 4002

ECONOMICS

ECO 213 MICROECONOMICS 3-0-3

Introduction to the theory of demand and supply and price determination in market economies. The study of individual consumers and producers, different market structures and the distribution of income.

ECO 223 MACROECONOMICS 3-0-3

Introduction to the theory of national income determination for the United States and other global economic systems. The study of fiscal and monetary policy tools and the government's role in promoting stability and growth, and the causes of unemployment, inflation, and trade deficits.

ECO 303 QUANTITATIVE ANALYSIS IN BUSINESS 3-0-3

This course builds on designing operations and applies quantitative techniques to common business problems, preparing the student to make data-driven decisions. Topics include decision theory, Bayesian analysis, forecasting, linear programming, dynamic programming, game theory, transportation models, assignment and scheduling modeling, simulations, and queuing theory.

Prerequisites: MA 253, MGT 353

ECO 323 MONEY AND BANKING 3-0-3

This course is a study of the principles of monetary economics. An analysis of the structure and operation of financial institutions and the Federal Reserve System is included. The function of monetary policy within the framework of macroeconomic theory is examined.

Prerequisite: ECO 223 (Same as FIN 323)

ECO 333 PUBLIC FINANCE 3-0-3

This course involves an investigation of the role of the public sector in economic development. Fiscal policy and the practice of public finance are examined. Topics cover cost functions for public goods, externalities, and fiscal federalism.

Prerequisite: ECO 223

ECO 343 ECONOMIC GEOGRAPHY 3-0-3

A spiritual approach to economics, the course considers historical, present and future economic activities, developments, and trends, in a global context, with the goal of answering the two basic questions of geography: "where?" and "why there?".

Prerequisite: ECO 223 (Same as GEO 343)

ECO 363 COMPARATIVE ECONOMIC SYSTEMS 3-0-3

A comparison of the capitalist, socialist, communist and mixed economies, theory, history, and application of the system in selected countries.

Prerequisite: ECO 223

ECO 373 INTODUCTION TO ECONOMETRICS 3-0-3

This course is designed for the finance and economics students as a continuation of MA 253 (Statistics). Students will first revisit the topics of probability, distributions, and hypothesis testing, exploring these topics more thoroughly. Most of the semester will be devoted to building solid theoretical and practical foundation of econometrics. Students will proceed from the simple regression model onto multiple regression analysis in the context of cross-sectional data, time series data, and finally panel data. Violations and fixes to serial correlation and heteroskedasticity problems will be studied. Students will be asked to demonstrate and apply the concepts studied while carrying out an empirical research project. **Prerequisite: ECO303, ECO 223, MA 253 (Same as FIN 373)**

ECO 383 INTERNATIONAL ECONOMICS 3-0-3

Introduction to the fundamental theories of international specialization and exchange, and international payments; the analysis of processes and organizations for maintaining equilibrium of international economic relationships. **Prerequisite: ECO 223**

ECO 393 ECONOMIC HISTORY OF THE UNITED STATES 3-0-3

A survey of major economic developments in American history. Stresses the changed conditions and values in moving from an agricultural to an industrial society.

Prerequisites: HIS 103, HIS 113 (Same as HIS 393)

ECO 453 BUSINESS AND PUBLIC POLICY 3-0-3

This course includes an analysis of the legal, political and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business. (same as BA 403)

Prerequisites: MGT 363, ECO 223, LAW 203, MK 303, or permission of the instructor

ECO 400X INDEPENDENT STUDIES IN ECONOMICS VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

EDUCATION

Information presented in this catalog is subject to change at any time depending on actions taken by state (IDOE/OELD) and national (NCATE) accrediting agencies. A student will be responsible for meeting any requirements for licensure that are in effect at the time she/he seeks to be licensed. The requirements may differ from what is presented in this document. Students should remain alert to changes in requirements. Updated information is available from the Franks School of Education.

EDU 111 FRESHMAN PRACTICUM 1-0-1

A study of teaching as a career. The candidate examines conditions and responsibilities at lower elementary, upper elementary, middle school, high school, and alternative school levels. Field experience. **Prerequisite: strong interest in a teacher education major**

EDU 211 SOPHOMORE PRACTICUM 1-5-1

A study of the responsibilities of teaching in a specific setting. The candidate is assigned to an area school according to subject matter and grade level of planned certification. Field experience.

Prerequisite: EDU 111; education major

EDU 212 INTRODUCTION TO MUSIC FUNDAMENTALS 2-0-2

A study of general music fundamentals and methods. There is an emphasis on integrated instruction and the appropriate use of music to enhance the cognitive and psychomotor domains. Open to elementary and HPE majors. **Prerequisite: Benchmark #1**

EDU 222 EDUCATIONAL PSYCHOLOGY FOR EARLY CHILDHOOD/MIDDLE CHILDHOOD TEACHERS 2-1-2

A study of the application of basic psychological principles to classroom instruction and the school environment at the K-6 level. Current research about motivation, theories and philosophies of how children learn, and major theories of child growth and development are explored. All developmental domains of children from birth through early adolescence are examined. Field experience. **Prerequisite: Benchmark #1**

EDU 232 EDUCATIONAL PSYCHOLOGY FOR MIDDLE GRADE AND SECONDARY TEACHERS 2-1-2

A study of the application of basic psychological principles to classroom instruction and the school environment at the middle and high school levels. Motivation, principles of learning, crucial issues and alternative learning environments are explored. All developmental domains of the early adolescent through young adult are examined. Field experience.

Prerequisite: Benchmark #1

EDU 301 INTRODUCTION TO TEACHING PRACTICUM 0-5-1

An in-depth study of the responsibilities of teaching in a specific setting. The candidate is assigned to an area school according to subject matter and grade level of planned certification. Field experience.

Prerequisite: Benchmark #1; Corequisite: EDU 303

EDU 303 INTRODUCTION TO TEACHING 3-0-3

A study of the problems, purposes, and responsibilities of teaching, including educational standards, deductive and inductive instructional strategies, assessment, needs of diverse learners, daily and long-range planning, classroom management, and parental involvement in the schools. **Prerequisite: Benchmark #1; Corequisite: EDU 301**

EDU 311 JUNIOR PRACTICUM 1-1-1

A study of educational programs and practices in schools with multicultural populations. Field experience. **Prerequisite: Benchmark #1**

EDU 312 EXCEPTIONAL CHILDREN IN THE SCHOOLS 2-1-2

A study of exceptional children and programs in K-12 educational settings. Areas of study are program design, identification processes, curriculum development, inclusion, mainstreaming and program evaluation. Special education areas of concentration include learning disabilities, visual/hearing impaired, physically handicapped, emotionally handicapped, and mentally handicapped. (Gifted area of concentration includes academic.) Field experience.

Prerequisite: Benchmark #1

EDU 323 FOUNDATIONS OF EDUCATION 3-0-3

A study of the historical, philosophical, and social aspects of American public education. The legal and financial basis of public education and the rights and responsibilities of teachers and students are reviewed. Significant professional issues are identified and explored.

Prerequisite: Benchmark #2

EDU 333 READING IN THE CONTENT AREA 3-1-3

A study of content area reading at the middle and high school levels. An emphasis on comprehension, study skills, and reading strategies appropriate for the various subject matter disciplines. Field experience. Open to secondary and all-grade majors only.

Prerequisite: Benchmark #2

EDU 342 THE KINDERGARTEN EXPERIENCE 2-1-2

A study of developmentally appropriate learning environments and practices for kindergarten teachers and their students. Integrated methods of teaching early and emergent literacy skills, math, social studies, science, art, health, technology, and music are explored in light of the cognitive, emotional, social, and physical development of children between the ages of 4-6 years old. In addition to raising awareness for identifying special needs, multicultural issues within the socio-cultural environment are addressed. **Prerequisite:** Benchmark #1, EDU 222

EDU 353 CHILDREN'S LITERATURE 3-0-3

Major emphasis is placed on selection and reading of quality children's literature associated with early childhood, middle childhood, and early adolescent stages of development. Literary genres are studied in relation to their value to children. Ways to best present literature in the classroom are explored, including children's responses to literature. Open to elementary education majors only.

Prerequisites: Benchmark #1, EDU 301, EDU 303

EDU 412 THE MIDDLE SCHOOL 2-1-2

A study of the historical and philosophical origins of the middle school. The changing cognitive, physical, social and emotional needs of the middle level learner are examined; team teaching, exploratory, advisor-advisee, intramural activities; scheduling; teacher qualities; parent expectations are examined. **Prerequisites:** Benchmark #1, EDU 301, EDU 303

EDU 422 MIDDLE SCHOOL METHODS 2-1-2

A study of instruction and techniques for successful teaching of middle-level students. Emphasis on planning, application, team teaching, interdisciplinary teaching, interrelationship of subject matter. Field experience. **Prerequisite:** EDU 412

EDU 432 PRACTICUM IN TEACHING—SECONDARY 0-10-2

A supervised field-based experience at the secondary (9-12) level, with an emphasis on effective teaching methods and the philosophy of education. Open to secondary and all-grade majors only.

Prerequisite: Benchmark #2; **Corequisite:** EDU 442

EDU 441 TEACHING OF READING PRACTICUM 0-5-1

An in-depth study of the responsibilities of teaching reading in an elementary setting. Field experience. Open to elementary majors only.

Prerequisite: Benchmark #2; **Corequisite:** EDU 445

EDU 442 SPECIAL METHODS FOR THE SECONDARY TEACHER 2-1-2

A study of teaching methods designed to facilitate competency in specific subject areas; methods, daily and long-range planning, classroom management, instructional technology, curriculum development, secondary school organization, individualized instruction, motivation, concept development, and interdisciplinary teaching. Open to secondary and all-grade majors only. Field experience.
Prerequisite: Benchmark #2; Corequisite: EDU 432

EDU 445 TEACHING OF READING 5-0-5

A study of multiple approaches used in the teaching of reading including balanced reading programs, phonics, and literature-based programs. A study of reading methods, strategies, and techniques designed to help children who are experiencing difficulties learning to read. Open to elementary majors only. **Prerequisite: Benchmark #2; Corequisite: EDU 441**

EDU 452 ART FOR THE ELEMENTARY TEACHER 2-1-2

A study of discipline-based art education as it applies to the elementary classroom. Emphasis on the preparation of art projects and the use of art as a tool of learning using a variety of mediums and materials. Open to elementary majors only. Field experience.

Prerequisite: Benchmark #2

EDU 454 METHODS OF TEACHING MATHEMATICS AND SCIENCE 4-4-4

A study of methodologies, techniques, and materials used in the teaching of mathematics and science at the K-6 level. Emphasis is on hands-on science and the use of math manipulatives. National and state curriculum standards specific to teaching mathematics and science are examined and included as critical components of effective lesson/unit planning. Open to elementary majors only. Field experience.

Prerequisite: Benchmark #2

EDU 462 EDUCATIONAL MEASUREMENT 2-0-2

A study of methods of assessment and evaluation that include standardized tests, teacher-made tests, authentic assessment, rubrics, portfolios, performance assessment, informal assessment.

Prerequisite: Benchmark #2

EDU 463 EDUCATIONAL MEDIA AND TECHNOLOGY 2-1-3

A study of instructional media and technology used in K-12 settings.

Prerequisite: Benchmark #2

EDU 464 METHODS OF TEACHING LANGUAGE ARTS AND SOCIAL STUDIES 4-1-4

A study of methodologies, techniques, technology, and curricular resources used in the teaching of language arts and social studies at the K-6 level. National and state curriculum standards specific to teaching social studies and oral/written expression in language arts are examined and included as critical components of effective lesson/unit planning. Field experience. Open to elementary majors only.

Prerequisite: Benchmark #2

EDU 470 SUPERVISED STUDENT TEACHING 1-40-10

Observation, participation, and teaching in a school under the direction of a master cooperating teacher and university supervisor. Candidate is assigned to an area school for 10 to 11 full weeks according to subject matter and grade level of planned certification.

Prerequisites: senior status; 2.5 GPA in major, overall; **Benchmark #3;** **Corequisite:** EDU 471

EDU 471 STUDENT TEACHING SEMINAR 1-0-1

Analysis, synthesis, and reflection based on the student teaching experience.

Prerequisites: senior standing; 2.5 GPA in major, overall; and **Benchmark #3;** **Corequisite:** EDU 470

EDU 472 PRACTICUM IN TEACHING—MIDDLE 0-10-2

A supervised field-based experience at the middle school (5-8) level, with an emphasis on effective teaching methods and the philosophy of education.

Prerequisites: EDU 422, **Benchmark #2**

EDU 482 PRACTICUM IN TEACHING—ELEMENTARY 0-10-2

A supervised field-based experience at the elementary (K-6) level, with an emphasis on effective teaching methods and the philosophy of education.

Prerequisite: **Benchmark #2**

EDU 400X DIRECTED STUDIES IN EDUCATION VARIES (1-6 HRS.)

Individual projects, research, and/or directed studies of contemporary issues in the field of professional education. Credit arranged on an individual basis.

Prerequisite: Approval of the Dean of the Franks School of Education

ENGINEERING GRAPHICS

EGR 143 ENGINEERING GRAPHICS 2-2-3

Graphical communication for engineers using sketching and computer-aided drafting. The fundamentals of orthographic projection, isometric projection and descriptive geometry are taught. An introduction to three dimensional models using solid modeling computer software is also covered. Emphasis is placed on developing the skills needed for mechanical engineering design.

EGR 153 ENGINEERING GRAPHICS FOR CE 3-0-3

Graphical communication by means of sketching and computer-aided drafting. Fundamentals of orthographic projection and descriptive geometry. This course stresses applications of graphic communications, both manually and through the use of CAD systems.

EGR 453 ADVANCED PARAMETRIC DESIGN 4-0-3

An introduction to the high end Unigraphics NX design software used by many major industry segments including a review of the advanced capabilities of the software.

Prerequisite: EGR 143 or ETD 263

ENGLISH

ENG 014 ACADEMIC WRITING 4-0-0

Review and practice of the basic skills and rules necessary for successful academic writing. This is a non-credit preparatory course.

ENG 024 ACADEMIC READING 4-0-0

Review and practice of the basic skills necessary for successful academic reading. This is a non-credit preparatory course.

ENG 034 ENGLISH PREPARATORY INDEPENDENT STUDY

This is a non-credit preparatory course.

ENG 103 ENGLISH COMPOSITION I 3-0-3

Intensive training in methods of exposition leading to the ability to write coherent, clear, and persuasive essays.

Prerequisite: Adequate SAT verbal score or ACT English score, class rank, and high school G.P.A., or successful completion of non-credit preparatory English courses.

ENG 104 INTENSIVE ENGLISH COMPOSITION I 4-1-4

Intensive training in methods of exposition leading to the ability to write coherent, clear and persuasive essays. This course also reviews the major conventions used in writing English. A one-hour weekly lecture will provide a general review of these conventions, along with a one-hour weekly lab to provide further instruction either on an individual or group basis.

ENG 113 ENGLISH COMPOSITION II 3-0-3

Continuation of ENG 103. Concentration on research paper and library methods.

Prerequisite: A grade of "C" or better in ENG 103 or ENG 104

ENG 133 TECHNICAL COMMUNICATION 3-0-3

Emphasizes written and oral communication in professional situations for technical fields. Concentration on project-oriented instruction and assessment, which includes creating technical documents (email, reports, proposals, instructions, et. al.) and adapting them to specific audiences and tasks.

Prerequisite: A grade of "C" or better in ENG 103 or ENG 104

ENG 153 INTRODUCTION TO LITERATURE 3-0-3

Introduces the student to literature of some complexity and sophistication, developing a critical vocabulary and skills in reading on an advanced level. Analysis of genre: short fiction, poetry, and drama.

ENG 204 BRITISH LITERATURE 4-0-4

A survey of British literature to the present. **Prerequisite: ENG 153**

ENG 233 MYTHOLOGY 2-0-3

An introduction to world mythology, with emphasis on Greek and Roman legends.

Prerequisite: ENG 153

ENG 214 AMERICAN LITERATURE 4-0-4

A survey of American literature to the present. **Prerequisite:** ENG 153

ENG 253 READINGS IN WORLD LITERATURE 3-0-3

Readings in selected major works which have influenced thought and culture. Selections may be drawn from (but not limited to) such writers as Dante, Juvenal, Confucius, Montaigne, Rabelais, Cervantes, Moliere, Goethe, and Dostoyevsky.

Prerequisite: ENG 153

ENG 263 CONTEMPORARY THEMES IN LITERATURE 3-0-3

A critical study of works of literature selected for their relevancy to current social, ethnic, minority, and ethical problems. Special emphasis placed upon minority writers.

Prerequisite: ENG 153

ENG 273 CREATIVE WRITING 3-0-3

Directed experiments in the original composition of literary essays, plays, short stories, longer narratives, or poems. **Prerequisite:** ENG 103

ENG 323 RESTORATION AND EIGHTEENTH CENTURY LITERATURE 3-0-3

A study of literature from 1660-1798. Authors studied include Moliere and Restoration playwrights, Swift, Pope, Voltaire, Dr. Johnson, and others.

Prerequisite: ENG 153

ENG 333 STUDIES IN LITERATURE 3-0-3

Study of selected authors and topics. May be repeated for credit so long as course content is not substantially duplicated.

Prerequisite: ENG 153

ENG 363 THE ENGLISH LANGUAGE 3-0-3

A systematic study of the development of the English language from its medieval beginnings; some consideration of contemporary dialectic and semantic differences; work with etymology.

Prerequisite: ENG 113

ENG 403 BRITISH AND AMERICAN NOVELS I 3-0-3

A chronological study of the major thematic and structural developments in the novel from its beginnings to the 21st century. Social commentary and satire on classes, monarchy, empire, war, education, religion, marriage, middle class morality. **Prerequisite:** ENG 153

ENG 423 DRAMA 3-0-3

Studies of selected playwrights, movements, trends, and developments in world drama from the beginnings to the present day. **Prerequisite:** ENG 153

ENG 433 SHAKESPEARE AND HIS TIMES 3-0-3

The close reading of at least eight plays by Shakespeare. Discussion of his life and times, the sonnets, his themes, and the differences between texts and productions. **Prerequisite: ENG 153**

ENG 443 POETRY 3-0-3

An investigation of the poetic process through the careful examination of selected poems and statements about poetry. **Prerequisite: ENG 153**

ENG 400X DIRECTED STUDIES IN ENGLISH VARIES (1-3 HRS.)

For senior students of superior ability able to assume a larger share of the responsibility for designing and pursuing a reading research project which is academically respectable.

Prerequisite: Permission of Department Chair

ENG 401X CAPSTONE STUDY IN ENGLISH 4-0-4

A capstone course for students who plan to enter law or graduate school and who are capable of writing a polished, academically significant research paper in the field of English.

Prerequisite: Permission of Department Chair

ENTREPRENEURSHIP

ENT 303 ENTREPRENEURIAL LEADERSHIP 3-0-3

This course examines leadership, influence, and power as it relates to entrepreneurship with a strong emphasis on entrepreneurial character traits and business ethics. Historical, literary, and contemporary examples of successful entrepreneurs provide a framework for examining the theories of leadership and power. **Prerequisite: Junior standing or permission of instructor**

ENT 313 BUSINESS CONCEPTS (FOR NON-BUSINESS MAJORS) 3-0-3

A survey course designed to introduce non-business majors to business issues and practices. All major functions of business are included (management, marketing, law, finance, economics, operations, accounting, information technology) as well as issues facing the business person (ethics, globalization, motivation, etc.). Not open to students enrolled in the business programs.

Prerequisite: Junior standing or permission of instructor

ENT 323 ENGINEERING CONCEPTS (FOR NON-ENGINEERING MAJORS) 3-0-3

Fundamental engineering concepts are introduced, with an emphasis on developing foundations for lifelong learning of technological issues. Broad-based technologies and the importance of technical communication are emphasized. Current and future technologies are discussed by visiting practitioners. Not open to students enrolled in the engineering and technology programs.

Prerequisite: Junior standing or permission of instructor

ENT 333 ENTREPRENEURSHIP SEMINAR SERIES 3-0-3

Through case studies, simulations, guest lectures, and reading, students become aware of legal business structures, legal issues related to emerging ventures (patents, copyrights, trademarks, licensing, franchising, employment law, etc.), venture financing, and venture marketing.

Prerequisite: ENT 313 or 323

ENT 413 CREATIVITY-PRODUCT/SERVICE DEVELOPMENT 3-0-3

This course explores the nature of creativity from four interacting viewpoints: person, process, product, and environment. Its goal is to develop students' awareness of their creative potential. Activities include group work, discussion, and the development of an idea or invention.

Prerequisite: BA 123 or ENT 313

ENT 423 ENTREPRENEURSHIP & VENTURE PLANNING 3-0-3

This course focuses on entrepreneurship and small business management. Through case studies, simulations, guest lectures, reading and business plan development, students become aware of the unique challenges facing small business owners and entrepreneurs. Students become familiar with the resources available to small business owners by developing and presenting a business start-up plan. **Prerequisite:** ENT 413

ENT 463 INTERNSHIP 3-0-3

Students will be assigned to a real world new venture, small business, or corporate new product development department to gain experience in the art and science of entrepreneurial/entrepreneurial thinking, problem solving, and decision making. The term of the internship will vary depending on the nature of the position and responsibilities. Ideally, students will be assigned the internship during the summer between their junior and senior year. **Prerequisite:** Junior Standing

ENGINEERING SCIENCE

ES 213 STATICS 3-0-3

The first course in engineering mechanics. Subjects cover includes; force and moment vectors, equivalent systems, trusses, frames, and machines, equilibrium of particles and rigid bodies, static friction, centroids and moments of inertia. **Corequisites:** MA 164, PH 224

ES 223 DYNAMICS 3-0-3

Kinematics of absolute and relative motion of particles and rigid bodies. Subjects include; kinetics of particles and particle systems. Principles of work and energy, impulse and momentum, and impact. Kinetics of rigid bodies in plane motion.

Prerequisite: Grade of C or better in ES 213, MA 164 and PH 224

ES 233 ENGINEERING MATERIALS 3-0-3

A study of the structure and properties of materials. Materials covered include metals, ceramics, polymers, and composites. Mechanical properties are emphasized, electrical properties, thermal properties, and environmental interactions are addressed. Structural features at the atomistic level, the crystal structure level, and the microstructure level of single and polyphase materials are studied in terms of their effects on material properties.

Prerequisite: CH 104; **Corequisite:** PH 224

ES 243 SOLID MECHANICS 3-0-3

Concepts of stress and strain in engineering materials. Subjects include; Hooke's law and Poisson's relationship, analysis of axial, shear, flexural, and torsional stresses, combined stress, shear and moment distribution in beams, and deformation of structural members.

Prerequisite: Grade of C or better in ES 213

ES 253 ELECTRICAL SCIENCE 3-0-3

Basic voltage-current-energy relationships in circuit elements. Fundamental circuit laws. Resistive networks and network theorems. Sinusoidal steady-state response and phasors. Power and energy in AC circuits. **Prerequisites: MA 134, PH 224**

ES 313 THERMODYNAMICS 3-0-3

Introduction to properties of substances and ideal gases by use of tables. Introduction to thermodynamic concepts of systems, control volumes, heat, work and internal energy. Formulation of the First and Second Laws of Thermodynamics with engineering applications, Vapor Water Systems Ranking cycle, First and Second Law analysis of power plant cycles.

Prerequisites: Grade of "C" or better in MA 164, PH 224, and ES 213

ES 323 FLUID MECHANICS 3-0-3

Fundamental properties of fluids. Fluid statics. Kinematics of fluid motion. Conservation of mass, energy and momentum as applied to compressible and incompressible fluids. Similitude. Introduction to laminar and turbulent boundary layers.

