

TRINE UNIVERSITY MINORS

- ACCOUNTING
- AERONAUTICAL ENGINEERING *(MECHANICAL ENGINEERING)
- ATHLETIC TRAINING
- BIOLOGY
- BIOPROCESS ENGINEERING *(CHEMICAL ENGINEERING)
- BUSINESS
- CHEMISTRY
- COMMUNICATION
- CRIMINAL JUSTICE
- ECONOMICS
- ENERGY ENGINEERING MINOR
- ENTREPRENEURSHIP
- ENVIRONMENTAL ENGINEERING *(CHEMICAL ENGINEERING, CIVIL ENGINEERING)
- FINANCE
- GOLF MANAGEMENT
- HISTORY
- HUMANITIES
- INTERNATIONAL STUDIES
- 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)
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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	393	Advanced Athletic Training	(3)
EXS	403	Remedial Exercise & Rehabilitation	(3)
EXS	423	Evaluation of Athletic Injuries	(3)
EXS	443	Therapeutic Modalities	(3)
HPE	332	Drug Education	(2)
HPE	343	Sport Psychology	(3)
HPE	413	Organization & Administration of Athletics	(3)
HPE	483	Internship in Sports Medicine	(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	
ES3		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)
MK	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.

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)
MK	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 333 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 **24-25 HRS.**

HUM	401	Humanities Portfolio	(1)
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HUMANITIES APPRECIATION COURSES **9 HRS.**

Choose nine (9) hours from: (9)

ARC	292	Architecture Appreciation
ART	252	Art Appreciation
ENG	153	Introduction to Literature
FLM	202	Film Appreciation
MUS	272	Music Appreciation
SP	102	Introduction to Theater

HUMANITIES CONDITION COURSES **3HRS.**

Choose three (3) hours from: (3)

ENG	433	Shakespeare
GEO	303	Human Geography
MGT		
PHL	313	Ethics
WS	103	Intro to Women's Studies

LANGUAGE **6HRS.**

Choose one group from the following languages: (6)

SPN	113	Spanish Reading & Writing I
<u>and</u>		
SPN	123	Spanish II
or		
FRN	113	French I
<u>and</u>		
FRN	123	French II
or		
CHN	113	Chinese I
<u>and</u>		
CHN	123	Chinese II

FOCUS AREA **5-6HRS.**

Choose two (2) courses from one of the following foci. (5-6)

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	212	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:

24-25 HRS.

INTERNATIONAL STUDIES MINOR

24 HRS.

COM	233	Intercultural Communication and 1 year of foreign language at the college level
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(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.

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	333	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	333	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.
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METALLURGICAL ENGINEERING MINOR			28 HRS.
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(MECHANICAL ENGINEERING)

The curriculum is designed to prepare students for professional engineering careers that require specialized training in metallurgy or for graduate studies in the metallurgical engineering field. A grade of C or better is required for all courses in the minor.

REQUIRED SCIENCE COURSE		4 HRS.
CH	104 General Chemistry I	
	or	
CH	104H Honors General Chemistry I	(4)
REQUIRED ENGINEERING SCIENCE COURSE		3 HRS.
ES	233 Engineering Materials	(3)
REQUIRED MATHEMATICS COURSE		3 HRS.
MA	393 Probability and Statistics	(3)
REQUIRED MECHANICAL ENGINEERING COURSES		18 HRS.
MAE	243 Manufacturing Processes and Equipment	(3)
MAE	383 Metallurgical Thermodynamics	(3)
MAE	393 Metallurgical Transport	(3)
MAE	443 Engineering Metallurgy	(3)
MAE	4143 Physical Metallurgy	(3)
MAE	4193 Metal Casting	(3)
TOTAL IN MINOR PROGRAM		28 HRS.

MUSIC MINOR		24 HRS.
MUS	111 Piano Class	(1)
MUS	113 Music Theory I	(3)
MUS	123 Music History I	(3)
MUS	213 Music Theory II	(3)
MUS	223 Music History II	(3)
MUS	253 Beginning Conducting	(3)
SELECT APPLIED STUDIES		4 HRS.
MUS	1011 Applied Studies (Woodwind, Brass, Percussion, String, Voice)	(1)
SELECT ENSEMBLE STUDIES		4 HRS.
Choose from:		
MUS	1141 Chamber Orchestra	(1)
MUS	1151 Marching Band	(1)
MUS	1161 Wind Ensemble/Pep Band	(1)
MUS	1171 University Choir	(1)
MUS	1181 Jazz Band	(1)
MUS	1191 Trine Chorale	(1)
TOTAL IN MINOR PROGRAM:		24 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)

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

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
(FOR ANY STUDENT AT TRINE UNIVERSITY)**

28 HRS.

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.
