Department of Applied Engineering

(College of Humanities, Arts and Sciences)

https://chas.uni.edu/aetm

The Department of Applied Engineering offers the following programs:

Undergraduate Majors (B.S.)

- Automation Engineering Technology (p. 1)
- Electrical Engineering Technology (p. 2)
- Manufacturing Engineering Technology (p. 2)
- Materials Science and Engineering (p. 3)
- Materials Science Engineering Technology (p. 4)
- Mechanical Engineering Technology (p. 4)
- Technology and Engineering Education-Teaching (p. 5)

Undergraduate Majors (B.A.)

- Graphic Technology (p. 6)
- Industrial Management (p. 6)

Minors

- Electrical and Electronics Technology (p. 7)
- Graphic Technology (p. 7)
- Manufacturing Technology Design (p. 7)
- Materials Science and Technology (p. 8) (also listed in Department of Chemistry and Biochemistry and Department of Physics)
- Metal Casting (p. 8)
- Technology Education - Teaching (p. 8)

Graduate Major (M.S.)

- Applied Engineering (p. 9)

Program Certificates

- Applied Systems Engineering Management (p. 10) (graduate certificate)
- Industrial Management (p. 10)

Bachelor of Science Degree Programs

Automation Engineering Technology Major

The B.S. Automation Engineering Technology major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Automation Engineering Technology program will provide industry-relevant training and hands-on experience for students to apply automation engineering technology knowledge to industry and manufacturing for process control and system review. Students will be trained on sensors, instrumentations, electrical power, computer programming for controllers, process control, pneumatics and hydraulics, and mechanical systems to solve engineering and technology problems. Students will have a chance to work with industry level state-of-the-art equipment to apply their theoretical knowledge as well as programming industry level controllers to implement Industry 4.0 standards.

Math and Science:		
MATH 1150	Calculus for Technology [^]	4
STAT 1772	Introduction to Statistical Methods [^]	3
PHYSICS 1511	General Physics I [^]	4
CS 1160	C/C++ Programming	3
Required Core:		
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
TECH 1037	Introduction to Circuits	3
TECH 1039	Circuits and Systems	3
TECH 2053	Digital Electronics	4
TECH 2055	Electrical Power Systems & Machinery	4
TECH 3160/5160	Computer-Aided Instrumentation and Interfacing	3
TECH 3164	Programmable Logic Controllers (PLCs)	3
TECH 1010	Fundamentals of Metal Removal	3
TECH 1024	Engineering Design with CAD	3
TECH 2065	Industrial Robotics	3
ENGR 2080	Statics	2
ENGR 2180	Strength of Materials	2
TECH 3147	Computer Aided Manufacturing	3
TECH 3148	Machine Design	3
TECH 4162	Hydraulics & Pneumatics	3
ENGR 4500	Senior Design [@]	3
Electives		9 - 10
Complete three of the following:		
TECH 2051	Analog Electronics	
TECH 4104/5104	Applied Digital Signal Processing [*]	
TECH 3129	Linear Control Systems [*]	
TECH 4167/5167	Power Electronics Applications [*]	
TECH 3157/5157	Microcontroller Applications [*]	

TECH 4103/5103	Electronic Communications *	
TECH 4165/5165	Wireless Communication Networks *	
TECH 1008	Basic Manufacturing Processes	
TECH 2024	Technical Drawing with GD&T	
TECH 2119	Computer Applications in Technology	
TECH 2072	Engineering Materials *	
TECH 2114	Making Cool Stuff	
TECH 3113	Manufacturing Tooling *	
TECH 3131/5131	Technical Project Management	
TECH 3142	Statistical Quality Control	
TECH 3143	Managing Operations and Manufacturing Systems	
TECH 3196	Industrial Safety	
TECH 3179 Cooperative Education		
Total Hours		**80-81**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

* These courses have additional prerequisites.

@This course meets the Bachelor of Science undergraduate research course requirement.

Electrical Engineering Technology Major

The B.S. Electrical Engineering Technology major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Electrical Engineering Technology major provides theoretical and hands-on experience in the field of electrical circuits, conventional and renewable electrical energy, analog/digital electronics, microprocessors, modern electronic communication systems, digital signal processing, power electronics, control systems, networking, and their applications. The Electrical Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org.