Prerequisite: ES 213; Corequisite: MA 213

ES 343 HEAT TRANSFER 3-0-3

Introduction to heat transfer analysis. Study of the primary modes of heat transfer: conduction, convection, and radiation. Engineering applications include heat exchangers, cooling of electronic components, engines, insulation.

Prerequisites: MA 233, ES 313, ES 323

ES 382 ENGINEERING ECONOMICS 2-0-2

An introduction to the economics component of design and problem solving. Application of economic concepts from present and future value of money, depreciation, and taxes to problems involving replacement studies and selection between alternative uses of capital. Methods include equivalent worth, rate of return, and incremental techniques.

Prerequisite: Junior standing or permission of instructor

ES 4703 OPERATION MANAGEMENT AND QUANTITATIVE DECISION ANALYSIS 3-0-3

Understand quantitative tools available to plan and manage a project, service or production orientated operation. The class will provide insight into the quantitative decision making and optimization techniques including linear programming, queuing theory and various simulation methodologies. The discussion topics will also include project management, forecasting, inventory management, aggregate planning, materials resource planning, short term scheduling, lean production systems, maintenance and reliability.

Prerequisites: MA 253 or MA 393 (Students cannot receive credit for this course and MGT 443)

ENGLISH AS A SECOND LANGUAGE

ESL 0003 GRAMMAR LITERACY

Students practice the fundamental English skills of reading, spelling, listening, and speaking while focusing on the most basic of grammar points. Students are introduced to singular and plural nouns, pronouns and possessive adjectives, the present and past tense of “be” and the simple present and present progressive tenses.

ESL 0012 BASIC VOCABULARY

Students are introduced to basic vocabulary items from everyday life such as household and classroom items, clothing, days of the week

ESL 002X READING LAB

Students are given thirty minutes of uninterrupted silent reading. After thirty minutes, students have a discussion session in small groups for ten minutes. The last ten minutes of each session are devoted to writing a summary or response to the material. At times the instructor may assign reading materials, but most of the time, students will be able to choose what they want to read. The number of hours varies (1-2 hours), and student may take the course multiple times.

ESL 0052 BASIC LEARNING

Beginning students will practice the most basic listening skills to help them understand every day greetings and conversations. They will also practice basic survival language skills such as discussing living situations, communicating with medical professionals, making emergency phone calls, and interacting in public settings, among others.

ESL 006X SPECIAL TOPICS IN ESL SURVIVAL SKILLS

This course will be tailored to meet the immediate language learning needs of true beginning-level learners of English. The number of hours will vary (from 1-5 hours), and student may take the course multiple times.

ESL 0090 ESL STUDIES

This is a series of individualized sessions for each student in the ESL program. All ESL students must register for this class every semester until they finish the program. With the consultation of all the students' current instructors, the ESL director will work with each student throughout the semester to identify the individual student's strengths and weaknesses and to advise appropriate courses of action for optimum success at Trine University. This course may be taken multiple times, and the final grade for this course will be the average of all current ESL courses. Academic probation may be given on the basis of the grade in this course.

ESL 0103 GRAMMAR I

Students focus on parts of speech, word order, imperatives, determiners and statements, questions and negation in the present, present progressive, and simple past tenses.

ESL 0112 VOCABULARY I

Students learn to recognize, spell, and pronounce over 2,500 essential vocabulary words for everyday situations. They also practice using new vocabulary words in basic everyday dialogues and conversations.

ESL 0123 READING I

Students learn to use word skills, context clues, and structural clues to determine meaning. Emphasis is placed on main ideas and details of beginning-intermediate reading passages with reading of limited non-prose graphs and charts included. Students demonstrate their skills in written reports, class discussions, presentations, or interviews on outside readings.

ESL 0133 WRITING I

Using their new vocabulary and grammar skills, students learn to write complete sentences with appropriate word order, spelling, and punctuation in the present and past tenses. Students later practice paragraph writing and elementary methods of cohesion.

ESL 0141 PRONUNCIATION

Students practice producing all the sounds of Standard American English along with proper stress and intonation.

ESL 0142 PRONUNCIATION & CONVERSATION

Students practice producing all the sounds of Standard American English along with proper stress and intonation while practicing conversational skills.

ESL 0152 LISTENING I

Students practice listening to and engaging in basic conversations while building a basic vocabulary and verbal and non-verbal conversational skills. Students also learn culturally appropriate social conventions.

ESL 016X SPECIAL TOPICS IN ESL SKILLS

This course will be tailored to meet the immediate language learning needs of ESL (English as a Second Language) students. The number of hours will varies (1-5), and students may take the course multiple times.

ESL 0201 IRREGULAR VERBS

Students practice spelling, pronunciation, and usage of over 140 American English irregular verbs. Students learn the parts of the verb and when to use them. In addition, students learn and practice over 120 phrasal verbs and idioms that contain irregular verbs. Emphasis is placed on grammar, writing, test-taking skills, and critical thinking.

ESL 0203 GRAMMAR II

Students practice using and understanding simple and progressive forms of present, past, and perfect tenses, the four forms of the future as well as future time clauses, adjectives and adverbs, and basic modal usage.

ESL 0212 IDIOMS

Students learn nearly 500 idioms, phrasal verbs, and colloquial expressions and how to use them appropriately in writing and conversation.

ESL 0223 READING II

Students learn to use word skills, context clues, and structural clues to determine meaning. Students learn to find main ideas and details of intermediate-advanced reading passages, and they practice

non-prose reading such as menus, graphs, tables, charts, and maps. Restatement and inference practice is also provided to help prepare the students for college-level reading assignments. Out-of-class readings with book reports and individual presentations are required.

ESL 0233 WRITING II

Students practice basic composition skills such as pre-writing, organization, appropriate topic choices, transitions, main idea sentences, topic sentences, appropriate detail, sentence combining, spelling, and punctuation.

ESL 0242 SPEAKING II

Students practice every-day dialogues with formal / informal variations attached to various cultural situations as they continue practicing culturally appropriate social conventions and honing their pronunciation skills.

ESL 0252 LISTENING II

Students learn to distinguish and produce American English phonetic sounds, to determine meaning from tone of voice, and to hear and understand idiomatic speech at normal speed with pauses, slurs, and inflections.

ESL 0303 GRAMMAR III

Students focus on parts of speech, word order, imperatives, determiners and statements, questions and negation in the present, present progressive and simple past tenses.

ESL 0312 VOCABULARY III

Students focus on English-English dictionary use and prefix, suffix, and root word usage. Students learn to use context, word parts, and logic to discover the meaning of unfamiliar words.

ESL 0323 READING III

Students practice all reading skills at an advanced level to prepare for college-level reading assignments. Discussion and critical-thinking skills are emphasized. Students also write book reports and give presentations on outside readings.

ESL 0333 WRITING III

Students review basic composition skills and focus on more advanced skills such as coherence devices, multiple support techniques, proper formatting, usage of secondary sources, and avoidance of plagiarism. Students also learn appropriate organization for various types of compositions such as comparison/contrast, process, narrative, cause-effect, and persuasive essays.

ESL 0342 SPEAKING III

Students practice more advanced conversational skills and learn basic public speaking skills. Students are given various assignments which require interviews with native speakers, presentations for outside audiences, and community service.

ESL 0343 LISTENING & SPEAKING III

Students practice listening and responding to advanced conversations, speeches, and academic lectures. Students learn effective note-taking strategies and discuss information from listening

exercises. Students are given various assignments which require interviewing native speakers, listening to news broadcasts, and giving informal and formal presentations in class.

ESL 0352 LISTENING III

Students practice listening and responding to conversations, speeches, and academic lectures. Students learn effective note-taking strategies and discuss information from listening exercises.

ESL 0403 GRAMMAR IV

Students review all verb tenses, the passive voice, modals, gerunds and infinitives. Students practice conditionals, indirect speech, and embedded questions. Emphasis is on writing and editing skills.

ESL 0423 READING & VOCABULARY IV

Students practice college-level reading skills while enhancing their advanced vocabulary skills. Emphasis is on discussion, critical thinking, and formal presentations.

ESL 0433 WRITING IV

Students review basic composition skills with a focus on more advanced skills such as coherence devices, multiple support techniques, proper formatting, usage of secondary sources, and avoidance of plagiarism. Emphasis is on appropriate organization for various types of compositions and on research skills.

ESL 0443 ADVANCED COMMUNICATION SKILLS

Students practice reading about real-life situations, asking appropriate questions, thinking creatively, presenting ideas in logical order, listening and responding to both conversational and academic American English spoken at normal speed, and pronouncing all the sounds of Standard American English with appropriate stress and intonation.

ESL 0453 ADVANCED CLASSROOM SKILLS

Students learn effective time management and study skills. They learn about and discuss appropriate classroom etiquette in different cultural settings and how to communicate well with U.S. faculty members. Students also learn effective methods of preparing for and taking academic tests including the TOEFL.

ENGINEERING TECHNOLOGY

ETD 103 BASIC TECHNICAL DRAWING 2-2-3

A course in the fundamentals of drafting. Use of instruments and materials, lettering and techniques of penciling. Primary emphasis is on shape and size description of three-dimensional objects. Preparation of drawings for various reproduction processes. Application of drawing geometry and study of sections and conventional practices.

ETD 113 GEOMETRIC DIMENSIONING AND TOLERANCING 3-0-3

Introduction to geometric dimensioning and tolerancing including advanced applications of dimensioning principles, tolerances and precision dimensioning. Introduction to part measurement techniques as it relates to geometric dimensioning and tolerancing.

Prerequisite: ETD 103

ETD 123 MANUFACTURING MATERIALS AND PROCESSES 3-0-3

Physical properties of ferrous and nonferrous materials, such as wood products, plastics, and rubber. Heat treating and testing of metals. Industrial practice in the working of metals and plastics. Fundamentals of metallurgy, machining, casting, welding and forming.

ETD 163 ENVIRONMENTAL HEALTH AND SAFETY 3-0-3

This introductory level course investigates safety philosophy and the principles of safety. The student will study occupational safety and industrial hazard control with a focus on the basic principles of accident prevention. The analysis of safety performance, cost and identification of accident potential is also studies. Emphasis is placed on concepts and techniques proven useful in reducing accidents and injuries.

ETD 173 COMPUTER AIDED 3-D MODELING 1-4-3

An Introductory course which studies the concept of parametric modeling and its application in industry. In this course students will learn the fundamentals of 3D parametric modeling, detail drawing creation, and assembly modeling using industry standard parametric modeling software. **Prerequisite: ETD 103 or EGR 143**

ETD 203 BASIC MECHANISMS 3-0-3

An introduction to simple mechanisms and their kinematics. This course studies linkages, cams, gearing, and belt drives. **Prerequisites: MA 123, PH 154**

ETD 233 ENGINEERING & MANUFACTURING SYSTEMS 3-0-3

A study of engineering and manufacturing systems such as engineering documentation systems, design control and lean manufacturing technologies.

Prerequisites: ETD 173

ETD 243 STATICS AND STRENGTH OF MATERIALS 3-0-3

Principles of statics, analysis of structures, graphic methods, and friction as applied to the inclined plane and wedge. Simple direct and combined stresses, determination of structural sizes as function of unit stress, and physical properties of the materials. **Prerequisites: MA 123**

ETD 253 DIMENSIONAL METROLOGY 3-0-3

Emphasis on methods and principles of measuring basic physical qualities for inspection and quality control. Laboratory work in measuring physical variables such as size, flatness, circularity, and total run-out. An introduction and project work in related areas, such as reverse engineering, functional gauge design, and statistical process control.

Prerequisites: ETD 113, ETD 123, ETD 173

ETD 263 DESIGN, ANALYSIS, AND PROTOTYPING 2-4-3

The use of the CAD system as an engineering tool for the presentation of engineering problem solving. The set-up and maintenance of CAD systems. A study of the advanced techniques that are available on typical CAD systems and their applications in industrial systems.

Prerequisite: ETD 233

ETD 273 ELECTRICAL FUNDAMENTALS 3-0-3

Electrical circuit principles. Basic circuit laws, motors, generators, controls, distribution systems, and electrical codes are presented. Theory of electricity and magnetism, electrical phenomena, and measurements. Circuits, power, AC phenomena, capacitance, and conduction are studied.

Prerequisite: PH 154

ETD 313 DESIGN FOR MANUFACTURE AND ASSEMBLY 3-0-3

Principles and methodologies for designing parts and products for: ease and efficiency of manufacture and assembly; maintenance and usability during the service life, along with disposal and recycling at the end of service life. Students will be able to apply DFMA principles to lower the cost of designing, commissioning, and using new products.

Prerequisite: ETD 123, ETD 233

ETD 323 PRODUCT DESIGN AND DEVELOPMENT 3-2-3

Introduction to product analysis, development and design. Conceptual design, design for manufacture, reverse engineering, concurrent engineering, designing for special needs, prototyping, and product safety. Integration of previous work into complete product design project. **Prerequisite:** ETD 233

ETD 363 ELEMENTS OF MACHINES 3-0-3

The study of design principles and calculations of machine elements. To consideration of loads, stresses, and deformations as they relate to design is presented. Failure theories, mechanical material properties, and fatigue are also studied.

Prerequisite: ETD 243, PH 154

ETD 423 SENIOR DESIGN PROJECT 4-0-3

Study of advanced design methods as used in engineering design. A study of the design process as practiced in the industrial setting. The procedures used from the start of a design until its final production including presentations and design reports. **Prerequisites:** ETD 263, ETD 323

ETD 433 COMPUTER NUMERICAL CONTROL PRINCIPLES 2-2-3

History of numerical control and comparison with conventional machining systems. Standard coding system and control terminology. **Prerequisites:** ETD 123, ETD 263

EXERCISE SCIENCE

EXS 102 LIFETIME WELLNESS 2-1-2

Positive wellness based on the value of physical activity and healthy choices is explored. Lab consists of clinical experience with personal wellness status. Personalized exercise prescriptions will be provided.

EXS 103 TEACHING OF SPORT SKILLS I 3-0-3

The purpose of this class is to give the student an understanding of the skills, rules, and strategies for a wide range of sports. The use of proper teaching progressions and techniques will be covered and the students will be asked to write lesson plans and demonstrate their ability to teach. **(Sport Management and Exercise majors/minors only.)**

EXS 123 TEACHING OF SPORT SKILLS II 3-0-3

This class builds on what was taught in EXS 103. The purpose of this class is to give the student an understanding of the skills, rules, and strategies for a wide range of sports. The use of proper teaching progressions and techniques will be covered and the students will be asked to write lesson plans and demonstrate their ability to teach. (Sport Management and Exercise Science majors/minors only.)

EXS 131 FIRST AID 1-1-1

Classroom discussion and practical application of basic first aid principles. American Red Cross certification available.

EXS 243 ATHLETIC TRAINING 2-2-3

The role of the athletic trainer is examined. Qualifications, relationships and responsibilities of the trainer in relation to the athlete, coach, team physician and community are discussed. Practical application for injury recognition, evaluation, management, and rehabilitation.

EXS 273 NUTRITION 3-0-3

A review of the nature of nutritional needs. Focus will include the function of nutrients in the body, weight control and the importance of balanced diets.

EXS 332 DRUG EDUCATION 2-0-2

Examines the effects of alcohol, tobacco, and the "illicit" drugs on the physical, psychological, and social health of the individual. Performance-enhancing drugs are investigated.

Prerequisite: Junior standing or permission of instructor

EXS 333 KINESIOLOGY 3-0-3

The study of the general body mechanics of the human organism; the activities of the physical education program in their relation to coordination and the proper body mechanics, analysis of movement. **Prerequisite: Junior standing or permission of instructor**

EXS 353 EXERCISE PHYSIOLOGY 3-0-3

The study of body composition, muscular strength, power and endurance. The response of the cardiovascular and respiratory systems to exercise, and the developmental stages of growth are also explored. **Prerequisite: Junior standing or permission of instructor**

EXS 373 HEALTH PROBLEMS 3-0-3

A theoretical and practical treatment of the concepts of disease prevention and health promotion. Topics include alcohol, tobacco and drug abuse, physical fitness, nutrition, chronic and communicable diseases, human sexuality and stress management.

Prerequisite: Junior standing or permission of instructor

EXS 383 NUTRITION COUNSELING 3-0-3

This class will equip the student with knowledge and an understanding of protocol to give nutrition counseling to a wide range of clients based on their health history and personal wellness and fitness goals. **Prerequisite: EXS 273**

EXS 393 ADVANCED ATHLETIC TRAINING 2-3-3

Builds on experiences gained in EXS 243. Includes prevention, evaluation and treatment of athletic-related injuries. Emphasis given to injury assessment and topics related to sports medicine. Examines relationship of athletic trainers in management and care of injuries and their role as professional allied health practitioners.

Prerequisites: BIO 254, EXS 243

EXS 402 AEROBIC LEADERSHIP (2 HRS.)

The purpose of the aerobic leadership class is to provide students with the principles and skills necessary to successfully lead activity classes aimed at the wellness goals of improving cardiovascular fitness, muscular strength and endurance, and body composition in the general population. Class instruction includes proper form sequencing, cueing, movement rhythm, and appropriate music selection. **Prerequisite:** Junior standing or permission of instructor

EXS 403 REMEDIAL EXERCISE & REHABILITATION 2-3-3

Students become familiar with common physical therapy modalities and their use in sports medicine. Where applicable, the following will be covered for each modality: physics, biophysics, effects, power application, indications and contraindication. Safety is emphasized during instruction and practical experience. **Prerequisites:** BIO 254, EXS 243, EXS 353

EXS 423 EVALUATION OF ATHLETIC INJURIES 2-3-3

Specialized course dealing with anatomy, kinesiology, injury symptoms and specific tests to help trainers recognize and evaluate athletic injuries.

Prerequisites: BIO 254, EXS 243

EXS 433 DEVELOPING HEALTH PROMOTION PROGRAMS FOR ADULTS 3-0-3

Presentation and examination of health promotion strategies and programs that emphasize lifestyle behaviors that impact health and wellness. **Prerequisite:** Junior standing or permission of instructor

EXS 443 THERAPEUTIC MODALITIES 2-3-3

Explores principles of therapeutic rehabilitation of orthopedic injuries including the role of the athletic trainer in the implementation and supervision of a sound rehabilitation program. Special topics include aquatic therapy, the body's response to healing and exercise, development of exercise programs, development and evaluation of tests, measurement techniques and programs, and applications of therapeutic exercise equipment and supplies.

Prerequisites: BIO 254, EXS 243

EXS 452 FITNESS EVALUATION ASSESSMENTS 2-0-2

Examination of fitness and wellness assessment techniques. Students are expected to demonstrate competencies in a wide variety of testing and assessment procedures for analyzing fitness and wellness levels. Includes submax testing, blood pressure, body fat analysis, strength assessment, nutritional analysis, and individual exercise program development. American College of Sport Medicine protocol is utilized. **Prerequisite:** Junior standing or permission of instructor

EXS 463 MOTOR LEARNING 3-0-3

A study of the science of perceptual/motor learning including an understanding of the research in this area and application to the teaching of a variety of motor skills to people of different ability levels. The student should understand the problems that a learner faces in the acquisition of a variety of motor skills, develop a researched-based vocabulary, and have the ability to apply this knowledge by designing a teaching strategy that can assist the learner in this process.

Prerequisite: Junior standing or permission of instructor

EXS 464 CAPSTONE EXPERIENCE IN FITNESS AND EXERCISE SCIENCE (4HRS.)

A culminating final project, representative of the student's knowledge obtained in the Sports Management department. The project is to exemplify the student's professionalism and familiarity with the subject matter. The analysis is focused on independent study and the development of the student project. **Prerequisite: Junior standing or permission of instructor**

EXS 473 GLOBAL PERSPECTIVES HEALTH AND WELLNESS 3-0-3

The Global Understanding in Health and Wellness course is a study abroad trip intended to assist students in the comparative analysis of holistic health and wellness practices between the U.S. and selected countries. The trip will include site visits to holistic health centers, various cultural tours and key visits to international health and Olympic sport facilities. Students will be expected to complete assigned readings on key health and wellness practices in facilities. Students will be expected to complete assigned readings on key health and wellness practices in the U.S. and other countries to understand the interests and concerns of the global health and wellness community.

Prerequisites: sophomore, junior, or senior standing with 2.5 GPA

EXS 474 INTERNSHIP IN FITNESS AND EXERCISE SCIENCE (4 HRS.)

Observation of and participation in a field-related experience under the direction of a field supervisor and a University supervisor. Internship opportunities are limited to EXS majors only and must have the approval of the Department Chair. **Prerequisite: Junior standing or permission of instructor**

EXS 483 INTERNSHIP IN SPORTS MEDICINE (3 HRS.)

Field experiences involving conference, clinic and workshop attendance. Techniques and practice of written simulation and oral practical applications. Provides opportunity to interact with other allied health practitioners. **Prerequisites: BIO 254, EXS 243, EXS 353**

EXS 493 PERSONAL TRAINER CERTIFICATION PREPARATION (3 HRS.)

The purpose of this class is to prepare the student for the national certification exam by the National Council on Strength and Fitness. Certification is a necessity for a career in health promotion/fitness/strength and conditioning training. The course is designed by the National Council on Strength & Fitness for the specific purpose of preparing students to take their nationally recognized exam. Some of the course objectives are to learn to use evaluation protocols for health related fitness and to teach principles of exercise prescription, health programming and periodization. This class is intensive and should only be taken by graduating seniors in this field. **Prerequisite: Senior standing or permission of instructor**

FINANCE

FIN 303 MANAGERIAL FINANCE 3-0-3

This course is a study of the principles of managerial finance including time value of money, capital budgeting, methods of financing, working capital management, financial statement analysis, and other financial topics.

Prerequisites: AC 213, ECO 213, ECO 223, MA 253, or permission of the instructor

FIN 313 CORPORATE FINANCE 3-0-3

An analytical approach to financial management of a corporation. Areas covered include: long term financing, financial structure, cost of capital, dividend policy, mergers, reorganization, and international financial management. **Prerequisite:** FIN 303

FIN 323 MONEY AND BANKING 3-0-3

This course is a study of the principles of monetary economics. An analysis of the structure and operation of financial institutions and the Federal Reserve System is included. The function of monetary policy within the framework of macroeconomic theory is examined.

Prerequisite: ECO 223 (Same as ECO 323)

FIN 343 INTERNATIONAL FINANCE 3-0-3

This course involves a study of the topics essential to the understanding of international finance. Topics include foreign exchange markets and currency risk, international financial markets, international banking, trade financing, country risk analysis, accounting and taxation issues, capital budgeting, international lending, and borrowing techniques.

Prerequisite: FIN 303

FIN 353 PERSONAL FINANCE 3-0-3

An overview of financing decisions made by individual investors for personal financial needs. The course will cover pension investing, tax considerations, retirement planning, and various investment products available to investors. **Prerequisite:** MA 103

FIN 373 INTRODUCTION TO ECONOMETRICS 3-0-3

This course is designed for the finance and economics students as a continuation of MA 253 (Statistics). Students will first revisit the topics of probability, distributions, and hypothesis testing, exploring these topics more thoroughly. Most of the semester will be devoted to building solid theoretical and practical foundation of econometrics. Students will proceed from the simple regression model onto multiple regression analysis in the context of cross-sectional data, time series data, and finally panel data. Violations and fixes to serial correlation and heteroskedasticity problems will be studied. Students will be asked to demonstrate and apply the concepts studied while carrying out an empirical research project. **Prerequisite:** ECO303, ECO 223, MA 253 (Same as ECO 373)

FIN 403 INVESTMENTS 3-0-3

An overview of the security markets, sources of investment information, and the classic process of analyzing and valuing securities is presented. Investment opportunities in a wide variety of financial and real assets are explored. The concept of portfolio theory in terms of risk and return is examined. **Prerequisite: FIN 303**

FIN 473 FINANCE TECHNOLOGIES 3-0-3

This course is a study of the principles of managerial finance, investments, and other topics relevant to the field of finance. Students explore how to use technologies, such as Excel, WINKS, and others to solve financial problems. **Prerequisites: BA 213, FIN 303**

FIN 493 TOPICS IN FINANCE 3-0-3

Offered to examine specific or current business or special financial issues. Possible examples could include asset management, corporate financing, securities analysis and management of financial institutions. **Prerequisite: FIN 303**

FIN 503 FINANCIAL ANALYSIS FOR DECISION MAKING 3-0-3

This course reviews the economic and organizational context in which resource allocation decisions are made. Primary tools to be used include spreadsheet analysis, financial simulation, and case studies. Topics to be included are: the capital expenditure decision process, reviewing capital investment projects, capital expenditures, EVA, lease-versus-buy decisions and cash flow analysis. **Prerequisite: Graduate standing or approval of instructor**

FILM**FLM 203 FILM APPRECIATION 2-3-3**

Acquaints the student with the art of film criticism. Presents basic cinema vocabulary, information about film production, theory and history of film, and practice in analysis of individual films.

FITNESS**FIT 2101 WALKING/JOGGING 0-2-1**

Introduction to power walking and the fundamentals of jogging.

FIT 2111 RACQUET SPORTS 0-2-1

Introductory look at rules, skills, strategy, and etiquette of tennis, racquetball, badminton, and table tennis.

FIT 2131 GOLF/BOWLING 0-2-1

Introduction to the proper etiquette and fundamentals of golf and bowling. Service fee will be added for course enrollment.

FIT 2151 SOCIAL BOARD GAMES 0-2-1

The objective of this activity class is to expose the students to the history, rules, strategies and fundamentals of a variety of social board games including Chess, Checkers, Backgammon, Cranium, Scrabble, Trivial Pursuit, Pictionary, Taboo, and Monopoly.

FIT 2211 AEROBICS 0-2-1

Development of cardiovascular conditioning through dance & bench step aerobics.

FIT 2221 GOLF I 0-2-1

The course is an introduction to the game of golf. Golf history, terminology, rules, and etiquette will be introduced. The student will gain the golf skills (swing, pitching, chipping, and putting) to play a 9-hole round of golf.

Prerequisite: FIT 2131 or permission of instructor

FIT 2271 CONDITIONING 0-3-1

Development of cardiovascular and strength conditioning. Course will meet three days a week or the equivalent of three hours per week.

FIT 2331 INDOOR/OUTDOOR SOCCER 0-2-1

The objective of this activity class is to improve the student's knowledge of the skills and strategies of indoor and outdoor soccer through a series of drills and games.

FIT 2341 LACROSSE 0-2-1

The objective of this activity class is to introduce the game of lacrosse, its history, the skills, and the strategy of the game.

FIT 2351 KARATE 0-2-1

Introduction to the fundamentals, skills, and rules of karate.

FIT 2361 BALL ROOM DANCING 0-2-1

The objective of this activity class is to expose the student to a number of social dances including the fox trot, waltz, tango, salsa and swing. The proper steps, form, and coordination with the music will enhance the student's confidence on the dance floor.

FIT 2831 BASKETBALL 0-2-1

The objective of this activity class is to improve the student's knowledge of the skills and strategies of basketball through a series of drills and games.

FIT 400X SPECIAL PROJECTS IN FITNESS VARIES (1-3 HRS.)

Credit earned through directed reading, independent study, research or supervised lab or field work. Maximum three hours credit.

Prerequisite: Permission of Department Chair

FORENSIC SCIENCE

FS 203 PRINCIPLES OF FORENSIC SCIENCE I 3-0-3

This course is designed as an introduction and overview of the various branches of forensic science such as pathology, toxicology, anthropology, and entomology, and how the various fields play a part in the criminal justice system as they relate to the collection and analysis of crime scene evidence. General topics in forensic science such as ethics, crime scene investigation procedures, and law will be discussed.

Prerequisite: Forensic Science majors or permission of department chair

FS 213 DIGITAL FORENSIC SCIENCE 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods, and laws concerning digital devices. This course also covers how computers are used in investigations. **Prerequisite:** INF 103 (Same as INF 213 and LE 213)

FS 223 PRINCIPLES OF FORENSIC SCIENCE II 3-0-3

This course is a continuation of FS 203. It is designed to introduce the principles of the forensic science laboratory including such topics as microscopy, DNA techniques, latent print analysis, controlled substance analysis, and informatics.

Prerequisite: FS 203

FS 343 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS I 3-0-3

Introduction to criminalistics and crime scene investigation. Methods of processing a crime scene: documentation, location, and collection of evidence, proper collection and handling procedures, selection and presentation for analytical examination, and presentation of the process and findings in court. **(Same as LE 343)**

Prerequisite: Junior standing or permission of instructor

FS 351 CRIMINALISTICS AND CRIME SCENE LABORATORY 0-2-1

The study of types of chemical and physical analyses associated with crime scene investigations.

Prerequisite: FS 343 or LE 343 (Same as LE 351)

FS 353 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS II 3-0-3

Advanced criminalistics and crime scene investigation. A detailed review of current methodology of collection, processing and court presentation of evidence. Analysis of the roles of law enforcement and forensic scientists. **Prerequisite:** FS 343 or LE 343 (Same as LE 353)

FS 371 FORENSIC COMPARATIVE SCIENCE LAB 0-2-1

An introduction to the actual examination of finger, palm, and sole images; shoe sole images; fired bullets and cartridge cases; tool marks; and physical comparison of broken and torn items which might be found at crime scenes.

Prerequisite: FS 351 and FS 353, or by permission of the department chair

FS 373 FORENSIC COMPARATIVE SCIENCE 2-1-3

An introduction to the examination process of comparative science evidence. The philosophical study presented will provide the foundation for the student to judge sufficiency of details when determining the source of crime scene evidence. Practical comparative exercises of fractures and tears, firearm and tool marks, finger and palm print, and shoe and tire print examinations, will be included within the class. The class will be approximately half lecture and half examination exercises.

Prerequisite: Junior standing in Forensic Science or by permission of the department chair

FS 383 FIRE, ARSON, & EXPLOSION INVESTIGATIONS (3 CR.HRS.)

An in-depth study of fire, arson, and explosion scene investigation. Emphasis will be placed on the use of the Scientific Method, the principles and techniques of scene preservation and analysis, management of investigation functions, documentation of the scene, and determination of the origin and cause of fires. **Prerequisite:** CH 144 or CH 104, LE 263 or LE 273

FS 422 EXPERT TESTIMONY IN FORENSIC SCIENCE 2-0-2

Consideration of a scientist's role in courtroom testimony, communication of scientific data to the general public, courtroom demeanor, trial preparation, and mock trial experiences.

Prerequisite: Senior standing in forensic science program or permission of department chair, SP 203

FS 423 PROFESSIONAL PRACTICE IN FORENSIC SCIENCE 3-0-3

This course will consider the scientist's role in courtroom testimony, communication of scientific data to the general public, courtroom demeanor, trial preparation, and mock trial experiences. Topics pertinent to employment and active participation in the forensic science community will also be discussed.

Prerequisite: Senior standing in forensic science program or permission of department chair, SP 203

FRENCH

FRN 113 FRENCH 3-0-3

An introduction to the French language with an emphasis on reading and writing in French. Vocabulary development and the basics of French structure are also covered. No previous study of French is required.

FRN 123 FRENCH II 3-0-3

A continuation of French 113, integrating listening, speaking, and reading, and writing skills. Basic grammar and French cultures are covered. **Prerequisite:** FRN 113

FRESHMAN STUDIES

BA 101 INTRODUCTION TO BUSINESS 1-0-1

This course is required for all freshman business students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their business degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

GE 101 INTRODUCTION TO ENGINEERING 1-0-1

This course is required for all freshman engineering students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their engineering degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

UE 012 ACADEMIC FOUNDATIONS 2-1-0

This course helps students develop the proficiency needed to be successful in other college courses. The focus is on preparing students to do college level reading and writing and learning by building on each student's academic skills. This is a non-credit, preparatory class.

UE 101 UNIVERSITY EXPERIENCE 1-0-1

This course offers resources for success in learning for students new to Trine University. This course will assist students in becoming more proficient learners, understanding self and others, and learning personal life skills. This course will present information about Trine University offices and services to familiarize students with resources and procedures.

GENERAL ENGINEERING

GE 101 INTRODUCTION TO ENGINEERING 1-0-1

This course is required for all freshman engineering students. Its purpose is to improve student success, to make the college experience more relevant to career goals, and to help students obtain as much assistance from the University as possible while working towards their engineering degrees. The course will cover community building, academic goals, effective learning methods, University orientation, and personal and professional development.

GE 113 INTRODUCTION TO ENGINEERING DESIGN 0-6-3

Fundamental concepts of engineering design and development are introduced. Teams of students investigate an engineering problem, research alternative solutions, develop a design, and build and evaluate a prototype.

GE 301 ENGINEERING INTERNSHIP (1 HR.)

This course involves a meaningful work experience related to the student's field of study in engineering. The Engineering Internship Coordinator must approve the assignment and

company. Employment is full-time during the summer semester. This course may be taken a maximum of two times.

Prerequisites: Engineering major, 2.5 GPA, junior standing, adherence to the guidelines set by the Engineering Internship Coordinator and permission of the student's department chair

GE 401 PROFESSIONAL PRACTICE 1-0-1

This course covers the two broad areas of professional practice. The first consists of topics pertinent to career aspects of the profession: job search activities, graduate school information, lifelong learning, professional registration, and the role of professional societies. The second area concerns the social responsibilities of the practicing professional engineer: professional ethics, the role of engineering in public policy, the need for knowledge of current affairs, and consideration of the impact of technology upon society.

Prerequisite: Senior standing in engineering

GEOGRAPHY

GEO 203 OCEANOGRAPHY 2-2-3

A description of the oceans and their relation to humans. The principles of physical, chemical, geological, and biological oceanography are used to explain the ocean environment. Society's effect on the oceans and problems and potentials of utilizing the natural resources of the sea.

Prerequisites: A laboratory science and MA 113 (Same as EAS 203 and BIO 203)

GEO 213 PHYSICAL GEOGRAPHY 3-0-3

An analysis of the spatial and functional relationships among landforms, climates, soils, water, and the living world. This course also addresses the connections between environmental processes and human activity, such as human impact on the environment. (Same as EAS 213)

GEO 303 HUMAN GEOGRAPHY 3-0-3

Topical studies to show how human beings have altered and adapted to their physical environments over time through technology, migration, and demographic changes. Focus is on cultural identity and landscape, cultural interaction, and conflict.

Prerequisite: Junior standing or permission of instructor

GEO 313 GEOGRAPHY OF NORTH AMERICA 3-0-3

A regional approach to the United States and Canada. An in-depth look at economic, political, historical, and cultural developments in the context of the physical environment. Focus on the present and the future of each region, as well as how those futures are intertwined. Global context is also considered. **Prerequisite:** Junior standing or permission of instructor

GEO 323 WORLD GEOGRAPHY 3-0-3

A study of the major cultural regions of the world, with emphasis on human social development (economic, cultural, historical, political), in the context of a given physical environment. Focus is on the present and future of each region, as well as how those futures are intertwined.

Prerequisite: GEO 303

GEO 343 ECONOMIC GEOGRAPHY 3-0-3

A spatial approach to economics, the course considers historical, present and future economic activities, developments, and trends, in a global context, with the goal of answering the two basic questions of geography: "where?" and "why there?". **Prerequisite: ECO 223 (Same as ECO 343)**

GEO 353 POLITICAL GEOGRAPHY 3-0-3

The politics of place. A review of the basic concepts and principles of geopolitics, designed to help students understand the connections between place and political decision-making. The course explores the applications of these concepts using past and present world events, as well as projecting possible futures. **Prerequisite: GOV 113 (Same as GOV 353)**

GEO 400X INDEPENDENT STUDIES IN GEOGRAPHY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum four hours credit.

Prerequisite: Permission of Department Chair

GEOLOGY

GLY 271 GEOLOGY LABORATORY 0-1-1

An introductory laboratory study of basic physical geology. The laboratory emphasizes skills needed for the identification of minerals and rocks, for the interpretation of land surface features based on topographic maps and for the understanding of folding, faulting, and rock relationships through the interpretation of geologic maps.

Corequisite or Prerequisite: GLY 273

GLY 273 GEOLOGY 3-0-3

An introduction to the field of geology. Study of minerals and rocks and their formation within the context of the earth's geologic history. Emphasis on soils, running water, and groundwater. Plate tectonics, glaciers, volcanoes, erosion, and weathering are also covered. **(Same as EAS273)**

GOLF MANAGEMENT

GM 101 INTRODUCTION TO GOLF MANAGEMENT 1-0-1

This course includes an overview of the golf industry, the variety of career opportunities available, and the skills and talents necessary for successful employment in the golf industry.

GM 201 GOLF COURSE ARCHITECTURE 1-0-1

Students will study site selection, planning the layout, and designing golf holes and athletic fields for a variety of facilities and patrons. USGA, California, and topsoil greens design and construction are studied. Students will study methods of construction for golf, urban, and recreational turf sites.

GM 203 GOLF SHOP MANAGEMENT 3-0-3

This is an introduction to the management of various types of on- and off-course golf facilities (driving ranges, golf discount houses, par-3 courses, learning centers, private, public, executive, resort, etc.). Personnel, committee structure, corporate structure, public relations, promotion and marketing are among topics for consideration and study. Topics also include buying, merchandising, and selling hard and soft goods; golf cart use, maintenance, and repair; administration of membership play, tournaments, and special events; computer operations; record keeping, and analysis.

GM 213 GOLF CLUB DESIGN, REPAIR AND FITTING 3-0-3

This is an introduction to golf club design through the years. It includes a study of the techniques of club repair and maintenance. Club fitting for the individual and the masses is examined.

GM 223 PROMOTION/MARKETING OF GOLF FACILITIES 3-0-3

This course is a study of the various tools and techniques in golf facility promotion; advertising, special promotions, sales, brochures, tournaments, fund-raising, etc., are topics for study. Topics also include promoting, marketing and administering the golf school, the multi-day golf package and the corporate golf outing. Sales and market-targeting strategies are discussed and studied.

GM 302 TEACHING THE SHORT GAME 2-0-2

This is a comprehensive study of the methods of teaching and executing the chip shot, the pitch shot and putting. Golf management majors only.

Prerequisite: Junior standing or permission of instructor

GM 323 TEACHING THE GOLF SWING 3-0-3

This course examines the principles and theories of golf instruction in the 20th century. Terminology, teaching approaches and styles, practice drills and exercises, teaching aids, and other related areas in the teaching of the golf swing are included. In addition, this course is designed for teaching the accomplished player. It includes a more intricate and sophisticated study of swing methods and theories from the most successful contemporary teachers of the game. Golf management majors only.

Prerequisite: Junior standing or permission of instructor

GM 411 FOOD AND BEVERAGE MANAGEMENT 1-0-1

This course is an introduction to food/beverage operation and legal issues. Field trips to various types of golf course food operations are included.

Prerequisite: Junior standing or permission of instructor

GM 436 INTERNSHIP (6 HRS.)

Students will be assigned to golf courses or golf facilities to gain experience in golf operations and management. The term of each internship will vary from five to ten weeks, depending on the nature of the position and responsibilities.

Prerequisite: Junior standing or permission of instructor

GM 400X RESEARCH TOPICS IN GOLF MANAGEMENT VARIES (1-4 HRS.)

Special studies of topics related to golf management conducted in independent study under the direction of the staff. May be taken in conjunction with internships, and may be taken for variable credit, for a maximum of four credits. **Prerequisite: Junior standing or permission of instructor**

GOVERNMENT

GOV 113 INTRODUCTION TO GOVERNMENT 3-0-3

An examination of the origins and operations of the national political machinery; the development, functions and philosophy of political parties; the problems and tasks of leading governmental agencies.

GOV 313 COMPARATIVE GOVERNMENTS 3-0-3

A comparison of the systems, philosophies and functions of the governments of England, France, the United States, Germany and the countries of the former Soviet Union.

Prerequisite: GOV 113

GOV 323 THE CONTEMPORARY WORLD 3-0-3 (Same as HIS 323)

An analysis of current global issues from a historical perspective with an emphasis on developing an awareness of cultural diversity and an understanding of the role of international governmental and nongovernmental organizations. **Prerequisites: GOV 113 or HIS 113**

GOV 333 STATE AND LOCAL GOVERNMENT 3-0-3

The general relationship between the states and the federal government; organization, functions, and divisions of authority between the executive, legislative and judicial. The functions, powers, and forms of county and municipal governments. **Prerequisite: GOV 113**

GOV 343 AMERICAN POLITICAL THOUGHT 3-0-3 (Same as HIS 343)

A survey and analysis of significant political ideas from colonial times to present. Some of the ideas discussed in the survey include the philosophies of liberalism, conservatism, and pragmatism, as well as the political thinking of such men as Alexander Hamilton, Thomas Jefferson, John C. Calhoun, Henry Thoreau, Herbert Spencer and Lester Ward.

Prerequisite: GOV 113

GOV 353 POLITICAL GEOGRAPHY 3-0-3

The politics of place. A review of the basic concepts and principles of geopolitics, designed to help students understand the connections between place and political decision-making. The course explores the applications of these concepts using past and present world events, as well as projecting possible futures. **Prerequisite: GOV 113 (Same as GEO 353)**

GOV 363 UNITED STATES FOREIGN POLICY 3-0-3

A history of United States involvement in world affairs from the War for Independence to the present; the close relationship between the foreign policy and domestic concerns is emphasized; an analysis of the policy-making bureaucracy.

Prerequisites: HIS 103, HIS 113, or GOV 113 (Same as HIS 363)

GOV 373 POLITICAL PSYCHOLOGY 3-0-3

An examination of the role of group dynamics and personality variables in contemporary political issues, including leadership and power, political attitudes, current social movements, conflict resolution, coalition formation, cross-cultural comparison of political attitudes and other issues. **Prerequisite: PSY 113 or GOV 113 (Same as PSY 373)**

GOV 403 AMERICAN CONSTITUTIONAL DEVELOPMENT 3-0-3

A study of the historical and judicial developments of the Constitution of the United States by analyzing court decisions and the philosophies of the justices of the Supreme Court. Emphasis on the court's role in the development of national economic policy, with a focus on the court's position on civil rights and liberties, political freedom and social equality.

Prerequisites: HIS 103, HIS 113, GOV 113 (Same as HIS 403)

GOV 400X INDEPENDENT STUDIES IN GOVERNMENT VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

GENERAL STUDIES

GS 4003 SENIOR CAPSTONE PROJECT (3 HRS.)

The capstone project will give students the opportunity to demonstrate the integration of the two to three academic programs they have chosen for the self-directed concentration. The project will include an oral and written presentation encapsulating the rationale for the programs selected and the nature of the relationship between them.

Prerequisite: Senior standing

HISTORY

HIS 103 AMERICAN HISTORY I 3-0-3

Traces the major trends in the history of the United States from colonial times to the end of Reconstruction. Concentrates upon the diplomatic, political, economic, intellectual, and cultural achievements of the American nation, set within the larger framework of the European world.

HIS 113 AMERICAN HISTORY II 3-0-3

Increasing emphasis on the post Civil War industrial development of the United States and its subsequent role as a great world power to present.

HIS 203 WORLD CIVILIZATION I 3-0-3

A historical review of human civilization from prehistoric times through the Renaissance. The class focuses upon the political, economic, and cultural achievements of various civilizations of the world.

HIS 213 WORLD CIVILIZATION II 3-0-3

A survey of major civilizations of the world in the post-Renaissance period, including Asian, African, and Western European civilizations in the areas of politics, economics, and scientific, and cultural developments. Emphasis is placed on the increasing interdependence of world civilizations and people.

HIS 251 ANCIENT GREECE FROM THE PERSIAN THROUGH PELOPONNESIAN WARS 1-0-1

An examination of the culture of Athens and Sparta during the 5th century B.C., concentrating on the Persian and Peloponnesian wars and their lasting effects on Western Civilization.

(Same as PHL 251)

HIS 253 THE JAPANESE PEOPLE 3-0-3

A humanistic approach to the study of the Japanese people. An emphasis on using a historical context to reveal domestic political, social, and economic associations, as well as important achievements in literature, religion, philosophy and art.

HIS 323 THE CONTEMPORARY WORLD 3-0-3

An analysis of current global issues from a historical perspective with an emphasis on developing an awareness of cultural diversity and an understanding of the role of international governmental and nongovernmental organizations.

Prerequisite: GOV 113 or HIS 113 (Same as GOV 323)

HIS 343 AMERICAN POLITICAL THOUGHT 3-0-3

A survey and analysis of significant political ideas from colonial times to the present. Some of the ideas discussed in the survey include the philosophies of liberalism, conservatism, and pragmatism, as well as the political thinking of such men as Alexander Hamilton, Thomas Jefferson, John C. Calhoun, Henry Thoreau, Herbert Spencer, and Lester Ward.

Prerequisite: GOV 113 (Same as GOV 343)

HIS 363 UNITED STATES FOREIGN POLICY 3-0-3

A history of the United States involvement in world affairs from the War of Independence to the present, the close relationship between the foreign policy and domestic concerns is emphasized; an analysis of the policymaking bureaucracy.

Prerequisites: HIS 103, HIS 113, or GOV 113 (Same as GOV 363)

HIS 393 ECONOMIC HISTORY OF THE UNITED STATES 3-0-3

A survey of major economic developments in American history. Stresses the changed conditions and values in moving from an agricultural to an industrial society.

Prerequisites: HIS 103, HIS 113 (Same as ECO 393)

HIS 403 AMERICAN CONSTITUTIONAL DEVELOPMENT 3-0-3

A study of the historical and judicial developments of the Constitution of the United States by analyzing court decisions and the philosophies of the justices of the Supreme Court. Emphasis on the court's role in the development of national economic policy, with a focus on the court's position on civil rights and liberties, political freedom, and social equality.

Prerequisites: HIS 103, HIS 113, GOV 113 (Same as GOV 403)

HIS 423 THE UNITED STATES AS A WORLD POWER 3-0-3

A study of social, economic, intellectual, and political developments within the United States from approximately 1939 to the present. Emphasis is placed on relating America's developments to its role in international affairs.

Prerequisite: HIS 113

HIS 433 THE AMERICAN REVOLUTION 3-0-3

A history of the War of Independence and the formation of national government to 1787.

Prerequisite: HIS 103

HIS 443 READINGS IN AMERICAN HISTORY 3-0-3

An independent study and research on selected topics in American History. Open to students with departmental approval. **Prerequisite: Junior standing or permission of instructor**

HIS 453 READINGS IN WORLD HISTORY 3-0-3

An independent study and research on selected topics in World History. Open to students with departmental approval. **Prerequisite: Junior standing or permission of instructor**

HIS 400X INDEPENDENT STUDIES IN HISTORY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervised field work. Maximum 4 hours credit.