Mathematics (take two of the following four courses):		8
MATH 1140	Precalculus ^	
MATH 1150	Calculus for Technology	
MATH 1420	Calculus I	
MATH 1421	Calculus II	
STAT 1772	Introduction to Statistical Methods ^	3
Computer Science:		
CS 1160	C/C++ Programming	3
Physics:		
PHYSICS 1511	General Physics I ^	4
Required Core:		
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
TECH 1037	Introduction to Circuits	3
TECH 1039	Circuits and Systems	3
TECH 2051	Analog Electronics	4
TECH 2053	Digital Electronics	4
TECH 2055	Electrical Power Systems & Machinery	4
TECH 3129	Linear Control Systems	3
TECH 3157/5157	Microcontroller Applications	3
TECH 3160/5160	Computer-Aided Instrumentation and Interfacing	3
TECH 3164	Programmable Logic Controllers (PLCs)	3
TECH 4103/5103	Electronic Communications	3
TECH 4104/5104	Applied Digital Signal Processing	3
TECH 4165/5165	Wireless Communication Networks	3
TECH 4167/5167	Power Electronics Applications	3
ENGR 4500	Senior Design @	3
Recommended Electives:		
TECH 3179 Cooperative Education		
CS 1510	Introduction to Computing	
TECH 1024	Engineering Design with CAD	
TECH 3196	Industrial Safety	
PHYSICS 1512	General Physics II	
TECH CM 1015	Introduction to Sustainability	
TECH 3131/5131	Technical Project Management	
Total Hours		**75**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

@This course meets the Bachelor of Science degree undergraduate research course requirement.

Additional Program Requirements:

1. All 4000 level technology courses must be taken at UNI, i.e. no transfer is accepted for 4000 level technology courses.

2. All students in the program must have a UNI GPA of 2.00 or higher before they are allowed to take any TECH courses they have not already taken.

Manufacturing Engineering Technology Major

The B.S. Manufacturing Engineering Technology major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Manufacturing Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org.

Math and Science:		
MATH 1420	Calculus I	4
CHEM 1020	Chemical Technology	4
or CHEM 1110	General Chemistry I	
PHYSICS 1511	General Physics I ^	4
or PHYSICS 1701	Physics I for Science and Engineering	
Computer Science:		
CS 1510	Introduction to Computing	3-4
or CS 1160	C/C++ Programming	
Required Core:		
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
TECH 1008	Basic Manufacturing Processes	3
TECH 1010	Fundamentals of Metal Removal	3
TECH 1024	Engineering Design with CAD	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH 2024	Technical Drawing with GD&T	3
TECH 2036	Power Technology	3
TECH 2065	Industrial Robotics	3
TECH 2072	Engineering Materials	3
TECH 3113	Manufacturing Tooling	3
ENGR 2080	Statics	2
ENGR 2180	Strength of Materials	2
TECH 3136	Principles of Metal Casting	3
TECH 3142	Statistical Quality Control	3
TECH 3143	Managing Operations and Manufacturing Systems	3
TECH 3147	Computer Aided Manufacturing	3
TECH 3177	Advanced Manufacturing Processes	3
TECH 4137	Tooling Practices in Metal Casting	3
TECH 4162	Hydraulics & Pneumatics	3
ENGR 4500	Senior Design @	3
Recommended Electives		
TECH 3179 Cooperative Education		
TECH 3131/5131	Technical Project Management	
Total Hours		**79-80**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

@ENGR 4500 meets the Bachelor of Science undergraduate research course requirement.

Materials Science and Engineering Major

The B.S. Materials Science and Engineering major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Materials Science and Engineering (MSE) major provides students with instruction and practical experience in the science and engineering of materials, with a focus on metals. In addition to gaining skills in engineering design and materials properties, students will learn to design materials using computation.

Admission Requirements:

To be admitted to the B.S. in Materials Science and Engineering program, students must satisfy UNI's admission requirements and be prepared to take Calculus I. Preparation for Calculus I can be demonstrated with a satisfactory ALEKS score or MATH 1140 Precalculus or equivalent.