Prerequisite: Permission of Department Chair

HONORS SEMINAR

HNR 121 INTRODUCTION TO HONORS SEMINAR 1-0-1

An introduction to the Honors Program. Current topics will be discussed in an informal atmosphere. Emphasis will be placed on thinking critically as well as the ability to convey one's opinions through written essays. **Prerequisite: Admission into the Honors Program**

HNR X1X HONORS HUMANITIES SEMINAR (1-2 HRS.)

An honors seminar on special topics in the humanities. May be retaken for credit as long as the topics differ.

HNR X2X HONORS SOCIAL SCIENCES SEMINAR (1-2 HRS.)

An honors seminar on special topics in the social sciences. May be retaken for credit as long as the topics differ.

HNR X3X HONORS MATHEMATICS/ SCIENCE SEMINAR (1-2 HRS.)

An honors seminar on special topics in mathematics or science. May be retaken for credit as long as the topics differ.

HNR X4X HONORS SEMINAR (1-2 HRS.)

An honors seminar on special topics not considered to be either a humanity or a social science. May be retaken for credit as long as the topics differ.

HOSPITALITY AND TOURISM MANAGEMENT

HOS 103 CURRENT TRENDS IN TOURISM 3-0-3

The objective of this class is to look at the research, stats, and current trends as they relate to the Tourism Industry. Upon examination of the research, the class will discuss how the industry continues to adapt to meet the ever changing demands of the public.

HOS 203 LODGING MANAGEMENT 3-0-3

The objectives of this class are to examine the policies, techniques and trends in hotel administration from a front office perspective. Topics such as organization, ethics, procedures, and communication amongst the hotel staff and with the hotel guest will be examined.

HOS 213 SOPHOMORE INTERNSHIP IN HOSPITALITY MANAGEMENT (3 HRS.)

This sophomore experience is the first of two internships required for a Hospitality Management major. This field related experience is under the direction of a field supervisor and University supervisor. The Internship must have the approval of the Department Chair.

HOS 303 HOSPITALITY AND TOURISM MARKETING 3-0-3

The objective of this class is to provide the student with an understanding of the techniques used to market the many facets of the hospitality and tourism industry. Packaging pricing, promoting, advertising and merchandising will all be explored as they relate to restaurant sales, hotel occupancy, and the travel and tourism industry.

Prerequisite: Junior standing or permission of instructor

HOS 313 CATERING 3-0-3

The objective of this class is look at catering from a business perspective including pricing, production, promoting, packaging, and customer service.

Prerequisite: Junior standing or permission of instructor

HOS 322 MEETING AND EVENT PLANNING 2-0-2

This class looks at meeting and event planning from an organizational and administration perspective. Customer service as it relates to meeting the needs of the client will be examined. The culminating projects of this class are the creation of a event planning resource notebook and the class project of putting on a "campus event".

Prerequisite: Junior standing or permission of instructor

HOS 402 BEVERAGE MANAGEMENT 2-0-2

The objective of this class is to give the student an education in the purchasing, storing, serving, and production of alcoholic and non-alcoholic beverages.

Prerequisites: a hospitality management major and 21 years of age

HOS 404 QUALITY FOOD PREPARATION 3-2-4

The class will examine food preparation methods and service techniques important to the success of a food service operation. Menu planning, food preparation and production along with proper food service methods will be studied. A basic knowledge of food service operations will be taught in a lab setting through the production of a "A Night out on the Town". Student will

exhibit their skills by performing a variety of tasks in a cooperative environment as they produce a dining experience to the general public.

Prerequisite: Junior standing or permission of instructor

HOS 413 CASINO, SPA, AND RESORT MANAGEMENT 3-0-3

This class examines the day to day operations of casinos, spas, and resorts from a front office perspective including the law, procedures, and organizational structure. This class incorporates both classroom and field experiences to give the student the necessary perspective of how these facilities become successful.

Prerequisite: Junior standing or permission of instructor

HOS 423 SANITATION AND HEALTH IN THE FOOD SERVICE, LODGING, AND TOURISM INDUSTRY 3-0-3

This class will discuss food safety and other health related issues common to the Hospitality Industry, and other institutional programs like hospitals, schools, restaurants, cruise ships, airlines, and other form of travel. Students must pass a National Sanitation Certification examination upon completion of the course.

Prerequisite: Junior standing or permission of instructor

HOS 473 SENIOR INTERNSHIP IN HOSPITALITY MANAGEMENT (3HRS.)

This internship experience is of great importance to the Hospitality Management major because it comes at a time where the student has through their classroom experiences at Trine University, gained a knowledge of the hospitality and tourism industry, and now goes out into the field to complement their knowledge of the subject. The internship must have approval of the Department Chair. **Prerequisite: Junior standing or permission of instructor**

HEALTH AND PHYSICAL EDUCATION

HPE 202 INTRODUCTION TO ADAPTIVE PHYSICAL EDUCATION 1-2-2

Classroom discussion and supervised lab experience that familiarizes students with a general knowledge of various disability groups and the physical education needs of these special students.

HPE 212 ADAPTIVE PHYSICAL EDUCATION 1-2-2

Classroom discussion and supervised lab experience that familiarizes students with a general knowledge of adaptive physical education and the inclusion process from assessment to writing I.E.P. goals.

HPE 221 OFFICIATING 0-2-1

Knowledge of the rules and officiating practices of sports.

HPE 223 HISTORY OF PHYSICAL EDUCATION AND SPORT 3-0-3

The significance of physical education and sport from the ancient Greeks through modern times. The development of physical education as a broad-based academic discipline and sport management as a natural outgrowth of the field.

HPE 232 PHYSICAL EDUCATION FOR THE ELEMENTARY SCHOOL TEACHER 1-2-2

Methods of elementary school physical education which meet the developmental needs of children. Focus on curriculum and skill attainment. Field experience in area schools.

HPE 342 SCHOOL AND COMMUNITY HEALTH 2-0-2

Knowledge of observing and understanding the health needs of school-aged children. The role of the school health program, students' habits, attitudes and understanding of good health practices are explored. Focus on health programs amenable to community action.

Prerequisite: Junior standing or permission of instructor

HPE 352 FAMILY LIFE EDUCATION 2-0-2

Investigation of the biological, psychological and sociological components of sexuality and family life. Issues discussed include the anatomy and physiology of the reproductive systems, gender roles, family living, marriage, parenthood, divorce, and abuse/violence. **Prerequisite: Junior standing or permission of instructor**

HPE 404 CAPSTONE EXPERIENCE IN SPORT MANAGEMENT 4-2-4

The culminating final project of a Sport Management major. With the guidance of a professor the student will research a topic related to sport and the industry of sports and write a significant paper with cited references and statistics that examines the issue in great detail. Topics must be approved by the mentoring professor and the student must present his/her research in an open forum to selected faculty members for their examination. **Prerequisite: Junior standing or permission of instructor**

HPE 453 FACILITY PLANNING 3-0-3

The purpose of this class is to examine all the variables an administrator must consider when building or remodeling a sport or fitness facility. Cost, construction, materials, legal issues, and handicap accessibility are a few of the topics to be discussed. Field trips to local sport facilities and arena's will be scheduled. The design of a new facility is one of the class projects. **Prerequisite: Junior standing or permission of instructor**

HUMANITIES

HUM 233 SPECIAL TOPICS IN LANGUAGE AND HUMANITIES 3-0-3

Studies of one of the major topics in the Humanities, focusing on carefully chosen modes of expression that shape our culture. Topic will be announced in the class schedule. This course will change every time it is offered and may therefore be repeated for credit.

HUM 401 HUMANITIES PORTFOLIO 3-0-1

Exploring the relationship of coursework taken in a humanities minor as it relates to human experience, diversity, and communication through a variety of artistic forms.

Prerequisite: Completion of all other coursework in humanities minor

INFORMATICS

INF 103 INFORMATION TECHNOLOGY APPLICATIONS 3-0-3

Terminology, concepts, principles, and use of computer in solutions of business, scientific and educational decision-making problems. Introduction to system structures, storage media, peripheral equipment, communications and Web development. Emphasis on topics in human-computer interaction and human factors, collaborative technologies, ethics, privacy, and ownership of information and information sources, information representation and the information life cycle, the transformation of data to information. Hands on assignments: word processing, spreadsheet analysis, database, presentation graphics, and collaboration software.

Prerequisite: Computer Literacy

INF 132 INTEGRATED DEVELOPMENT (VISUAL BASIC) 2-0-2

User interface design fundamentals using VBasic, control objects, event-driven Windows applications, forms, functions, arrays, parameter passing, graphical user interface, using components of an integrated development environment.

Prerequisite: MA 103 or MA 113 or equivalent.

INF 163 STRUCTURED LOGIC AND DESIGN (C PROGRAMMING) 3-0-3

Algorithmic problem solving and programming using top-down design, stepwise refinement and functional decomposition. Declarations, operations, assignment conditional and loop statements, parameter passing, arrays, and structures. **Prerequisites:** MA 103 or MA 113 or equivalent.

INF 213 DIGITAL FORENSIC SCIENCE 1 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods, and laws concerning digital devices. This course also covers how computers are used in investigations. **Prerequisite:** INF 103 and ENG 113 or ENG 133 (Same as FS 213 and LE 213)

INF 223 DIGITAL MULTIMEDIA STUDIES 3-0-3

A beginner's course in digital multimedia including the creation and manipulation of digital images, audio files, video files, and hypermedia as steps in the creation of multimedia projects.

Prerequisite: INF 103

INF 243 MOTION GRAPHICS 3-0-3

A study of moving graphic design involving techniques of combining still images, video, animation and graphics into short dynamic composition stressing creative use of new technology. **Prerequisite:** INF 223

INF 253 DATA STRUCTURES I 3-0-3

Arrays of structures, arrays of addresses, searching, sorting, merging, analysis of algorithms, linked lists, stacks, queues, introduction to trees, introduction to recursive algorithms, backtracking. A significant amount of programming expected. **Prerequisite:** INF 163

INF 263 DATABASE CONCEPTS AND APPLICATIONS 3-0-3

Concepts including entity-relationship diagrams, normalization to fifth normal form, database optimization. Other concepts include: file organization, data base representation, descriptions, software reliability, security, integrity, relational data bases, query languages.

Prerequisite: INF 103

INF 273 VIDEO I 3-0-3

A study of time-based media production, design and issues including in-class demonstrations of equipment, camera/lighting techniques, file formats, codes, emphasizing attributes of digital video editing software. Exercises illustrate principles of visual dynamic images over a time frame. Students produce experimental commercial works of 10 to 15 seconds duration to interviews, documentaries, narratives up to 5 minutes length. Issues regarding streamed video discussed.

Prerequisite: INF 223

INF 303 NETWORK MANAGEMENT 3-0-3

Introduction to network management, including concepts and theory of data communications, network design, network security, network management tools, and network management tasks.

Prerequisites: INF 103

INF 311X INFORMATICS INTERNSHIP (1-3 HOURS)

This course involves meaningful work experience related to the student's field of study or other functional areas of Informatics at an approved company. The assignment must be approved by both the student's advisor and the department chair. A maximum of three (3) credit hours may be granted in a given semester.

Prerequisite: Informatics major, 3.0 GPA, Junior/Senior standing, and permission of advisor and department chair.

INF 313 DIGITAL FORENSIC SCIENCE II 3-0-3

This course continues the Digital Forensics 1 course by advancing into more detailed analysis techniques as expected by law enforcement and the court system. Topics include evidence collection procedures, detailed hardware analysis and report preparation.

Prerequisite: INF 213

INF 323 VIDEO II 3-0-3

A continuation of Video I studying time base video and audio production and current ideas in new media, visual grammar and literacy. Assignments deal with interviews, documentaries, narratives, experimental and open projects, using advance features of editing software. Issues related to web streaming video material discussed further.

Prerequisite: INF 273

INF 343 COMPUTER SECURITY 3-0-3

Introduction to computer security, including concepts and theory of security policies, access control methods, site security, network security, system security, user security, application security, and managing security functions.

Prerequisite: INF 303

INF 371 ADVANCED MICROCOMPUTER LABORATORY 0-2-1

Students work with both hardware and software components.

Co-requisite: INF 373

INF 373 ADVANCED MICROCOMPUTERS 3-0-3

Hardware considerations include system board features, memory, hard drive, floppy drives, I/O devices, and comparison of CPU features, CMOS/BIOS firmware. Operating system features, configurations, setup options, multimedia technology, software installation, configuration. Students present PC-related topics.

Prerequisite: INF 103; INF 132 or CS 1113

INF 383 INFORMATICS WEB PROGRAMMING 3-0-3

Fundamentals of the World Wide Web and its architecture. Designing separation of content and presentation with XHTML and CSS. Introduction to the Document Object Model (DOM). Dynamic documents with Java script and Ajax (Asynchronous Java script and XML). Basics of scripting languages (PHP and Perl). Introduction to server-side programming using PHP and Perl. XML technologies (XML Schema, XSLT). Database access through Web. Programming with distributed components and Web services. A comparative study of CGI programming, Java Server Pages and ASP.net.

Prerequisites: INF 223 or CS 1303; INF 132 or CS 1113

INF 400X INDEPENDENT RESEARCH IN INFORMATICS (1-3 HOURS)

Independent research under the direction of an individual instructor. A research paper or project is required.

Prerequisite: Informatics major, 3.0 GPA, Junior/Senior standing, and permission of advisor and department chair.

INF 403 ADVANCED DATABASE 3-0-3

Advanced topics for relational and object oriented data base, enhanced query, tables, report features, macros, and Visual Basic applications, relational algebra including RAR modeling. SQL informatics applications development. **Prerequisite:** INF 263

INF 411X SPECIAL TOPICS IN INFORMATICS (1-3 HOURS)

Addresses advanced topics in Informatics that vary by year.

Prerequisite: Junior/Senior standing, and permission of advisor and department chair.

INF 413 GEOGRAPHIC INFORMATION SYSTEMS 3-0-3

This course introduces students to the concepts, techniques, and tools of Geographic Information Systems (GIS), which is a computer-based data processing tool used to manage and analyze spatial information. Topics covered include data acquisition, management, manipulation, and analysis, and cartographic output for applications of GIS in scientific and technological operations such as environmental assessment, analysis or natural hazards, site analysis for business and industry, resource management, and land-use planning. Through hands-on exercises with ArcGIS and/or projects with other related software packages, students will acquire basic skills in GIS. **Prerequisites:** INF 263 and Junior Standing

INF 423 INFORMATICS CAPSTONE 3-0-3

In this course, Informatics majors apply the techniques they have learned in prior course work to a significant project of their own definition. The project may be completed through group effort. The design of the course follows the goals for the capstone experience. Students define the information problem for themselves, determine what techniques to use for the information problem they identify, and integrate human-centered and technical dimensions of information systems.

Prerequisite: Senior Standing

LAW

LAW 203 BUSINESS LAW I 3-0-3

This course is an introduction to the American legal system. It includes a survey of courts, legal procedures, torts, and criminal law. It involves an intensive study of the common law of contracts, including contract formation, performance, breach and remedies, as well as a study of the law of sales under the Uniform Commercial Code.

LAW 303 BUSINESS LAW II 3-0-3

This course is a study of the law of agency, partnerships, corporations, and other business organizations. It includes a study of negotiable instruments, secured transactions, surety ship, bankruptcy, securities regulation, and related legal issues.

Prerequisite: LAW 203

LAW 403 EMPLOYMENT LAW 3-0-3

This course is a survey of the law relating to the employment relationship, with a major emphasis on federal law. The course covers unions and collective bargaining under the National Labor Relations Act. Discrimination in employment will address the Civil Rights Act of 1964 as amended, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, and related statutes. State and federal law with regard to employment-at-will, privacy, whistleblower protection, and related issues will also be discussed.

Prerequisites: LAW 203, MGT 363

LAW 413 INTERNATIONAL LAW 3-0-3

The legal considerations governing international business transactions. Introduction to the international legal environment including the status of international law, international dispute settlement, conflicts of law. A more detailed study of the international contracting process, international payment mechanisms, carriage contracts, insurance issues, and related subjects. Government regulation of international business will also be addressed.

Prerequisites: LAW 203, BA 343

LAW 503 PUBLIC POLICY AND THE LEGAL ENVIRONMENT 3-0-3

This course includes an analysis of the legal, political and economic framework that has shaped public policy toward business in the United States. It will include the methods as to how public policy is created and its implications for management decision-making. The issues that this course will be concerned with are: how public policy is related to societal, community, employee, consumer, and environmental concerns and their implication for business.

Prerequisite: Graduate standing or approval of instructor

LAW ENFORCEMENT

LE 103 INTRODUCTION TO CRIMINAL JUSTICE 3-0-3

This course is an introduction to the criminal justice system that covers the processes, institutions and administration of justice in the United States. The course will concentrate on the purposes and history of the three primary parts of the criminal justice system: law enforcement, courts, and corrections.

LE 153 JUVENILE JUSTICE 3-0-3

A comprehensive review of the nature and etiology of juvenile delinquency. The legal and philosophical basis of the juvenile justice process, procedures, and programs of prevention and rehabilitation.

LE 213 DIGITAL FORENSIC SCIENCE 3-0-3

This course introduces the student to investigative techniques involving computers and other electronic devices. Topics include investigative procedures, computer hardware, data recovery methods and laws concerning digital devices. This course also covers how computers are used in investigations. **Prerequisite: INF 103 (Same as FS 213 and INF 213)**

LE 253 PROBATION, PAROLE & COMMUNITY CORRECTIONS 3-0-3

An introduction to community-based corrections within the criminal justice system. A comprehensive review of the philosophies, and practices, traditional and nontraditional approaches, and exemplary programs of the juvenile, and adult systems.

LE 263 INTRODUCTION TO CRIMINAL LAW AND JUSTICE 3-0-3

A survey of the American criminal justice system, its legal bases, and the interrelationships between local, state and national agencies. Specific attention will be focused on criminal law, criminal liabilities and punishments.

LE 273 CRIMINAL PROCEDURES AND EVIDENCE 3-0-3

An examination of the various aspects of criminal procedures and their bases in the Constitution and in law. Topics include arrest, search and seizure, interrogation, and the exclusionary rule.

LE 313 POLICE ADMINISTRATION 3-0-3

Historical and legal perspectives of policing in the United States. Issues include: organizational theory, police responsibilities, and leadership roles in contemporary law enforcement organizations. **Prerequisite: LE 103**

LE 343 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS I 3-0-3

Introduction to criminalistics and crime scene investigation. Methods of processing a crime scene: documentation, location, and collection of evidence, proper collection and handling procedures, selection, and presentation for analytical examination, and presentation of the process and findings in court. **(Same as FS 343)**

LE 351 CRIMINALISTICS AND CRIME SCENE LABORATORY 0-2-1

The study of types of chemical and physical analyses associated with crime scene investigations.

Prerequisite: LE 343 (Same as FS 351)

LE 353 CRIMINALISTICS AND CRIME SCENE INVESTIGATIONS II 3-0-3

Advanced criminalistics and crime scene investigation. A detailed review of current methodology of collection, processing, and court presentation of evidence. Analysis of the roles of law enforcement and forensic scientists. **Prerequisite: LE 343 (Same as FS 353)**

LE 363 INSTITUTIONAL CORRECTIONS AND CORRECTIONAL LAW 3-0-3

A detailed review of penology and institutional corrections. A historical and contemporary perspective on jails and prisons. Rehabilitation and incarceration in both the adult and juvenile systems. A critical analysis of legislation and appellate decisions in correctional law for pretrial detainees and convicted and sentenced prisoners. **Prerequisite: Junior standing or permission of instructor**

LE 423 CRIMINAL JUSTICE AGENCY ADMINISTRATION 3-0-3

A detailed examination of the unique blend of criminal justice and business/public administration required in the administration of law enforcement, judicial and corrections agencies. A pragmatic analysis of public funding and utilization of local, state, and federal grants.

Prerequisite: Junior standing or permission of instructor

LE 453 TOPICS IN CRIMINAL JUSTICE 3-0-3

Selected topics in the area of criminal justice. **(May be taken multiple times.)**

Prerequisite: Junior standing or permission of instructor

LE 473 LAW ENFORCEMENT INTERNSHIP I (3 HRS)

Professional internship placement in a criminal justice agency in the students' areas of concentration. Students will participate in agency activity under the supervision of an agency professional. **Prerequisite: Junior or senior standing and department approval**

LE 483 LAW ENFORCEMENT INTERNSHIP II (3 HRS.)

Students with a double concentration or double major may enroll in a second professional internship placement. **Prerequisite: Double concentration in criminal justice or double major, junior/senior standing, and department approval**

LE 493 FORENSIC/CORRECTIONAL INTERNSHIP (3 HRS.)

Field experience in diagnostic correctional settings or facilities.

Prerequisite: Junior standing or permission of instructor

LE 400X INDEPENDENT STUDIES IN CRIMINAL JUSTICE VARIES (1-4 HRS.)

Original research and/or a review of current, critical research on an approved topic within the student's field of concentration.

Prerequisite: Junior or senior standing and department approval (course may be repeated)

LEADERSHIP

LDR 203 LEADERSHIP STRENGTHS AND SKILLS (3 HRS.)

This course focuses on a strengths-based approach to leadership and leadership development as well as the skills necessary for facilitating positive change in groups, organizations, and communities. Active learning opportunities to understand and practice essential skills such as continual learning, powerful communication, problem solving, managing process, goal achievement, conflict resolution, win-win negotiating, and empowering stewardship are woven throughout the course. Effective leadership practice through emphasis on strengths development is the goal of this class.

LDR 303 CONTEMPORARY LEADERSHIP THEORY AND PRACTICE (3 HRS.)

This course examines the major theories, principles, and concepts related to the art and practice of leadership. Multiple contexts of leadership will be analyzed, including self-leadership, one-on-one leadership, team leadership and organizational leadership. Readings, case studies, and activities promote the development of a deeper understanding of the historical, political, social, cultural, psychological and organizational contexts in which leadership occurs. Information presented in the course includes methods of social scientific inquiry through which students assess their individual leadership perspectives and competencies and develop a personal leadership philosophy.

LDR 403 CREATIVITY, INNOVATION, AND INFLUENCE (3 HRS.)

This course empowers leaders to envision and develop new ideas from inception through implementation. Readings and activities engage students in defining and building creativity, critical thinking, and collaboration skills they can use to facilitate innovation in individuals, groups, organizations, and communities.

LDR 433 LEADERSHIP PRACTICUM (3 HRS.)

This course deepens students' capacity for leadership, in addition to concluding the leadership minor by linking leadership practice to leadership theory. Students assume leadership responsibilities with a Trine University or community organization, program, or project in order to gain direct leadership experience and further the mission and goals of the selected organization. Students will set goals, practice and develop skills, reflect on experiences, evaluate actions, discuss lessons learned, and complete assignments. A well-written synthesis paper and a high-quality portfolio presentation are crafted to integrate students' learning about leadership and to provide a post-graduation plan for life-long leadership development. Current and active involvement in a leadership position is required for students in this class.

MATHEMATICS

MA 0304 INDIVIDUALIZED ALGEBRA 4-0-0

(Same as MA 034, for non-traditional students.) This is a non-credit, preparatory class.

MA 034 ELEMENTARY ALGEBRA 4-0-0

Topics include: basic Algebra, signed numbers, polynomial rational expressions, factoring, linear equations, graphs, linear systems. This is a non-credit, preparatory class.

MA 0404 INDIVIDUALIZED INTERMEDIATE ALGEBRA 4-0-0

(Same as MA 044, for non-traditional students.) This is a non-credit, preparatory class.

Prerequisite: Equivalent of high school Algebra I

MA 044 INTERMEDIATE ALGEBRA 4-0-0

Topics include: rational algebraic expressions, exponents, radicals, linear systems, functional notation, graphs. This is a non-credit, preparatory class.

Prerequisite: Adequate SAT/ACT Mathematics score.

MA 103 BUSINESS ALGEBRA 3-0-3

This course emphasizes the business applications of the following: rational algebraic expressions, quadratic equations, linear systems, synthetic division, determinants, exponents, radicals, and logarithms. **Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.**

MA 113 COLLEGE ALGEBRA 3-0-3

Topics include: rational algebraic expressions, quadratic equations, non-linear systems, partial fractions, binomial expansion, synthetic division, determinants, exponents, radicals, logarithms.

Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 123 TRIGONOMETRY 3-0-3

Topics include: Trigonometric functions, identities, inverses, unit circle, solutions of triangles, trigonometric equations, complex numbers, radian measure, angular velocity.

Prerequisite: Adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 124 PRE CALCULUS 4-0-4

Topics include: review of algebraic expressions, linear systems, partial fractions, synthetic division, matrices, slope, fractional exponents, exponential and logarithmic relations, Trigonometric functions, identities, inverses, vectors, polar coordinates, conic sections, summation notation, and elementary series.

Prerequisite: Three years of high school mathematics and adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 134 CALCULUS I 4-0-4

Topics include: limits, continuity, differentiation, applications, definition of the integral, and fundamental theorem of integral calculus. Uses symbolic algebra software.

Prerequisite: Three years of high school mathematics, including trigonometry, and adequate SAT/ACT Mathematics score or approval from mathematics department chair.

MA 153 FINITE MATHEMATICS 3-0-3

Topics include: set operations, introduction to logic, mathematics of finance, introduction to probability and statistics. Not open to engineering/science majors.

Prerequisite: Two years of high school mathematics

MA 164 CALCULUS II 4-0-4

Topics include: applications of integration, differentiation, and integration of transcendental functions and methods of integration, L'Hopital's rule, conic sections, parametric equations, polar coordinates, infinite series. Uses symbolic algebra software.

Prerequisite: "C" or better for MA 134 or equivalent

MA 173 APPLIED MATHEMATICS 3-0-3

Topics include: Mathematics of finance, graphical solution of linear programming problems, introduction to differential and integral calculus with applications.

Prerequisite: MA 103 or MA 113

MA 184 MATHEMATICS FOR ELEMENTARY TEACHERS I 4-0-4

Topics include: numeration systems, set theoretic development of whole number system, decimals, percent's, ratios, elementary number theory, elementary algebra, problem solving techniques. Designed specifically for elementary and middle school curricula emphasizing NCTM standards.

MA 194 MATHEMATICS FOR ELEMENTARY TEACHERS II 4-0-4

Topics include: linear, angular, area, and volume measure. Metric system, congruence, and similarity in geometric figures, probability, and statistics. Designed specifically for elementary and middle school curricula emphasizing NCTM standards.

Prerequisite: MA 184

MA 203 DISCRETE MATHEMATICS FOR INFORMATION SCIENCES 3-0-3

An introduction to methods of analytical, abstract and critical thinking, deductive reasoning, and logical and mathematical tools used in information sciences. The topics include propositional and predicate logic, natural deduction proof system, sets, functions and relations, proof methods in mathematics, mathematical induction and finite state machines.

Prerequisites: MA 103 or MA 113

MA 213 CALCULUS III 3-0-3

Topics include: Calculus of several variables, algebra and calculus of vectors, partial differentiation, directional derivative, multiple integrals, applications. Uses symbolic algebra software.

Prerequisite: "C" or better in MA 164 or equivalent

MA 233 DIFFERENTIAL EQUATIONS 3-0-3

Topics include: methods of solution for first and higher order differential equations, systems of ordinary differential equations, Laplace transforms, series solutions. **Prerequisite: MA 213**

MA 253 STATISTICS 3-0-3

Topics include: laws of probability, frequency distributions, sampling, expectation and variance, normal and sampling distributions, hypothesis testing, least squares, point, and interval estimates of parameters. Not open to engineering/ science majors.

Prerequisites: MA 103 or MA 113

MA 303 COLLEGE GEOMETRY 3-0-3

Topics include: axiomatic development of Euclidean geometry, constructions, geometric transformations, introduction to non-Euclidean geometry. **Prerequisite: MA 164**

MA 312 HISTORICAL ASPECTS OF MATHEMATICS 2-0-2

Topics include: chronologically explore significant results in mathematics. Perspective from different cultures considered. Selected topics vary from numeration systems to algebra, geometry, probability, and calculus. **Prerequisite: MA 213**

MA 313 LINEAR ALGEBRA 3-0-3

Topics include: vectors spaces, determinants, subspaces, bases, transformations, and mappings. Theory and applications of matrix algebra. **Prerequisite: MA 213**

MA 323 OPERATIONS RESEARCH 3-0-3

Topics include: computer solution of mathematical models for decision making. Linear, dynamic and integer programming, critical path scheduling, queuing theory, game theory, resource allocation.

Prerequisites: INF 132 or CS 1113; MA 253 or MA 393

MA 333 NUMBER THEORY 3-0-3

Topics include: divisibility, prime numbers, Euclid's algorithm, linear congruences, quadratic residues. Numerical functions, factorization, Fibonacci numbers, Diophantine equations, applications, puzzles. **Prerequisite: MA 164**

MA 343 SETS AND LOGIC 3-0-3

Topics include: sets, set operations, methods of proof, induction, truth tables, relations, symbolic logic, real number system considerations, elementary combinatorics. **Prerequisite: MA 164**

MA 353 VECTOR ANALYSIS 3-0-3

Topics include: algebra and calculus of vectors, dot and cross products, Green's and Stokes' Theorems, gradient, divergence, and curl of a vector field. **Prerequisite: MA 213**

MA 363 ADVANCED DIFFERENTIAL EQUATIONS 3-0-3

Topics include: Bessel and Legendre equations, eigenvalue problems, Sturm-Liouville theory, existence and uniqueness theorems for linear and nonlinear equations, stability considerations.

Prerequisite: MA 233

MA 373 ABSTRACT ALGEBRA 3-0-3

A study of fundamental algebraic structures emphasizing groups, rings, integral domains and fields. Homomorphism and isomorphism perspectives. **Prerequisite: MA 313**

MA 383 COMPUTER SOLUTIONS TO DIFFERENTIAL EQUATIONS 3-0-3

Numerical techniques for solving both ordinary and partial differential equations. Initial value and boundary valued conditions (Uses Computer.)

Prerequisite: MA 233 and high level programming language

MA 393 PROBABILITY AND STATISTICS 3-0-3

Topics include: finite probability, distributions, data analysis, sampling and sampling distributions, hypothesis tests, regression and correlation analysis, analysis of variance, design of experiments.

Prerequisite: MA 213

MA 403 ADVANCED CALCULUS 3-0-3

A modern topological approach to real analysis. Selected concepts include bounded, open, closed sets, connectedness, completeness and compactness, functions, sequences, limits, continuity, series, differentiation, and integration.

Prerequisite: MA 213 and junior/senior standing

MA 423 COMPLEX VARIABLES 3-0-3

Topics include: complex numbers and functions, analytic functions, Cauchy-Riemann equations, conformal mapping. Cauchy theory, Taylor and Laurent series, calculus of residues, Dirichlet and Neumann problems, Poisson integral formula, and analytic continuation.

Prerequisite: MA 233 and Junior/Senior standing

MA 443 NUMERICAL ANALYSIS 3-0-3

Topics include: numerical solution of algebraic and transcendental equations, numerical differentiation and integration, linear systems, eigenvalues, curve fitting and two dimensional problems. (Uses computer.)

Prerequisite: MA 213

MA 473 GRAPH THEORY AND COMBINATORICS 3-0-3

An introduction to discrete and combinatorial mathematics. Construction and analysis of mathematical models using combinatorics, graph theory and other discrete methods with application in a wide variety of areas.

Prerequisite: MA 213

MA 400X SPECIAL PROBLEMS IN MATHEMATICS (VARIES, 1-3 HRS.)

Selected topics may include, but not limited to, advanced differential equations, modern algebra, boundary-values problems, probability and statistics, topology, transform calculus. Arranged with permission of department chair.

Prerequisite: Senior standing (See Chair for independent study policy)

MECHANICAL & AEROSPACE ENGINEERING

MAE 203 MECHANICAL ENGINEERING ANALYSIS 3-0-3

An introduction to analytical and numerical methods of solving mechanical engineering problems. Programming in MATLAB. An introduction to various topics of mechanical engineering. Lecture focuses on the interrelationship between mathematics, natural sciences, and engineering design.

Prerequisite: MA 134, **Corequisite:** EGR 143

MAE 243 MANUFACTURING PROCESSES AND EQUIPMENT 2-2-3

An examination of commonly used engineering materials and the manufacturing processes and machines used in processing these materials. Demonstrations of: sand molding, metal casting, metal removal processes (turning, milling, drilling, grinding), and deformation processes. Introduction to CNC machining.

Prerequisites: ES 233, **Corequisite** ES 243

MAE 303 MECHANICS OF MACHINERY 3-0-3

Topics include: study of the kinematics and dynamics of mechanisms. Fundamentals of displacement, velocity, and acceleration analysis of rigid bodies as a basis for the study of mechanisms. Motion analysis of linkages, cams, and gearing. Static and inertia force in machines. Balancing of rotating and reciprocating masses. **Prerequisite:** ES 223

MAE 323 THERMODYNAMICS II 3-0-3

Gas power systems: air-standard cycles, gas turbines. Refrigeration and heat pump systems. Non-reacting ideal gas mixtures and psychrometrics. Reacting mixtures and combustion. Compressible flow. **Prerequisite:** ES 313

MAE 333 FLUID MECHANICS II 3-0-3

Topics include: surface resistance, wall shear stress, and boundary layer flow, internal flow, laminar, and turbulent flow in conduits, external flow, drag, and lift, compressible flow, normal shock waves, isentropic flow through nozzles and diffusers. Introduction to turbomachinery. (Through Spring 2013)

Prerequisites: ES 223, ES 313, ES 323, MA 233

MAE 343 MANUFACTURING PROCESSES AND EQUIPMENT 2-2-3

An examination of commonly used engineering materials and the manufacturing processes and machines used in processing these materials. Demonstrations of: sand molding, metal casting, metal removal processes (turning, milling, drilling, grinding), and deformation processes. Introduction to CNC machining. **Prerequisites:** ES 233, ES243

MAE 353 MACHINE COMPONENT DESIGN 3-0-3

Topics include: stress analysis of machine parts, combined stresses, working stress, stress concentration, theory of failure for both static and fatigue loadings, design of machine elements.

Prerequisites: ES 233, ES 243; **Corequisite:** MA 313

MAE 363 INTRODUCTION TO MECHATRONICS 2-2-3

A multidisciplinary, hands-on, project-oriented course studying the use of electronics and microprocessors to control mechanical devices. Students complete a design project in mechatronics. Projects may include building an analog to digital converter, using a transistor H-bridge for motor control, construction of digital logic circuits, use of proximity sensors, and creating music using a microprocessor.

Prerequisite: ES 253 or ECE 223

MAE 363H HONORS INTRO. TO MECHATRONICS 2-2-3

A self-paced, project-oriented course studying the use of electronics and microprocessors to control mechanical devices. Introductory projects include material such as building an analog to digital converter, using a transistor H-bridge for motor control, construction of digital logic circuits, use of proximity sensors, and creating music using a microprocessor. Students are also required to complete a major robotics design project and are encouraged to enter a national competition. **Prerequisite:** ES 253 or ECE 223

MAE 373 COMPUTER-AIDED MACHINE DESIGN 1.5-3-3

Use of computer applications software as a part of the engineering design process. Introduction to the finite element method for stress analysis. Software packages, such as nonlinear solvers, finite element analysis, solid modeling, and kinematic simulation, will be introduced. Design work using these tools will be a major component of the course.

Prerequisites: EGR 143 or MAE 203, ES 243

MAE 383 METALLURGICAL THERMODYNAMICS 3-0-3

Thermodynamic fundamentals and their application to metallurgical processes such as melting, phase transformations, and melt composition control. First and Second Laws in an open system. Property relationships and Maxwell's relations. Physical and chemical equilibrium. Thermodynamic basis of phase diagrams, and metallurgical solution activities. Introduction to statistical thermodynamics. Applications to melt chemistry control and heat treatment processes. **Prerequisites:** ES 233, ES 313

MAE 393 METALLURGICAL TRANSPORT PROCESSES 3-0-3

Topics include: thermal, fluid, and diffusional transport in metallurgical processes, such as cupola melting, AOD vessel operation, electric, and reverberatory furnace chemistry control, steel making, and recovery of secondary aluminum and copper. Application of mathematical models from fluid mechanics, heat transfer, and mass transport to the fluid, thermal, and diffusional aspects of metallurgical processes.

Prerequisite: ES 323 or MAE 3033

MAE 3033 FLUID DYNAMICS FOR MECHANICAL ENGINEERING 3-0-3

Fundamentals of fluid mechanics. Properties, characteristics, parameters, and governing equations of fluid flow in laminar and turbulent regimes.

Prerequisites: ES 223, ES 313, MA 233

MAE 413 THERMO-FLUID COMPONENT DESIGN 3-0-3

Introduction to components for energy transfer including ducts, valves, pumps, fans, compressors, heat exchangers, and burners. Design of piping systems and fluid networks. Analysis of pumps and design of systems including pumps. Design of duct systems. Analysis of fans, blowers, compressors, and design of systems which use them.

Prerequisites: ES 343, MAE 333 or MAE 3033

MAE 423 HEATING, VENTILATING, AND AIR CONDITIONING 3-0-3

Topics include: design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Heat conduction in buildings. Convection and infiltration. Radiation and solar insolation loads. Psychrometry and thermal comfort. Heating and cooling load calculations. Particular attention will be paid to the HVAC needs of industrial firms and commercial installations.

Prerequisites: ES 333 or MAE 3033, MAE 323

MAE 443 ENGINEERING METALLURGY 2-2-3

Physical metallurgy of practical engineering alloys as it relates to processing and mechanical properties. Ferrous alloys and selected non-ferrous alloys are covered. Property measurements and other characterization techniques and their meanings. Phase diagrams, heat treatment and structure-property processing relationships in practical steels, cast irons, and aluminum alloys. Laboratory measurement of properties and microstructure: tensile strength, optical metallography, impact toughness, statistical nature of strength, plastic strain anisotropy in sheet metal. **Prerequisite:** ES 233

MAE 453 MECHANICAL VIBRATION 3-0-3

Introduction to vibration theory and analysis. Undamped, damped, free and forced vibration of single degree-of-freedom mechanical systems. Transient vibration and response to nonperiodic excitation. Vibration of two degree-of-freedom systems without damping. Vibration isolation and vibration absorbers. **Prerequisites:** MA 233, MAE 303

MAE 463 MEASUREMENT LABORATORY 1-4-3

Principles of dimensional measurement and the measurement of deflection, stress, strain, and vibration. Transducer theory and signal conditioning. Use of computer data acquisition and signal analysis. Analysis of experimental error and construction of test plans. Laboratory work leading to an experimental project. **Prerequisites:** ES 253, MA 393, MAE 353

MAE 473 APPLIED AERODYNAMICS 3-0-3

Properties of the atmosphere. Aerodynamic coefficients and their dependence on Reynolds number and Mach number. Aerodynamics of airfoils, wings, and complete aircraft. Performance analysis of aerospace vehicles in atmospheric flight: range, endurance, climb, descent, takeoff, and landing.

Prerequisites: ES 223, MAE 333 or MAE 3033 and MAE 323

MAE 483 VEHICLE STRUCTURES 3-0-3

Introduction to the design of minimum weight structures. Design of members in tension, bending, or torsion. Design of compression members. The concept of shear flow and its use in analyzing monocoque and semi-monocoque structures. **Prerequisites:** MAE 353

MAE 493 AERODYNAMICS LABORATORY 1-4-3

Introduction to subsonic and supersonic wind tunnel testing. Wind tunnel characteristics and data acquisition systems. Measurements of lift, drag, moments, with corresponding data reduction and aerodynamic coefficients. Turbulence factor, Reynolds and Strouhal number calculations. Airfoil, aircraft, and vehicle investigations. Supersonic measurements, including total and static pressures, Mach number, and shock angles. Engineering laboratory reports are required for each investigation. Team wind tunnel project and report is required. **Prerequisite:** MAE 473

MAE 400X SPECIAL PROBLEMS IN MECHANICAL ENGINEERING VARIES (1-6 HRS)

Independent study of special topics of particular interest in mechanical engineering. Course may be taken more than once with a maximum of six credit hours.

Prerequisite: Permission of Department Chair

MAE 4023 SYSTEM DYNAMICS AND CONTROLS 2-2-3

Analysis of dynamic systems using free body diagrams, equation of motion, differential equations, and transfer functions. Introduction to Laplace transforms and solving for time history of dynamic systems. Experimental verification of analytical solutions. Analysis of hydraulic, thermal, and electrical systems. Analysis of first, second, and higher order systems, and analysis of effect of proportional, integral and derivative controls. Experimental verification of PID control analysis, time permitting. **Prerequisites:** ES 223, MA 233

MAE 4053 MECHANICAL ENGINEERING DESIGN I 2-2-3

Introduction to design methodology and practice. Product specifications. Concept generation and selection. Product design. Design for manufacturing. Economics of product development. Prototyping. Teams of students work on a design project in the area of mechanical engineering. Design project work will continue in MAE 4063.

Prerequisites: MAE 303, MAE 353, MAE 373, ES 313

MAE 4063 MECHANICAL ENGINEERING DESIGN II 1-4-3

Conclusion of mechanical engineering design project. Preparation of a formal written design report and oral presentation of the design. Course must be taken the semester immediately following MAE 4053. **Prerequisite:** MAE 4053

MAE 4073 SYSTEM DYNAMICS AND CONTROLS 3-0-3

The development of linear models in terms of state-variable equations, input-output differential equations, and transfer functions. The introduction of both time-domain solutions and Laplace transforms. The development of time constants, damping ratios, transfer functions, poles and zeros, mode functions, and frequency-response functions. The application of feedback modeling and design tools including: root-locus diagrams, Bode plots, and PID control. Co-listing MAE 5473 as an undergraduate elective course. **Prerequisite:** MAE 4053, ES 223

MAE 4123 POWER GENERATION 3-0-3

Topics include: design of a power plant to meet specified energy demand. Selection and/or synthesis of principal components and pollution control equipment. Performance optimization, instrumentation, and control. **Prerequisite:** MAE 323

MAE 4133 INTERNAL COMBUSTION ENGINES 3-0-3

Introduction to internal combustion engines. A study of gas cycles and combustion thermodynamics. Analysis of overall engine performance characteristics, heat and mass transfer, friction, and emissions. **Prerequisite: MAE 323, MAE 333 or MAE 3033, ES 343**

MAE 4143 PHYSICAL METALLURGY 2-2-3

Course explores the underlying structure-property relationships of metals. Topics include: thermodynamics and kinetics of phase transformations, diffusion, dislocation behavior, strengthening mechanisms, fracture mechanisms, crystallography, creep, and fatigue behavior. Laboratory work in fractography, scanning electron microscopy, fracture, tensile properties, and metallography. **Prerequisite: MAE 443 or grade of "C" or better in ES 233**

MAE 4173 GAS TURBINES 3-0-3

Topics include: basic theory of gas turbine engines. Study of the aerothermodynamics of propulsion, component characteristics, overall engine performance, and introduction to engine design.

Prerequisites: MAE 333 or MAE 3033 and MAE 323

MAE 4183 AIRCRAFT STABILITY AND CONTROL 3-0-3

The linearized equations of motion for atmospheric flight are developed. Longitudinal and lateral motions of the airplane are studied with particular emphasis on the phugoid, short-period, dutch-roll, and spiral motions. Static stability and control requirements for airplane design are considered. **Prerequisite: MA 233, MAE 473**

MAE 4193 METAL CASTING 2-2-3

This course covers the casting process from the perspective of engineering design. Tooling design for casting processes, melt quality control, heat transfer and fluid mechanics applications in casting, dynamics of mold interaction with the cast metal. Commercial software applications are included in solidification modeling and melt chemistry control.

Prerequisite: MAE 343 or consent of instructor

MAE 500X SPECIAL TOPICS

Topic(s) to be jointed selected by the student(s) and the instructor. May be retaken for credit if the topic is substantially different.

Prerequisite: Graduate standing or consent of department chair.

MAE 5213 ADVANCED HEAT TRANSFER 3-0-3

Analytical and numerical methods in steady and unsteady conduction and convection. Convection with phase change. Use of commercial software for numerical analysis of heat transfer problems. As time permits, radiation heat transfer and mass transfer.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5223 INTRODUCTION TO COMPUTATIONAL FLUID MECHANICS 3-0-3

Fluid kinematics, integral analysis of the conservation equations. Differential analysis of fluid flow. Approximate solution of the Navier-Stokes equations. Introduction to computational fluid dynamics (CFD). Laminar CFD calculations. Turbulent CFD calculations. CFD with heat transfer.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5433 MECHANISM SYNTHESIS 3-0-3

Analytical synthesis of planar linkages for function, path and motion generation. Dynamic analysis of joint forces in planar mechanisms. Synthesis of rigid and compliant cam and follower systems.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5473 SYSTEM DYNAMICS AND CONTROL 3-0-3

The development of linear models in terms of state-variable equations, input-output differential equations, and transfer functions. The introduction of both time-domain solutions and Laplace transforms. The development of time constants, damping ratios, transfer functions, poles and zeros, mode functions, and frequency-response functions. The application of feedback modeling and design tools including root-locus diagrams, Bode plots, and PID control.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5543 ADVANCED MACHINE DESIGN 3-0-3

Design of machine elements with an emphasis on uncertainty. Statistical descriptions of material properties. Limits and fits, dimensions and tolerances, and the propagation of error. Effect of uncertainty in theories of failure for both static and fatigue loading. Design for reliability. Application to selected machine elements.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5583 DESIGN OF EXPERIMENTS 3-0-3

Design and statistical analysis of engineering experiments with a focus on process optimization and robust product design. Single factor and multi-factor experimental design and analysis. Taguchi methods are discussed including the application of signal-to-noise ratio, and orthogonal arrays.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5663 MATERIALS FAILURE ANALYSIS 3-0-3

A study of the mechanisms of materials failure, failure analysis techniques, and non-destructive testing methods. Emphasis is placed on the analysis and interpretation of case studies. Fracture mechanics, fatigue, environmental influences, and manufacturing influences on failure are all addressed. Practical laboratory work with the scanning electron microscope and with optical microscopes serves to illustrate and reinforce key concepts in fractography.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 5753 COMPUTER INTEGRATED MANUFACTURING 3-0-3

Computer-assisted process planning and estimating. Concepts of computer control and feedback mechanisms. Design considerations for machine tools, machining cells, robotics, and flexible manufacturing systems.

Prerequisite: Graduate standing in mechanical engineering or consent of instructor

MAE 600X MECHANICAL ENGINEERING GRADUATE PROJECT (VARIES 1-6 HRS.)

A design or capstone project, with industrial or real-world application, producing all necessary and appropriate documentation, and if applicable, models, and prototypes. The project should entail a minimum of 3 hours of work per week per credit hour. Students should choose the number of credits each semester based on the amount of time they expect to spend on the project. **Prerequisite: Graduate standing in Mechanical Engineering or consent of department chair.**

MANAGEMENT

MGT 313 HUMAN RESOURCES MANAGEMENT 3-0-3

This course includes a discussion of policies, objectives, principles and organizational structure as they pertain to personnel work. The major activities of a personnel department such as recruiting, selecting, training, and employee relations are examined along with the impact of government laws and regulations on these activities. **Prerequisite: Junior standing or permission of instructor**

MGT 333 SUPERVISION 3-0-3

This course is intended for people who are, or plan to be, first line supervisors. Its purpose is to present basic principles that will assist in developing the talent needed to direct other people. Skill building cases and incidents are part of the course content. **Prerequisite: MGT 363**

MGT 343 HUMAN RESOURCE DEVELOPMENT 3-0-3

This course is a study of processes, methods, theories, and current practices in training and staff development in business and organizational settings. The course focuses on practices that facilitate learning and change to achieve organizational objectives.

Prerequisite: Junior standing or permission of instructor

MGT 353 DESIGNING OPERATIONS 3-0-3

This course examines the central concepts of designing operations in both manufacturing and service enterprises. Topics include process strategy, location and layout strategy, job design, quality management, planning, productivity, and the design of goods and services.

Prerequisites: MA 173 or permission of instructor

MGT 363 ORGANIZATIONAL BEHAVIOR 3-0-3

This course examines the manager's role in dealing with behavior at all organizational levels. It emphasizes the need for interpersonal and group skills. Applications of behavioral science concepts and findings to organizational situations are included. Topics include motivation, communications, leadership, conflict, and change.

Prerequisites: COM 213, PSY 113, or permission of instructor

MGT 413 MANAGEMENT OF QUALITY 3-0-3

This course examines principles of quality management and continuous improvement in manufacturing and services enterprises. The focus is on using key quality tools, including statistical process control, pareto charts, flow charts, cause-effect diagrams, etc.

Prerequisite: MGT 353, MA 253, or permission of instructor

MGT 443 MANAGING OPERATIONS 3-0-3

This course examines contemporary operations management principles and practices. Topics include project management, inventory management, aggregate planning, supply chain management, materials requirement planning, lean manufacturing, and just-in-time principles.

Prerequisite: MGT 353 and MA 253 or permission of instructor

MGT 453 STRATEGIC MANAGEMENT 3-0-3

This course requires a knowledge of all functional areas of business. It integrates these areas through analysis of case histories and related readings. Class discussion, presentations and written reports are used extensively. This course is the capstone business course and should be taken the last semester before graduation.

Prerequisite: Completion of all business core courses or permission of the dean of the Ketner School of Business

MGT 463 SMALL BUSINESS MANAGEMENT 3-0-3

This course examines the preparatory steps necessary to launch a small business enterprise, as well as manage the everyday complexities of cash flow, marketing, staffing, pricing, purchasing, and advertising. Its purpose is to present the many competencies needed to operate a small business successfully in the competitive environment of the 21st century. Case analysis and personal interviews are the primary integral components of the course content.

Prerequisites: AC 213, MK 303, FIN 303, MGT 353, MGT 363

MGT 523 COMMUNICATIONS, LEADERSHIP AND ETHICS 3-0-3

This course examines leadership, influence, and power across a variety of disciplines with a strong emphasis on ethics. Historical, literary, and contemporary examples of successful leadership provide a framework for examining the theories and practice of leadership and power. This course requires substantial advanced critical thinking and writing.

Prerequisite: Graduate standing

MGT 543 OPERATIONS STRATEGY AND MANAGEMENT 3-0-3

This course examines the central role of operations in both manufacturing and service enterprises. Topics include quality management, design of goods and services, layout, scheduling, project management, inventory management, supply chain management, and purchasing activities within the firm.

Prerequisite: Graduate standing

MARKETING

MK 303 MARKETING 3-0-3

The marketing activities necessary to provide goods and services to target customers are examined, as well as the role marketing plays in the social and economic system. The marketing variables of product, promotion, placement, and price are considered in the context of strategic planning, implementation, and control.

Prerequisite: Junior standing or permission of instructor

MK 313 RETAIL MANAGEMENT 3-0-3

This is the study of the role of retailing in the domestic and international marketing process. A functional approach is taken in the study of retailing topics of placement, promotion, pricing, inventory control. Also examined are the consumer purchasing behavior and lifestyle profiles to understand growth of nontraditional channels.

Prerequisite: Junior standing or permission of instructor

MK 323 INTEGRATED MARKETING COMMUNICATIONS 3-0-3

The integrated approach to marketing communications is emphasized. Advertising, sales promotion, database/direct marketing, public relations, sponsorship/event marketing, support media, trade promotions, internet marketing, personal selling, and their coordination through a common brand and theme are investigated.

Prerequisite: Junior standing or permission of the instructor

MK 343 INTERNATIONAL MARKETING 3-0-3

This course provides a detailed examination into the principles and practices of international marketing as it applies to today's global economy. In-depth studies and analysis will be made of trade and commercial policies and practices, as well as international product adaptation, promotion, distribution, and pricing strategies. The student will examine the international marketing manager's role in the development of an export marketing program.

Prerequisites: BA 343, MK 303 or permission of the instructor

MK 363 BUYER BEHAVIOR 3-0-3

Studies in this course include consumer and organizational buying behavior, as well as determinants of this behavior. Consumer characteristics, including attitudes and behaviors, processing of information, as well as consumer cultural, psychological and communication theories are also studied. Course also examines industrial perspectives; the unique aspects of organizational markets and how they differ from individual consumer behavior.

Prerequisite: Junior standing or permission of instructor (same as PSY 363)

MK 423 PERSONAL SELLING 3-0-3

This course examines the impact of personal selling in today's competitive marketplace. Topics examined are motivation, account selection, compensation, seller's role in the economy, and personality variables.

Prerequisite: Junior standing or permission of the instructor

MK 433 MARKETING MANAGEMENT 3-0-3

This is the study of the planning, implementation, and outcomes of a firm's marketing program. Content will focus on identification, analysis, and reviews of internal/external factors associated with marketing policies and programs. **Prerequisite:** MK 303

MK 463 MARKETING RESEARCH 3-0-3

This is the study of techniques and approaches associated with researching marketing topics. It includes consumer research, market analysis, product research, advertising research, and sales analysis.

Prerequisites: MK 303 or permission of the instructor

MK 473 E-MARKETING 3-0-3

Electronic technologies are applied to the functions of marketing which are product, price, placement, and promotion. E-marketing transforms traditional business using new models that add customer value and increase profitability. The outcome of the course will be the creation of an E-marketing plan.

Prerequisites: Junior standing or permission of the instructor

MK 483 SENIOR SEMINAR IN MARKETING 3-0-3

This is an integrative capstone course which brings together all the functional areas of marketing. The focus is on decision-making and problems in marketing strategy. Students will study marketing considerations and responses to changes in the customer, legal, trade, technological and regulatory environments. This course includes the preparation and organization of a comprehensive marketing plan.

Prerequisite: Senior Marketing Major or Minor in Marketing having completed most of the required marketing courses

MK 493 SPECIAL TOPICS IN MARKETING 3-0-3

Offered to treat specific or current marketing issues in depth.

Prerequisite: Junior standing or permission of the instructor

MK 503 STRATEGIC MARKETING MANAGEMENT 3-0-3

This course examines the collective marketing activities (pricing, promotion, placement, product) as they relate to the target market. The strategic planning process and how it relates to the overall profitability of the marketing department and a corporate structure will be studied.

Prerequisite: Graduate standing

MUSIC

MUS 111 PIANO LAB 0-1-1

Designed to provide students with little or no piano background fundamentals of keyboard and musicianship on the piano.

MUS 113 MUSIC THEORY I 3-0-3

A study of basic music theory concepts including notation of pitch, rhythm and meter, scales, keys and key signatures, intervals, triads and seventh chords.

MUS 123 MUSIC HISTORY AND LITERATURE I 3-0-3

The study of composers, styles and literature and their influence on music in western culture from the Medieval period through the Baroque period.

MUS 1011 APPLIED STUDIES 0-1-1

Designed to provide the students with private instruction on his or her principal instrument, voice or secondary instrument. The student will develop greater facility and technique along with enhanced musicianship and a better understanding of performing at a high level of competency.

MUS 1110 PERCUSSION ENSEMBLE 0-1-0

Percussion Ensemble is for musicians who are interested in improving their skills in percussion performances and performing in an ensemble designed specifically for percussion instruments. This ensemble is open to all students regardless of experience in percussion performance.

MUS 1111 PERCUSSION ENSEMBLE 0-1-1

Percussion Ensemble is for musicians who are interested in improving their skills in percussion performances and performing in an ensemble designed specifically for percussion instruments. This ensemble is open to all students regardless of experience in percussion performance.

MUS 1120 BRASS ENSEMBLE 0-1-0

Brass Ensemble is open to all students and community members who play brasswind instruments. The ensemble will perform a variety of music and can accommodate diverse brass instrumentation.

Prerequisite: Players must have prior playing experience on their instrument and at least moderate music reading skills. Players of small brass instruments must provide their own instrument in good working order. Larger instruments may be available from the University.

MUS 1121 BRASS ENSEMBLE 0-1-1

Brass Ensemble is open to all students and community members who play brasswind instruments. The ensemble will perform a variety of music and can accommodate diverse brass instrumentation.

Prerequisite: Players must have prior playing experience on their instrument and at least moderate music reading skills. Players of small brass instruments must provide their own instrument in good working order. Larger instruments may be available from the University.

MUS 1130 CHORAL CONCOURSE 0-1-0

The Choral Concourse is a large, mixed, vocal ensemble that will meet one evening a week and consist of Trine University students and community members. This ensemble will perform a variety of music and provide students and community members a secular vocal ensemble that rehearses in the evening.

Prerequisite: General knowledge of reading music and singing ability.

MUS 1131 CHORAL CONCOURSE 0-1-1

The Choral Concourse is a large, mixed, vocal ensemble that will meet one evening a week and consist of Trine University students and community members. This ensemble will perform a variety of music and provide students and community members a secular vocal ensemble that rehearses in the evening,

Prerequisite: General knowledge of reading music and singing ability.

MUS 1140 CHAMBER ORCHESTRA 0-1-0

The Chamber Orchestra is a performance ensemble designed for in-depth study, preparation and performance of all types of chamber orchestra literature. The Chamber Orchestra will play a mixture of string orchestra and full orchestra music. The ensemble performs at concerts and special events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1141 CHAMBER ORCHESTRA 0-1-1

The Chamber Orchestra is a performance ensemble designed for in-depth study, preparation and performance of all types of chamber orchestra literature. The Chamber Orchestra will play a mixture of string orchestra and full orchestra music. The ensemble performs at concerts and special events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1150 MARCHING BAND 0-1-0

The Marching Band is a performing ensemble designed to bring excitement and enthusiasm to Thunder football games and other special events and to offer the students of Trine University the opportunity to perform in a collegiate marching band with all of its spectacle and showmanship.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1151 MARCHING BAND 0-1-1

The Marching Band is a performing ensemble designed to bring excitement and enthusiasm to Thunder football games and other special events and to offer the students of Trine University the opportunity to perform in a collegiate marching band with all of its spectacle and showmanship.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1160 WIND ENSEMBLE/PEP BAND 0-1-0

Wind Ensemble/Pep Band is a performance ensemble designed for in-depth study, preparation and performance of all types of standard band literature. The ensemble performs at concerts and athletic events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1161 WIND ENSEMBLE/PEP BAND 0-1-1

Wind Ensemble/Pep Band is a performance ensemble designed for in-depth study, preparation and performance of all types of standard band literature. The ensemble performs at concerts and athletic events. Open to all university students.

Prerequisite: Previous experience in an instrumental ensemble is preferred.

MUS 1170 UNIVERSITY CHOIR 0-1-0

University Choir is a performance ensemble which offers students the opportunity to sing the finest choral music. Open to all university students.

Prerequisite: General knowledge of reading music and singing ability.

MUS 1171 UNIVERSITY CHOIR 0-1-1

University Choir is a performance ensemble which offers students the opportunity to sing the finest choral music. Open to all university students

Prerequisite: General knowledge of reading music and singing ability.

MUS 1180 JAZZ BAND 0-1-0

Jazz Band is a performance ensemble, designed for in-depth study, preparation and performance of all types of jazz band literature from swing to Latin, rock, fusion, etc. The ensemble performs at concerts and special events. Open to all university students. (May be taken multiple times.)

MUS 1181 JAZZ BAND 0-1-1

Jazz Band is a performance ensemble, designed for in-depth study, preparation and performance of all types of jazz band literature from swing to Latin, rock, fusion, etc. The ensemble performs at concerts and special events. Open to all university students. (May be taken multiple times.)

MUS 1190 JAZZ/SHOW CHOIR 0-3-0

The Jazz/Show Choir is a small audition vocal ensemble for experienced vocal musicians with good skills in sight reading, part reading, movement, and vocal production. As the name indicates, this ensemble performs music in the jazz and show genre.

Prerequisite: Students must audition with class instructor and other music faculty

MUS 1191 JAZZ/SHOW CHOIR 0-3-1

The Jazz/Show Choir is a small audition vocal ensemble for experienced vocal musicians with good skills in sight reading, part reading, movement, and vocal production. As the name indicates, this ensemble performs music in the jazz and show genre.

Prerequisite: Students must audition with class instructor and other music faculty

MUS 1200 MUSICAL THEATER/OPERA ENSEMBLE 0-3-0

This auditioned ensemble allows the singer to not only improve musical skills but also to develop sound stage movement and performance. This small ensemble uses mainstream musicals and operas as the primary source of literature and performs key scenes form the works.

MUS 1201 MUSICAL THEATER/OPERA ENSEMBLE 0-3-1

This auditioned ensemble allows the singer to not only improve musical skills but also to develop sound stage movement and performance. This small ensemble uses mainstream musicals and operas as the primary source of literature and performs key scenes form the works.

MUS 213 MUSIC THEORY II 3-0-3

The study of music theory and concepts including advanced four part writing, analysis, score study, and listening.

Prerequisite: MUS 113

MUS 223 MUSIC HISTORY AND LITERATURE II 3-0-3

The study of composers, styles and literature and their influence on music in western culture from the Classic period through the Contemporary.

MUS 253 BEGINNING CONDUCTING 3-0-3

The principals of baton technique. The student will develop a fluent and expressive beat style and rhythmic and aural facilities essential to successful instrumental and choral direction.

MUS 272 MUSIC APPRECIATION 2-0-2

An introduction to the heritage of music culture of the Western world, including musical styles of the past and styles and forms of contemporary music literature. Previous music training not a prerequisite.

PHYSICS

PH 104 PHYSICAL SCIENCE 3-2-4

A development of basic concepts and theories in the physical sciences and physics. Conceptual view of mechanics, thermodynamics, sound waves, electricity, magnetism, and optics.

PH 154 COLLEGE PHYSICS I 3-2-4

An algebra-based introduction to the concept and application of Newton's Law, linear and rotational motion, work, energy, and momentum, solids and fluids, heat, vibrations, waves and sounds. Experimental investigation of selected topics.

Prerequisites: MA 113, MA 123

PH 164 COLLEGE PHYSICS II 3-2-4

An algebra-based introduction to the concept and application of Coulomb's Law, capacitance, DC electric circuits, magnetism, electromagnetic induction, optics and optical instruments, and relativity and quantum physics. Experimental investigation of selected topics.

Prerequisites: PH 154

PH 224 UNIVERSITY PHYSICS I 3-2-4

Underlying principles of measurement, vectors, translatory, rotary, uniform, circular, and harmonic motion, work, power, energy, and physical properties of liquids, solids, gases, and statics. Also the fundamentals of heat: thermometry, expansion of liquids, solids and gases, calorimetry, heat transfer, elementary thermodynamics, and fluids. Experimental investigation of selected topics.

Prerequisite: MA 134

PH 224H HONORS UNIVERSITY PHYSICS I 3-2-4

Topics covered include measurement, kinematics and dynamics of translational motion, kinematics and dynamics of rotational motion, momentum, work, mechanical energy, power, statics, properties of solids, and thermodynamics. Emphasis is on collaborative learning and inquiry as opposed to traditional lecture. Assignments include additional analysis, research methods. Students complete a research project. Experimental investigation of selected topics.

Prerequisites: MA 134 and admission to the Honors Program or permission of the instructor.

PH 234 UNIVERSITY PHYSICS II 3-2-4

Study of vibrations and wave motion: different types of simple harmonic motion, sound. Also the fundamentals of electric fields, Gauss's Law, electric potential, capacitance, magnetism, direct, and alternating currents and circuits. Electromagnetic wave propagation and optics. Experimental investigation of selected topics.

Prerequisites: MA 164, PH 224

PH 234H HONORS UNIVERSITY PHYSICS II 3-2-4

Topics covered include oscillatory motion, wave motion, electrostatics, DC and AC circuits, magnetostatics, electromagnetism, and optics. Emphasis is on collaborative learning and inquiry as opposed to traditional lecture. Assignments include additional analysis, research methods. Students complete a research project. Experimental investigation of selected topics.

Prerequisites: PH 224, MA 164 and admission to the Honors Program or permission of the instructor.

PH 303 INTRODUCTION TO MODERN PHYSICS 3-0-3

Introduction to contemporary atomic and nuclear physics: special theory of relativity, particle properties of waves, wave properties of particles, atomic structure, first ideas of quantum mechanics.

Prerequisites: MA 233, PH 234

PH 323 ELECTROMAGNETISM 3-0-3

A study of electrostatics, special techniques for calculating potentials, electrostatic fields in matter, magnetostatic fields in matter, and Maxwell's equations.

Prerequisites: MA 233, PH 224, PH 234

PH 333 MECHANICS 3-0-3

The topics will be chosen based on the students' backgrounds from the following: fundamental laws of mechanics of particles and rigid body including vibrations and Lagrangian mechanics.

Prerequisites: MA 233, PH 234

PH 343 MATHEMATICAL METHODS IN PHYSICS 3-0-3

Emphasis on physics applications from the following topics: partial differential equations of mathematical physics. Orthogonal functions. Fourier series.

Prerequisites: MA 233, PH 234

PH 400X SPECIAL TOPICS IN PHYSICS VARIES (1-6 HRS.)

Selected fields of physics chosen for their mathematical, philosophical or technological interest. May be repeated with the approval of the Department Chair for a maximum of 6 credit hours.

Prerequisite: Permission of Department Chair

PHILOSOPHY

PHL 203 INTRODUCTION TO PHILOSOPHY 3-0-3

A study of the perennial problems of philosophy, such as the nature of knowledge, the role of the self, the existence of God, and the function of science. The contributions of the great thinkers of history to these problems are presented so that the student may find aid in forming his or her own philosophy.

PHL 251 ANCIENT GREECE FROM THE PERSIAN THROUGH PELOPONNESIAN WARS 1-0-1

An examination of the culture of Athens and Sparta during the 5th century B.C., concentrating on the Persian and Peloponnesian wars and their lasting effects on Western Civilization. (Same as HIS 251)

PHL 313 ETHICS 3-0-3

A study of ethical language, methods of justifying ethical decisions, and types of ethical value systems, with emphasis on practical applications in terms of personal and social morality.

Prerequisite: Junior standing or permission of instructor

PHL 323 PHILOSOPHY OF RELIGION 3-0-3

An inquiry into the nature of religious experience, activity and belief. An examination of the concepts of God, freedom, and immortality as well as the relationship of religious knowledge to artistic and scientific knowledge. **Prerequisite: Junior standing or permission of instructor**

PHL 333 ART, TECHNOLOGY AND SOCIETY 3-0-3

An interdisciplinary effort to place modern technology within a social, cultural, and historical context. **Prerequisite: ENG 113 or ENG 133 (Same as SOC 333)**

PHL 343 LOGIC 3-0-3

An examination of the function of language and the nature of meanings. Valid and invalid reasoning, deductive and inductive methods. Particular emphasis will be given to the application of formal techniques to the evaluation of arguments in everyday settings. The course is argument and language oriented. **Prerequisite: Junior standing or permission of instructor**

PRE-LEGAL STUDIES

PL 4003 LEGAL CAPSTONE EXPERIENCE (3 HRS.)

The legal capstone experience will provide the opportunity to utilize the skills and knowledge the student has attained in their previous coursework in a concerted effort to prepare for and gain law school admission. **Prerequisite: Junior standing or permission of instructor**

PSYCHOLOGY

PSY 113 PRINCIPLES OF PSYCHOLOGY 3-0-3

Introduction to the scientific study of human and animal behavior. Course covers all of the major areas within psychology, including development, learning, intelligence, personality, attitudes, altered states of consciousness, abnormal behavior, and psychotherapy.

PSY 113H HONORS PRINCIPLES OF PSYCHOLOGY 3-0-3

Introduction to the scientific study of human and animal behavior. Course covers all of the major areas within psychology, including development, learning, intelligence, personality, attitudes, altered states of consciousness, abnormal behavior, and psychotherapy. The course will involve more in-depth analysis of selected topics as well as more classroom activities than usually covered.

Prerequisite: Admission into the Honors Program or permission of the instructor

PSY 303 RESEARCH METHODS IN PSYCHOLOGY 3-0-3

An introduction to research methods employed in psychology, with special emphasis on experimental design. Topics include between and within-subjects designs, quasi-experimental designs, as well as research ethics and procedures for controlling extraneous variables.

Prerequisite: PSY 113

PSY 313 TOPICS IN PSYCHOLOGY 3-0-3

Survey, in detail, of one of the major areas of study within psychology. The course changes each semester with the specific topic of study announced in the class schedule.

Prerequisite: PSY 113

PSY 323 ABNORMAL PSYCHOLOGY 3-0-3

Survey of abnormal psychology, including such topics as clinical assessment, anxiety disorders, schizophrenia, personality disorders, age-related problems, depression, sexual dysfunctions, psychotherapy, and related legal and ethical questions arising within clinical psychology.

Prerequisite: PSY 113

PSY 333 PSYCHOLOGY OF PERSONALITY 3-0-3

An introductory survey of problems, methods, and theories; personality development and motivation, with emphasis on the normal contemporary theories of adjustment and idiodynamics.

Prerequisite: PSY 113

PSY 343 SOCIAL PSYCHOLOGY 3-0-3

An introduction to the measurement and principles of human interaction and group behavior including attitude change, prejudice, attraction, love, altruism, aggression, conformity, group dynamics, crowding, and other current social issues.

Prerequisite: PSY 113 (Same as SOC 343)

PSY 353 CHILD AND ADOLESCENT PSYCHOLOGY 3-0-3

An investigation into the development stages within the life of a human being, from birth through adolescence, with emphasis on the origin of personality and factors related to intellectual growth.

Prerequisite: PSY 113

PSY 373 POLITICAL PSYCHOLOGY 3-0-3

An examination of the role of group dynamics and personality variables in contemporary political issues, including leadership and power, political attitudes, current social movements, conflict resolution, coalition formation, cross-cultural comparisons of political attitudes, and other issues.

Prerequisites: GOV 113 or PSY 113 (Same as GOV 373)

PSY 363 BUYER BEHAVIOR 3-0-3

Studies in this course include consumer and organizational buying behavior, as well as determinants of this behavior. Consumer characteristics, including attitudes and behaviors, processing of information, as well as consumer cultural, psychological and communication

theories are also studied. Course also examines industrial perspectives; the unique aspects of organizational markets and how they differ from individual consumer behavior.

Prerequisite: Junior standing or permission of instructor (same as MK 363)

PSY 383 FORENSIC PSYCHOLOGY 3-0-3

A pragmatic review of the psychological and sociological theories and practices which seek to evaluate and analyze deviant human behavior and environments which precipitate criminal conduct. An introduction into the profiling and prediction of criminals and criminal behavior.

Prerequisite: PSY 113

PSY 393 SPORT PSYCHOLOGY 3-0-3

Study of the underlying mechanisms that coordinate individuals' thoughts, feelings and behavior, and how these processes are impacted by the sport setting. Psychological factors to be discussed include motivation and aggression. **Prerequisite: PSY 113 (same as SM 393)**

PSY 403 HUMAN SEXUALITY 3-0-3

A survey of the historical, cultural, and psychological origins of sex differences as they relate to sex role identity, stereotyping, and related behavior. **Prerequisite: PSY 113**

PSY 413 THE PSYCHOLOGY OF ADDICTION 3-0-3

A study of the psychological and sociological factors relating to the problems of addiction. Special attention will be given to the effects which alcohol and other drugs have upon fetuses, children, adults, families, and communities.

Prerequisite: PSY 113

PSY 423 COUNSELING THEORIES AND PRACTICES 3-0-3

A thorough review of contemporary approaches to counseling. This course examines the major current theories and practices in psychotherapy in detail.

Prerequisite: PSY 323

PSY 443 ADVANCED FORENSIC PSYCHOLOGY 3-0-3

An in-depth study of the etiology of criminal behavior. A critical analysis of mentally disordered, psychopathic, and sexually disordered offenders. Students acquire profiling and prediction skills.

Prerequisites: PSY 383, junior or senior standing and Department Chair approval

PSY 453 CLINICAL INTERNSHIP I (3 HRS.)

Field experience in psychology related occupations such as local mental health centers, work with local counselors, or school psychologists. May be taken concurrently with PSY 463.

Prerequisites: Psychology major, senior standing and permission of the instructor

PSY 463 CLINICAL INTERNSHIP II (3 HRS.)

A continuation of PSY 453. May be taken concurrently with PSY 453.

Prerequisite: Psychology major, senior standing and permission of the instructor

PSY 473 PSYCHOLOGY CAPSTONE DEMONSTRATION (3HRS.)

This capstone will provide students the opportunities to integrate and synthesize previous course work in psychology.

Prerequisite: All required coursework in Psychology core

PSY 400X INDEPENDENT STUDIES IN PSYCHOLOGY VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervised field work. Maximum four hours credit.

Prerequisite: Permission of Department Chair

SCIENCE

SC 400X INDEPENDENT STUDIES IN SCIENCE VARIES (1-4 HRS.)

Credit earned through directed reading, independent study, research, or supervise field work.

Prerequisite: Permission of the Department Chair

SC 412 SENIOR RESEARCH SEMINAR 1-3-2

Project selection, initial preparation, and preliminary data collection for a major science research project that integrates several scientific disciplines, methods of analysis, the reporting of conclusions and communication skills. Course continues in SC 422.

Prerequisite: Junior standing

SC 422 SENIOR RESEARCH PROJECT 0-6-2

An integrated research project that incorporates the basic and advanced sciences, mathematics and communication skills. This course must be taken the semester immediately following SC 412.

Prerequisite: SC 412 and senior standing

SC 43X SCIENCE INTERNSHIP VARIES (2-4 HRS.)

An extended professional work experience in an area related to the student's major. The work experience consists of at least 80 hours of documented work hours (which is equal to 2 hours of credit). **Prerequisite: SC 412**

SPORT MANAGEMENT

SM 253 RISK MANAGEMENT 3-0-3

Consideration of the legal aspects involved with physical education and sport activities. Emphasis on negligence case law, liability issues and facility safety.

SM 313 PRINCIPLES OF SPORT AND RECREATION MANAGEMENT 3-0-3

A study of the management, marketing, financial and legal principles within a sports and recreation operation and the primary components and support structures of the industry. The purpose is to examine and gain an understanding of all facets of running a team or sporting organization. A significant research project will be due at the end of the course.

Prerequisite: Junior standing or permission of instructor

SM 323 LEADERSHIP IN SPORT AND RECREATION 3-0-3

Investigation of leadership theories and practical applications for managers in sport and recreation settings. Exploration of the interrelationship between leadership and group dynamics.

Prerequisite: Junior standing or permission of instructor

SM 363 CONTEMPORARY ISSUES IN SPORT 3-0-3

Discussion of the problems and issues facing sport managers today. Analysis of the relationship between sport and culture. Topics may include commercialization, amateurism and socialization in sport.

SM 393 SPORT PSYCHOLOGY 3-0-3

Study of the underlying mechanisms that coordinate individuals' thoughts, feelings and behavior, and how these processes are impacted by the sport setting. Psychological factors to be discussed include motivation and aggression. **Prerequisite: PSY 113 (same as PSY 393)**

SM 412 BUSINESS PLANNING IN SPORT AND RECREATION 2-0-2

The creation of a business plan for a sport/recreation operation. **Prerequisite: LAW 203**

SM 413 ORGANIZATION & ADMINISTRATION OF PHYSICAL EDUCATION AND ATHLETICS 3-0-3

Theories establishing the procedures for facility, curriculum and faculty development in physical education and athletics are examined. **Prerequisite: Junior standing or permission of instructor**

SM 416 INTERNSHIP IN SPORT MANAGEMENT (6 HRS.)

Observation of and participation in a field-related experience under the direction of a field supervisor and a University supervisor. Must have the approval of the Department Chair

Prerequisite: Junior standing or permission of instructor

SOCIOLOGY

SOC 103 PRINCIPLES OF SOCIOLOGY 3-0-3

A presentation of the basic concepts and principles of sociology, designed to develop a system of thought about the nature of society and major special issues, such as ethnic patterns, social stratification, youth, educational, and religious institutions.

SOC 313 TOPICS IN SOCIOLOGY 3-0-3

Selected topics in sociological content such as criminology, minority groups, urbanization, and the like. Topics will vary from semester to semester.

Prerequisite: SOC 103

SOC 323 THE FAMILY 3-0-3

An analysis of problems and relationships in the family setting: divorce, mobility, generation differences, changing role of women and youth, delinquency, cross cultural patterns.

Prerequisite: PSY 113 or SOC 103

SOC 333 ART, SOCIETY AND TECHNOLOGY 3-0-3

An interdisciplinary effort to place modern technology within a social, cultural and historical context.

Prerequisite: ENG113 or ENG 133 (same as PHL 333)

SOC 343 SOCIAL PSYCHOLOGY 3-0-3

An introduction to the measurement and principles of human interaction and group behavior, including attitude change, prejudice, attraction, love, altruism, aggression, conformity, group dynamics, crowding, and other current social issues.

Prerequisite: PSY 113 (Same as PSY 343)

SPEECH

SP 103 INTRODUCTION TO THEATER 2-0-3

Understanding the roles of playwrights, actors, directors, designers, and audiences within the "living art" of theater. Demonstrates the relationship between art and culture through the study of, participation in, and viewing of theater.

SP 203 EFFECTIVE SPEAKING 3-0-3

Application of communication principles to improve extemporaneous public speaking and listening skills. Considers principles of audience analysis and rhetorical invention, worthy and effective evidence and inductive reasoning, speaker and source credibility, organization and outlining, effective speaker-audience interaction, listening for comprehension, and critical listening. **Prerequisite: ENG 113 or ENG 133**

SPANISH

SPN 103 SPANISH CONVERSATION I 3-0-3

An introduction to the Spanish language with an emphasis on functional conversation skills. Vocabulary development and pronunciation within communicative contexts are stressed. No previous study of Spanish is required.

SPN 113 SPANISH READING AND WRITING I 3-0-3

An introduction to the Spanish language with an emphasis on reading and writing in Spanish. Vocabulary development and the basics of Spanish structure are also covered. No previous study of Spanish is required.

SPN 123 SPANISH II 3-0-3

A continuation of Spanish 113, integrating listening, speaking, reading, and writing skills. Basic grammar and Latin American and Spanish cultures are covered.

Prerequisite: SPN 113 or by placement

SPN 203 SPANISH III 3-0-3

An intermediate Spanish class with an emphasis on reading and writing skills and grammar review. Students explore Hispanic culture through readings based on historical as well as current events. Conversational skills are also emphasized. **Prerequisite: SPN 123 or by placement**

SPN 213 SPANISH IV 3-0-3

A continuation of Spanish III, with an emphasis on increasing reading speed and comprehension as well as improving writing fluency and accuracy. The difficulty level of the reading selections increases in this course. **Prerequisite: SPN 203**

UNIVERSITY EXPERIENCE

UE 012 ACADEMIC FOUNDATIONS 2-1-0

This course helps students develop the proficiency needed to be successful in other college courses. The focus is on preparing students to do college level reading and writing and learning by building on each student's academic skills. This is a non-credit, preparatory class.

UE 101 UNIVERSITY EXPERIENCE 1-0-1

This course offers resources for success in learning for students new to Trine University. This course will assist students in becoming more proficient learners, understanding self and others, and learning personal life skills. This course will present information about Trine University offices and services to familiarize students with resources and procedures.

UE 201 Success Skills and Reflection 1-0-1

This course provides an opportunity to build and reflect on college success skills. It is required for students on academic probation.

UE 301 PEER MENTORING 1-0-1

This course trains a student to provide mentoring for second-year students at Trine University. **Prerequisite: Junior standing or permission of instructor**

WOMEN'S STUDIES

WS 103 INTRODUCTION TO WOMEN'S STUDIES 1-0-3

Introduction to Women's Studies offers an interdisciplinary exploration of the psycho-sociological construction of a woman's gender identity. It analyzes the historical progression of gender roles and feminist theory through a confluence of social, cultural, economic, political, geographic, and institutional pressures. The course examines how these components intersect in order to define what it is to be a woman in contemporary times.

Prerequisite: ENG 103 or ENG 104; Prerequisite or Corequisite: ENG 113 or ENG 133

BOARD OF TRUSTEES

Year in parentheses denotes when affiliation with board began.

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Westfield Center, Ohio
B.S.M.E., Hon. D.E. (Tri-State University);
Vice President, Product Development TVC Communications, Inc.,
Wadsworth, Ohio

James P. Fabiani (2001) Vice Chair
McLean, Virginia
B.S. (Harvard); M.Ed. (University of Massachusetts);
Chair and CEO, Fabiani & Company, Washington, DC

Ralph D. Trine (1990) Secretary
Fremont, Indiana
B.S.M.E., Hon. D.E. (Tri-State University); M.S.M.E., M.B.A. (Michigan State
University);
Chair and CEO, Vestil Manufacturing Co., Angola, Indiana

MEMBERS:

James D. Bock (2003)
Elkhart, Indiana
B.S.M.E. (Tri-State University);
President/Owner, Bock Engineering Co., Elkhart, Indiana

Lynn A. Brooks (2007)
Auburn, Indiana
B.S. (Tri-State University);
President and CEO, Rieke Corporation, Auburn, Indiana

Tobias Buck (2010)
Pierceton, Indiana
A.A.S. (Red Wing Technical Institute); B.S. (Purdue University, Fort Wayne);
Chairman, President/CEO and Founder, Paragon Medical, Inc.

Keith E. Busse (2003)
Fort Wayne, Indiana
B.S.B.A. (University of Saint Francis); M.B.A. (Indiana University/Purdue
University–Fort Wayne); Hon. DBA (University of Saint Francis); Hon. DBA (Trine University);
President and CEO (ret.), Steel Dynamics, Inc., Fort Wayne, Indiana

Suzanne Ehinger (2007)

Roanoke, Indiana

B.S. (Indiana University); M.B.A. (Saint Francis College); Ph.D. (Kennedy Western University);
Chief Operating Officer, Parkview Hospital & Affiliates, Fort Wayne, Indiana

Lawrence A. Franks (1984-2002) (2004) Chair Emeritus

Sturgis, Michigan

B.S.M.E., Hon. D.E. (Tri-State University);

President (ret.), Burr Oak Tool, Inc., Sturgis, Michigan

Tomas Furth (1997)

New York, New York

B.S.M.E., B.S.Ch.E., Hon. D.E. (Tri-State University);

President, Sudamtex Holding, Caracas, Venezuela

William A. Gettig (1984) Chair Emeritus

Spring Mills, Pennsylvania

B.S.M.E., Hon. D.E. (Tri-State University); Hon. Doctor of Laws,

(Susquehanna University);

President and C.E.O., Gettig Technologies Inc, Spring Mills, Pennsylvania

John N. Hester (2000)

Orangevale, California

B.S.Ch.E. (Tri-State University); M.S.Ch.E. (Michigan State University); Ph.D. (Walden University);

V.P. for Technology (ret.), Clean Custom Fuels, Inc.

Associate Dean Emeritus, College of Engineering, California State University,

Sacramento, California

Louis Holtz (2011)

Orlando, Florida

B.S. (Kent State); M.S. (University of Iowa)

Hon. Degrees (Trine University, Notre Dame, Kent State, Gonzaga, Benedictine & Wingate);

ESPN Sports Analyst

Rick L. James (2010)

Auburn, Indiana

B.S.B.A. (Tri-State University);

Chairman/CEO, Metal Technologies, Inc., Auburn, Indiana

Dennis Kruse (2010)

Auburn, Indiana

B.S., GRI and CAI (Indiana University);

Indiana State Senator, Indianapolis, Indiana

Lawrence H. Lee (2011)
Fort Wayne, Indiana
B.S. (Indiana University); J.D. (Harvard Law School)
President and Owner, Leepoxy Plastics Inc
Fort Wayne, Indiana

Phillip H. Mayberry (2010)
Clear Lake, Indiana
B.A. (Indiana University)
President (ret.), Centennial Wireless;
Investor, Congeries LLC

John J. "Mike" McKetta, III (2004)
Austin, Texas
B.A. (Harvard University); J.D. (University of Texas);
President, Graves, Dougherty, Hearon & Moody PC, Austin, Texas

Richard L. Oeder (1995)
Morrow, Ohio
B.S.C.E. (Tri-State University);
Area Manager (ret.), Columbia Gas of Ohio, Springfield, Ohio

John A. Pittman (1997) Chair Emeritus
Austin, Texas
B.S.E.E., Hon. D.E. (Tri-State University); M.B.A. (Baldwin-Wallace College);
President (ret.), The Fieldbus Foundation, Austin, Texas

Larry E. Reiners (2009)
Tulsa, Oklahoma
B.S.C.E. (Tri-State University);
Manager, Makoi Group, LLC

Mitchel E. Rhoads (2006)
Rockport, Texas
B.S.B.A. (Tri-State University)

Ian M. Rolland (2010)
Fort Wayne, Indiana
B.A. (DePauw University), M.S. (University of Michigan), Hon. D.E. (Purdue University, University of St. Frances, DePauw University, Manchester College,
Tri-State University, and Indiana Institute of Technology)
Chairman (ret.), Lincoln National Corp.

Clifford D. Ryan (2009)
Naples, Florida
B.S.B.A. (Tri-State College);
Manager, R.& R. Real Estate, Ltd.

Jack A. Shaw (2010)
Coldwater, Michigan
B.S.E.E. (Purdue University)
President and CEO, Hughes Electronics Corp. (ret.), Coldwater, Michigan

Wayne M. Shive (2008)
Fort Wayne, Indiana
Hon. D.B.Ad. (Tri-State University);
CEO, Best Boy & Co., Fort Wayne, Indiana

Sheri Trine (2007)
Fremont, Indiana
Hon. D.H.L. (Tri-State University);
Director of Human Resources and Accounting, Vestil Manufacturing Co., Angola, Indiana

Theresa Wagler (2011)
Fort Wayne, Indiana
B.A. (Taylor University)
Executive Vice President and CFO, Steel Dynamics, Inc.
Fort Wayne, Indiana

R. Wyatt Weaver (2004)
Angola, Indiana
B.S. and M.D. (Indiana University);
Parkview Physician's Group, Angola, Indiana

TRUSTEES EMERITI

(Dates denote years of active service as a trustee.)

Jimmie Caldwell (1976-2009) Chair Emeritus
Indianapolis, Indiana
B.S.C.E., Hon. D.E. (Tri-State University);
Registered Professional Engineer;
President and Chair (ret.), Chair Emeritus, Geiger and Peters, Inc.,
Indianapolis, Indiana

Joanne S. Crown (1969-1987)
Wilmette, Illinois
B.S. (Indiana University)

Morgan L. Fitch, Jr. (1968-1977)
Western Springs, Illinois
B.S.Ch.E. (Illinois Institute of Technology); J.D. (U.S. Navy Law School,
University of Michigan);
Senior Partner, Fitch, Even, Tabin, and Flannery, Chicago, Illinois

Leamen I. Forman (1984-2002)
Appleton, Wisconsin
B.S.B.Ad., Hon. D.B.Ad. (Tri-State University);
President & Chair of the Board (ret.), Bank of Menasha, Menasha, Wisconsin

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Naples, Florida
B.S. (Tri-State University);
Chair of the Board, Indian Trails, Inc., Owosso, Michigan

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Columbus, Indiana
B.S.M.E., Hon. D. E. (Tri-State University);
Vice President (ret.), Cummins Engine Company, Inc., Columbus, Indiana

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Sturgis, Michigan
Ed. (Albion College); M.B.A. (Indiana University);
Chair of the Board (ret.), Kirsch Company, Sturgis, Michigan

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Pasadena, California
B.S.B.A. (Tri-State University);
Owner, Wayne H. Larson Insurance Agency, Pasadena, California

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Austin, Texas
B.S.Ch.E., Hon. D.E. (Tri-State University); B.S.E., M.S., Ph.D. (University of Michigan); Hon. D.Sc. (University of Toledo); Hon. D.E. (Drexel University);
Joe C. Walter Chair in Chemical Engineering (Emeritus) Department of Chemical Engineering, University of Texas, Austin, Texas;
Registered Professional Engineer

Earl F. McNaughton (1983-2003) Chair Emeritus
Fremont, Indiana
B.S.B.A., M.S.B.A., (Indiana University); J.D. (Valparaiso University);
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Gary L. Ray (1990-2002) Chair Emeritus
Medina, Ohio
B.S.M.E., Hon. D.E. (Tri-State University); M.B.A. (Wharton Graduate Division, University of Pennsylvania);
President/Owner, Transformer Engineering Corp., Cleveland, Ohio

Richard A. Rosenthal (1971-1977)
Niles, Michigan
B.S. (University of Notre Dame);
Director of Athletics, University of Notre Dame, South Bend, Indiana

Clifford W. Sponsel (1978-1999)
Santa Barbara, California
B.S.C.E., Hon. D.E. (Tri-State University);
Investments and Consultant

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Bloomfield Hills, Michigan
B.S.M.E., Hon. D.E. (Tri-State University);
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Erlene Yentes	Director of Records & Receipts

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J. Michael Ferrell	Director of Conference & Events
Greg Perschke	Assistant Athletic Director, Head Baseball Coach
Brian Alden	Sports Information Director
Van Brandt	Head Women's Golf Coach
Dan Callahan	Head Wrestling Coach, Compliance Officer
Shea Chambers	Coach, Cheer/Dance/Spirit
Donnie Danklefsen	Head Softball Coach
Trevor Ferrell	Head Men's Soccer Coach
Ryan Gould	Head Men's & Women's Tennis Coach
Ginny Hawthorne	Administrative Assistant
Thomas Knudson	Head Women's Track, Asst. Men's and Women's Cross Country Coach
Vinnie Lang	Head Men's Lacrosse Coach
Charles Massi	Head Cross Country Coach and Track Coach

Brooks Miller	Head Men's Basketball Coach
Steve Mix	Head Women's Basketball Coach
Jeannine Ravellette	Head Women's Lacrosse Coach
Bill SanGiacomo	Head Men's Golf Coach
Terry Stefankiewicz	Head Women's Soccer Coach
Jamie Wozniak	Head Women's Volleyball Coach

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Julie Hoy	Creative Media Specialist
Niclas Hulting.....	Interactive Marketing Specialist
Dean Orewiler	Creative Digital Multi-Media Specialist
Celesta Torok.....	Creative Media Specialist
Lindsay Winslow Brown.....	Communications Specialist

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Dawn Musson.....	Staff Accountant
Karen Norris	Accounts Payable Administrator
Loretta Simmons	Senior Student Accounts Administrator
Andrea Smith	Director of Business Services

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Kristine Schultz	Office Manager

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Cindy Ax	Director of First Impressions
Tyler Benner	Admission Counselor & Visit Coordinator
Kimberly Bennett	Chief Financial Aid Administrator
Emily Boerman	Director of International Services
Taja Cunningham.....	Admission Counselor
Travis Foster.....	Regional Director of Admission - Greater Indianapolis
Sam Hartman.....	Admission Counselor
Anita Hughes	Admission Coordinator
Kelly McGuire	Assistant Director of Financial Aid
Deborah McHenry	Director of Student Retention
Alisa Mills.....	Assistant Director of Financial Aid
Jamie Morton	Admission Counselor

Julie Parish..... Senior Admission Coordinator
Karen Reinoehl Admission Counselor and Transfer Student Coordinator
Jon Walmer..... Director of Admission

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Michelle Dunn Chief Information Officer
Joshua Beard..... Systems Administrator
Matt Brockington Technical Services
Kodi Buell..... Academic Technologist, School of Professional Studies
..... Web Content Developer
..... Help Desk Technician
Angie Kiess Director of Academic Technology
Kristina Brewer Library Director
Lauren Magnuson..... Senior Information Services Librarian
Carly Statz..... Information Services/Archives
Mathew Steury..... System Administrator
Connie Tharp Secretary, Acquisitions
Kurt Thompson..... Academic Technology
Renee Van Wagner Telecommunications/PC Technician
Wendy Yagodinski..... Programmer/Analyst

LABORATORY TECHNICIANS

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Joe Thompson Mechanical Engineering

MAIL CENTER

Kathy Grygienc..... Manager
Wendy Kipfer..... Mailroom Assistant

MIDDLE COLLEGE

Andrea DeLancey Director
Nick Pfafman..... Coordinator

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Linda Bateman..... Director of Career Services
Teresa Johnson Assistant Director of Career Services
Mallory McClelland Administrative Assistant
Paul Viglianti Employee Outreach Coordinator

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Karen Reinoehl Transfer Coordinator
Lucretia Shank Assistant Registrar

Renee Shipe..... Assistant Registrar

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Emily Boerman Director of International Student Services
Tammy Bowen Director of Residence Life
Megan Cook..... Counselor
Jeremy Howard..... Director of Student Activities
Kristen Fee Campus Safety Director
Wendy Kipfer..... Internal Scheduling
Karissa Schmoe..... Associate Director of Student Activities
Linda Werling..... Administrative Assistant

WEAX RADIO STATION

Josh Hornbacher Operations Manager

ZOLLNER GOLF COURSE

Jennifer Lymangood..... Head Golf Professional
Barry Emerick Superintendent, Grounds
Nick Wentworth Assistant Superintendent, Grounds
Dan Zimmerman Maintenance

FACULTY

Year in parentheses denotes when employment with Trine University began.

Amy Alexander (2008/2011)

Assistant Professor, Franks School of Education

B.S. (University of Findlay); B.S., M.S. (Bowling Green State University)

A.J. Alnaser (2010)

Assistant Professor, Department of Mathematics & Informatics

B.S. (Jordan University of Science & Technology);

M.S., Ph.D. (Kansas State University)

David Anspaugh (2001-2007, 2012)

Lecturer, Health Sciences and Sport Management & Public Relations

B.S. (Albion College); M.S. (Eastern Michigan University);

Pe.D. (Indiana University); Ed.D. (University of Mississippi)

Susan Anspaugh (2005)

Assistant Professor, Department of Health Sciences

B.S., M.S. (University of Memphis); Ph.D. (University of Mississippi)

William Barge (2002)

Assistant Professor, Department of Mathematics & Informatics

B.S. (Miami University of Ohio); M.B.A. (Indiana University),

M.S. (Regis University)

William Barry (2008)

Associate Professor, Reiners Department of Civil & Environmental Engineering

B.S. (Carnegie Mellon University); M.S. (Stanford University); Ph.D. (Carnegie Mellon University)

Brett Batson (2006)

Associate Professor, Wade Department of Mechanical & Aerospace Engineering

B.S., M.S., Ph.D. (Iowa State University)

Ann Benson (1985)

Associate Professor, Department of Science

B.S. (Tulane University); B.S. (Tri-State University); M.S. (Indiana University)

Catherine Benson (2012)

Instructor, Sport Management & Public Relations

B.A. (Transylvania University); PGA (class A)

Michael Biegas (2005)

Assistant Professor, Department of Criminal Justice, Psychology,
& Social Sciences

B.S. (Tri-State University); M.S. (Michigan State University)

W. Brooks Bigelow (1988)

Associate Professor, Department of Science

B.S. (University of Delaware); M.S., Ph.D. (New Mexico State University)

Michael Blaz (1976)

Professor, Department of Criminal Justice, Psychology, & Social Sciences

B.A. (University of Minnesota); M.A. (Illinois State University); Ph.D. (University of Kentucky)

James Canino (2010)

Assistant Professor, Wade Department of Mechanical & Aerospace Engineering

B.S. (Milwaukee School of Engineering); M.S., Ph.D. (Purdue University)

Stephen Carr (2003)

Associate Professor, Department of Electrical & Computer Engineering

B.S. (University of Ulster); Ph.D. (Queens University of Belfast)

Sean Carroll (1990)

Professor, Department of Electrical & Computer Engineering

B.E. (Vanderbilt University); M.A., Ph.D. (Princeton University)

Timothy Carver (2005)

Assistant Professor, Department of Mathematics & Informatics

B.S. (Union Institute and University); M.S. (University of Cincinnati)

David Colbert (2012)

Instructor, English Language Center

B.A. (Central Washington University); M.A. (New Mexico State University)

Linda Conley (2010)

Instructor, Department of Business & Finance

B.B.A., M.A. (Bowling Green State University)

Thomas DeAgostino (2009)

Assistant Professor, Department of Technology

B.S. (Michigan Technological University); M.S. (Rensselaer Polytechnic Institute)

Jean Deller (1989)

Professor, Franks School of Education

B.A. (Milligan College); M.S. (Indiana University); Ph.D. (University of Toledo)

Brandy DePriest (2007)

Instructor, Department of Language & Humanities

B.A. (University of Louisville); M.A. (Xavier University)

Eileen Dial (2012)

Assistant Professor, Franks School of Education

B.A., M.Ed. (Cal Poly); Ed.D. (University of California)

Scott Fergusson (2011)
Instructor, Ketner School of Business
B.S. (Tri-State University)

John Fiandt (1995)
Assistant Professor, Department of Criminal Justice, Psychology, & Social Science
B.S.Ed. (Ball State University); M.A. (University of Notre Dame)

Nandan Garg (2010)
Assistant Professor, Department of Electrical & Computer Engineering
B.C.A. (Devi Ahilya University); M.C.A. (Rajiv Gandhi Technical University);
Ph.D. (Wayne State University)

Karen Hamilton (2007)
Associate Professor, School of Education
B.Ed. (University of Toledo); M.A. (Bowling Green State University); Ph.D. (University of Toldeo)

Kandee Heisler (2010)
Lecturer, Department of Language & Humanities
B.A., M.A. (Morehead State University)

Mark Helmke (2012)
Instructor, Ketner School of Business
B.A. (College of Potomac); M.A. (Goddard College)

Allen Hersel (2003)
Associate Professor, Department of Chemical & Bioprocess Engineering
B.S. (Rockhurst College); B.S. (University of Missouri-Rolla); M.S. (University of Kansas);
M.S., Ph.D. (Yale University)

Timothy Hopp (2003)
Associate Professor, Department of Language & Humanities
B.A. (Rocky Mountain College); M.A. (University of Maine);
Ph.D. (Texas A.& M. University-Commerce)

Julie Howenstine (2005)
Associate Professor, Department of Sport Management and Public Relations
B.S. (Oakland University); M.B.A. (University of Saint Thomas)
Erica Hutton (2011)
Instructor, Department of Criminal Justice, Psychology, & Social Sciences
B.S. (Liberty University); M.A. (Argosy University)

Timothy Jenkins (2012)
Assistant Professor, Engineering Technology
B.S., M.B.A., M.S. (Michigan Technological University)

Raymond Jensen (2010)

Assistant Professor, Department of Mathematics & Informatics

B.S. (University of Pittsburgh); B.S. (Indiana University of Pennsylvania)

M.S. (Carnegie Mellon University); Ph.D. (University of Notre Dame)

Donald Jones (1996)

Associate Professor, Sport Management & Public Relations

B.A. (University of Minnesota); A.M. (University of Illinois);

Ph.D. (Southern Illinois University)

Ira Jones (1983)

Professor, Department of Science

B.S. (Davidson College); M.S. (New York University); Ph.D. (Auburn University)

Pavan Karra (2009)

Assistant Professor, Department of Mechanical & Aerospace Engineering

BTech. (Regional Engineering College); M.S. (University of Nebraska);

Ph.D. (Iowa State University)

Prashanth Karra (2009-1010, 2012)

Assistant Professor, Department of Mechanical & Aerospace Engineering

BTech. (Regional Engineering College); M.S. (Mississippi State University);

Ph.D. (Iowa State University)

Mark Kays (2007)

Assistant Professor, Department of Language & Humanities

B.S. (Ball State University), M.S. (Indiana University)

Haseeb Kazi (2006)

Associate Professor, Department of Mathematics & Informatics

B.S. (University of Punjab), M.S. (Quaid-I-Azam University),

M.S., Ph.D. (Southern Illinois University)

Chad Keefer (2005)

Assistant Professor, Department of Science

B.S., M.A., Ed.D. (Ball State University)

Ruth Kohlmeier (2011)

Assistant Professor, Department of Science

B.A. (Case Western Reserve University); M.D. (S.U.N.Y. Health Science Center);

Board Certification (Forensic Pathology, Anatomic Pathology, Clinical Pathology)

Marek Kolar (2009)

Assistant Professor, Department of Business Administration

B.B.A. (Northwood University); M.A. (Western Michigan University); Ph.D. (Michigan State University)

Craig Laker (1999)

Associate Professor, Department of Criminal Justice, Psychology, & Social Sciences
C.B.S., B.S., M.P.A., M.A. (Indiana University)

Anthony Layson (2009)

Assistant Professor, Department of Science
B.Sc. (Indiana-Purdue University); Ph.D. (Iowa State University)

Will Lindquist (2009)

Assistant Professor, Reiners Department of Civil & Environmental Engineering
B.S., M.S. Ph.D. (University of Kansas)

Gail Lugo (2007 - 2008, 2010)

Instructor, English Language Center
B.A., M.A. (Indiana University)

William Maddock (1998)

Assistant Professor, Department of Sport Management & Public Relations
B.S. (Slippery Rock State University); M.S. (University of Tennessee)

Amanda Malefyt (2012)

Assistant Professor, McKetta Department of Chemical Engineering
B.S. (Tri-State University); M.S., Ph.D. (Michigan State University)

Dan Matthews (1983)

Associate Professor, Department of Mathematics & Informatics
B.S. (Tri-State University); M.S. (Indiana University)

John Milliken (2004)

Associate Professor, Department of Criminal Justice, Psychology,
& Social Sciences
B.A. (Ohio State University); J.D. (University of Toledo)

Andrea Mitofsky (2008)

Assistant Professor, Department of Electrical & Computer Engineering
B.S., M.S., Ph.D. (University of Illinois)

Kevin Molyet (2009)

Assistant Professor, Wade Department of Mechanical & Aerospace Engineering
B.S., M.S., Ph.D. (University of Toledo)

Vicki Moravec (2002)

Associate Professor, Department of Science
B.S. (Indiana University Purdue University-Fort Wayne);
Ph.D. (University of Illinois-Chicago)

Timothy J. Murphy (2008)

Instructor, Department of Civil & Environmental Engineering

B.S. (Virginia Polytechnic and State University) M.S. (University of Texas)

Alexander Odemba (2012)

Assistant Professor, Department of Business and Finance

M.B.A. (Fordham University); D.B.A. (University of Phoenix)

Ryan Overton (2012)

Assistant Professor, Department of Civil & Environmental Engineering

B.S., M.S., Ph.D. (University of Tennessee-Knoxville)

Cindy Neyer (1998)

Assistant Professor, Department of Science

B.S. (University of Kansas); Ph.D. (Iowa State University)

Hong Park (2009)

Assistant Professor, Department of Science

B.S. (Pukyong National University); M.S., Ph.D. (University of Wisconsin - Milwaukee)

Kiwon Park (2011)

Assistant Professor, Wade Department of Mechanical & Aerospace Engineering

B.S. (Inha University); M.S. (Virginia Polytechnic Institute and State University);

Ph.D. (University of Illinois) (ABD)

Jeremy Rentz (2010)

Assistant Professor, Reiners Department of Civil & Environmental Engineering

B.S., Ph.D. (University of Iowa)

Amy Salyer-Nicholls (2011)

Instructor, Language & Humanities Department

B.S. (Tri-State University); M.A. (Western Michigan University)

Majid Salim (1984)

Associate Professor, Department of Chemical & Bioprocess Engineering

B.S., M.S., Ph.D. (Wayne State University)

Steven Schonefeld (1978)

Associate Professor, Department of Mathematics & Informatics

B.S., M.S., Ph.D. (Purdue University)

John Shannon (2007)

Professor, Jannen School of Arts & Sciences

B.A. (Plattsburgh University); M.A. (Southern Illinois University); Ph.D (Ohio State University)

Sameer Sharma (2008)

Assistant Professor, Department of Electrical & Computer Engineering

B.S. (Punjab Engineering College, India); M.S. (Brandeis University); M.S., Ph.D. (Oklahoma State University)

VK Sharma (2008)

Professor, Allen School of Engineering & Technology

B.S. (India Institute of Technology); M.S. (University of Michigan); M.B.A. (University of Chicago); Ph.D. (Illinois Institute of Technology)

Hope Sheets (2010)

Lab Tech, Department of Science

B.S. (Indiana University)

Sally Simpson (1995)

Professor, Franks School of Education

B.A. (Colby College); M.S. (Northern Illinois University);

Ph.D. (Florida State University)

William Sluis (2007)

Assistant Professor, Department of Science

B.S., Ph.D. (University of Illinois)

Joni Smith (2012)

Instructor, Department of Mathematics & Informatics

B.S. (Indiana University); M.S. (Purdue University)

Roberto Soto (2012)

B.A. (Florida International University); M.A. (William Paterson University);

D.A. (Rockville University)

Jan Stannard (2010)

Associate Professor, Wade Department of Mechanical & Aerospace Engineering

B.S., M.S., Ph.D. (University of Michigan); Ed.D. (Northeastern University)

Marlene Sweet (1999)

Assistant Professor, Department of Criminal Justice, Psychology & Social Sciences

B.S.W. (Ball State University), M.S.W. (Western Michigan University), L.C.S.W. (State of Indiana)

Catherine Swick (2010)

Assistant Professor, Department of Health Sciences/Franks School of Education

B.S., M.Ed., Ph.D. (Bowling Green State University)

Thomas Swick (2012)

Assistant Professor, Business & Finance

B.S., M.B.A. (Bowling Green State University)

Michael "Brian" Thomas (2010)
Assistant Professor, Department of Technology
B.S., M.S., Ph.D. (Ohio State)

Thomas Tierney (1974)
Professor, Department of Language & Humanities
Director, Humanities Institute
B.A. (University of Illinois); M.A., Ph.D. (Loyola of Chicago)

R. Thomas Trusty (2007)
Associate Professor, Department of Technology
B.S. (Purdue University), M.A. (Ball State University); M.S. (Trine University)

Timothy Tyler (1994-1998, 1999)
Professor, Reiners Department of Civil & Environmental Engineering
B.S., M.S. (West Virginia University); Ph.D. (Virginia Polytechnic Institute);
P.E. (Indiana, Michigan, Ohio, and Virginia)

Debra Van Rie (1991)
Professor, Department of Mathematics & Informatics
B.S. (Indiana University-South Bend); M.A. (Indiana University-Bloomington);
Ph.D. (Bowling Green State University)

Suzanne Van Wagner (1983)
Professor, Franks School of Education
B.A., M.A., Ph.D. (Michigan State University)

John Wagner (1994)
Professor, Department of Chemical & Bioprocess Engineering
B.S. (University of Colorado); Ph.D. (Rice University); P.E. (Ohio)

Sean Wagner (2001)
Assistant Professor, Department of Business Administration and Finance
B.A. (Southern Methodist University); M.A. (University of Hawaii)

Diane Wallinger (2008)
Instructor, Department of Business & Finance
B.S. (Indiana University); M.A.E. (Ball State University)

Darryl Webber (2006)
Associate Professor, Department of Mechanical & Aerospace Engineering
B.S. (Montana College of Mineral Science and Technology);
M.S. (Montana Tech of the University of Montana)
Ph.D. (Missouri University of Technology)

Kathie Wentworth (1993)

Assistant Professor, Department of Language & Humanities
A.A., B.S. (Tri-State University); M.Ed. (Indiana Wesleyan)

Justin Young (2008)

Instructor, Department of Language & Humanities
M.S. (Murray State University)

Sarah Young (2009)

Instructor, Department of Language & Humanities
M.S. (Indiana University)

Christina Zumbrun (2006)

Assistant Professor, Department of Mathematics & Informatics
B.B.S. (Hardin-Simmons University); M.S. (Purdue University)

ADJUNCT FACULTY

Year in parentheses denotes when employment with Trine University began.

Deborah Blaz (2010)

Department of Language & Humanities

B.A. (Illinois State); M.A. (University of Kentucky)

Anna Boman (2010)

English Language Center

Shirley Brauker (2010)

Department of Language & Humanities

BF.A., M.A. (Central Michigan University)

David Conklin (2008)

Department of Criminal Justice, Psychology & Social Sciences

Police Administration (Michigan State University)

Bureau of Alcohol, Tobacco & Firearms - Retired

Rita Deller (2005)

School of Education

B.S., M.S. (Indiana University)

Patrick Ellis (2008)

Department of Mathematics & Informatics

B.S. (Case Institute of Technology); B.S. (The Ohio State University); M.B.A. (University of Cincinnati)

Wesley Garner (2001)

School of Education

B.S. (District of Columbia Teachers College); M.Ed. (Wayne State University)

Greg Gorbett (2010)

Department of Science

B.S. (Tri-State University); B.S. (University of Maryland University College)

M.S. (Grand Canyon University); M.S., Ph.D. (Worcester Polytechnic Institute)

Scott Gruner (2001)

School of Business

B.S. (Tri-State University); M.B.A. (Indiana University-Fort Wayne)

Jason Hartz (2007)

Department of Language & Humanities

B.A. (Bethany College); M.A. (Marshall University)

Tricia Hersel (2009)

Department of Criminal Justice, Psychology & Social Sciences
B.B.A. (Hofstra University); M.B.A. (St. Johns University)

Michael Hess (2010)

Department of Science
B.S. (Michigan State University); J.D. (Thomas Cooley Law School)

Greg Kenner (2007)

Department of Criminal Justice, Psychology & Social Sciences
B.A. (Huntington College); J.D. (Thomas M. Cooley Law School)

Cheryl Kline (2006)

Ketner School of Business
B.B.A. (University of St. Francis); M.S., M.B.A. (Bowling Green State University);
Ph.D. (Northcentral University)

Jim Landis (2011)

Department of Mathematics & Informatics

Sally Lanier (2000)

School of Education
B.S. (North Central College)

Suzanne Lenhart (2002)

Department of Criminal Justice, Psychology, & Social Sciences
B.A. (Defiance College); M.A. (Antioch University)

Ron Mercer (2008)

Mechanical Engineering
B.S. (Indiana Institute of Technology); M.S. (University of Saint Francis)

Mike Magdich (2009)

Music Program
B.M.E. (Ball State University); B.M. (Indiana/Purdue-Fort Wayne)

Bill Mirgain (2008)

Department of Criminal Justice, Psychology & Social Sciences
B.S., M.S. (North Dakota State University)

Raetta Mirgain (2008)

Department of Language & Humanities
B.A., M.A. (North Dakota State University); J.D. (Kent College of Law, Illinois Institute of
Technology)

Pete Mondron (2007)
Department of Science
B.A. (Kenyon College), M.S. (University of Notre Dame)

Bruce Novak (2002)
School of Business
B.S., M.S. (Indiana University)

David Paas (1994)
School of Business
A.B., M.A., Ph.D. (University of Nebraska-Lincoln)

Marcia Powers (2009)
School of Education

Barb Radebaugh (2011)
English Language Center

Sue San Giacomo (1994)
School of Education
B.L.S. (Hillsdale College); M.S.Ed. (Indiana University-Fort Wayne)

Dorene Scheimann (2005)
School of Education
B.S., M.S. (Indiana University)

Adelle Schwan (2008)
Department of Criminal Justice, Psychology & Social Sciences
B.S. (Indiana University); M.S. (Missouri State University); M.B.A. (Baker College)

Neil Shamberg (2005)
Department of Criminal Justice, Psychology, & Social Sciences
M.A. (Ball State University); Ph.D. (Case Western Reserve University)

Greg Shull (2010)
Ketner School of Business
B.A. (Indiana University) M.A. (George Washington University)

Cheryl Skiba-Jones (2005)
Department of Language & Humanities
B.S. (University of Minnesota); M.A. (University of Dayton)

Thomas Smith (2003)
Department of Criminal Justice, Psychology, & Social Science
B.A. (The Ohio State University); M.A. (University of Dubuque);
Graduate Theological Foundation

Carter Snider (1997)
Department of Business & Finance
A.B., M.A. (West Virginia University)

Susan Stackhouse (2005)
School of Education
B.S. (Manchester College), M.S. (Indiana University)

Beth Stepp (2009)
Music Program
B.M.E., M.S.E. (Indiana/Purdue-Fort Wayne)

Frank Swenson ((1982)
Professor Emeritus, 1998; Mechanical Engineering
Science Department
Ph.D. Mechanical Engineering (University of Kansas)

Dave Syler (1968)
Department of Mathematics and Informatics
B.S. (Heidelberg College); M.A. (Bowling Green State University); M.A. (Ball State University)

Loralee Taylor (2007)
Department of Civil & Environmental Engineering
B.S. (Tri-State University); Land Surveyor License (State of Indiana)

John Vanderkolk (2004)
Department of Science
B.A. (Indiana University)

Jan Wilson (1991)
School of Education
B.S. (Indiana University); M.S.Ed. (University of St. Francis)

Maryellen Wright (2010)
Department of Language & Humanities
B.S. (Indiana University - Ft. Wayne); M.S. (Indiana State University)

FACULTY & ADMINISTRATION EMERITI

Jerry Beehler (1969) Professor Emeritus, 2005; Mathematics
John Berger (1983) Professor Emeritus, 1994; Business Administration
Jack Brillhart (1979) Associate Professor Emeritus, 2002; Mathematics
Benjamin L. Dow (1977) Professor Emeritus, 1987; Aerospace Engineering
Arthur E. Eberhardt (1952) Professor Emeritus, 1990; Electrical Engineering
Paul F. Eble (1957) Professor Emeritus, 1981; Physics
Carl H. Elliot (1974) President Emeritus, 1983
David R. Finley (1996) Vice President Emeritus, 2012, Academic Affairs
Wesley Garner (2001) Professor Emeritus, 2011; Education
Satish Goyal (1979) Professor Emeritus, 1987; Civil Engineering
Albert Guilford (1957-59, 1961-62, 1963, 1967) Professor Emeritus, 2005; Civil & Envir. Engg.
Roger Hawks (1977) Professor Emeritus, 2009; Mechanical & Aerospace Engineering
William W. Hill (1961) Professor Emeritus, 1993; Mechanical & Aerospace Engineering
Peter Hippenstein (1964) Professor Emeritus, 2005; Biology
Joan Karbach (1994) Professor Emeritus, 2006; English
Leo F. Kuhn (1961) Professor Emeritus, 1992; Engineering Graphics
Sushil Kumar (1981) Professor Emeritus, 2005; Civil & Environmental Engineering
Richard Kruger (1965) Associate Professor Emeritus, 2006, Mathematics
Theron G. Lansford (1964) Professor Emeritus, 1999; Psychology
Michael J. Lesiak (1967) Associate Professor Emeritus, 2004; Accounting
Ping-Wha Lin (1965-79, 1982) Professor Emeritus, 1995; Civil Engineering
William Lipman (2000) Associate Professor Emeritus, 2012, Business & Finance
John C. McBride (1977-88, 1994) University Relations Director Emeritus, 1995
Kenneth Meeks (1997-2008) Professor Emeritus, 2008, Civil Engineering
William Meyers (1964-66, 1972-76, 1983) Professor Emeritus; 2005; Aero. & Mechanical Engg.
Jane L. Mitchell (1975-2000, 2005) Professor Emeritus; 2011; School of Professional Studies
Derald Moore (1968) Professor Emeritus, 1998; Social Sciences
John E. Morin (1966) Professor Emeritus, 2004; Social Sciences
Edward Nagle (1967) Professor Emeritus 2008, Department of Technology
Aldo R. Neyman (1986) Professor Emeritus, 1999; Business Administration
Dennis Petrie (1975) Professor Emeritus, 2010; Language & Humanities
Chester A. Pinkham (1967) Professor Emeritus, 2002; Chemistry
R. John Reynolds (1993) President Emeritus, 2000
Richard A. Ruselink (1966) Associate Professor Emeritus, 2004; Mathematics
Lawrence Samuelson (1983) Professor Emeritus, 2010; Electrical & Computer Engineering
William San Giacomo (1965) Associate Professor Emeritus, 2012, Sport Management
Ronald E. Scheffer (1967) Professor Emeritus, 2005; Social Sciences
Leonard E. Sheffield (1966) Professor Emeritus, 1998; Business Administration
Alan R. Stoudinger (1962) Professor Emeritus, 2003; Electrical & Computer Engineering
Billy E. Sunday (1946) Vice President & Treasurer Emeritus, 1983
Frank Swenson (1982) Professor Emeritus, 1998; Mechanical Engineering
David Syler (1968) Professor Emeritus, 2009; Mathematics
Donald L. Trennepohl (1966) Professor Emeritus, 1973; Business Administration
Dolores Tichenor (1967) Professor Emeritus, 2010; Mathematics
W. Henry Tucker (1969) Professor Emeritus, 1984; Chemical Engineering
David E. Wagner (1997) Professor Emeritus, 2011; School of Professional Studies

William J. Walter (1972) Professor Emeritus, 1993; Business Administration

Robert Whelchel (1969-72, 1974), Professor Emeritus, 2008; Electrical & Computer Engineering

James Zimmerman (1973) Professor Emeritus, 2005; Arts & Sciences

CALENDAR

Fall Semester 2012

August 21	Classes begin
September 3	Labor Day (no classes)
October 1-2	October break (no classes)
November 21-23	Thanksgiving break (no classes)
December 7	Last class day
December 10-13	Final exams

Spring Semester 2013

January 8	Classes begin
January 21	Martin Luther King Jr. Day
March 4-8	Spring Break
March 29	Good Friday
April 26	Last Class Day
April 29-May 2	Finals
May 4	Commencement