Math and Science:		
CHEM 1110 & CHEM 1120	General Chemistry I and General Chemistry II	5-8
or CHEM 1130	General Chemistry I-II	
MATH 1420	Calculus I	4
MATH 1421	Calculus II	4
MATH 2422	Calculus III	4
PHYSICS 1701	Physics I for Science and Engineering	4
PHYSICS 1702	Physics II for Science and Engineering	4
PHYSICS 2700	Mathematical Methods of Physics & Engineering	3
or MATH 3425/5425	Differential Equations	
PHYSICS 4750/5750	Physics of Modern Materials	3
PHYSICS 4760/5760	Computational Materials Science	3
PHYSICS 4900/5900	Thermodynamics and Statistical Mechanics	4
CHEM/PHYSICS 4200	Nanoscience	3
STAT 3751	Probability and Statistics	3
Technology and Engineering:		
ENGR 1000	Introduction to Engineering & Professional Practice	3
ENGR 2080	Statics	2
ENGR 2089	Engineering Seminar: (Topic)	1
ENGR 2180	Strength of Materials	2
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH 1024	Engineering Design with CAD	3
TECH 2072	Engineering Materials	3
TECH 3127	Applied Thermodynamics	3
TECH 3132/5132	Metallurgy and Phase Transformation	3

TECH 3136	Principles of Metal Casting	3
TECH 3192/5192	Non-Destructive Evaluation of Materials/Scanning Electron Microscopy	3
ENGR 4235/5235	Material Transformations & Modeling	3
ENGR 4500	Senior Design @	3
Technical Electives - 12 credits of course work approved by your academic advisor.		12
Total Hours		**97-100**

@ENGR 4500 meets the Bachelor of Science degree undergraduate research course requirement.

Materials Science Engineering Technology Major

The B.S. Materials Science Engineering Technology major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Materials Science Engineering Technology (MSET) major provides students with instruction and practical experience in the science and engineering of materials, with a focus on metals. Significant lab work and a senior design project allow students to build and test their technical and communication skills and ensure that graduates are prepared for the workplace.

Admission Requirements:

To be admitted to the B.S. in Materials Science and Engineering program, students must satisfy UNI's admission requirements and be prepared to take calculus. Mathematical preparation can be demonstrated with a satisfactory ALEKS score or MATH 1140 Precalculus or equivalent.

Math and Science:		
CHEM 1110 & CHEM 1120	General Chemistry I and General Chemistry II	5-8
or CHEM 1130	General Chemistry I-II	
MATH 1420	Calculus I	4
or MATH 1150	Calculus for Technology	
PHYSICS 1511	General Physics I ^	4
or PHYSICS 1701	Physics I for Science and Engineering	
PHYSICS 1512	General Physics II	4
or PHYSICS 1702	Physics II for Science and Engineering	
CHEM 2320	Chemical Analysis	3
CHEM 2330	Chemical Analysis Laboratory	2
Required Core:		
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
ENGR 2080	Statics	2
ENGR 2089	Engineering Seminar: (Topic)	1
ENGR 2180	Strength of Materials	2
TECH 1024	Engineering Design with CAD	3
TECH 2072	Engineering Materials	3
TECH 3127	Applied Thermodynamics	3
TECH 3136	Principles of Metal Casting	3
TECH 3142	Statistical Quality Control	3
TECH 3164	Programmable Logic Controllers (PLCs)	3
TECH 3192/5192	Non-Destructive Evaluation of Materials/Scanning Electron Microscopy	3
TECH 3196	Industrial Safety	3
ENGR 4500	Senior Design @	3
Technical Electives - 12 credits of course work approved by your academic advisor.		12
Total Hours		**78-81**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

@ENGR 4500 meets the Bachelor of Science degree undergraduate research course requirement.

Mechanical Engineering Technology Major

The B.S. Mechanical Engineering Technology major requires a minimum of 120 total credits. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

Math and Science:		
MATH 1420	Calculus I	4
CHEM 1020	Chemical Technology	4
or CHEM 1110	General Chemistry I	
PHYSICS 1511	General Physics I ^	4
or PHYSICS 1701	Physics I for Science and Engineering	
Computer Science:		
CS 1510	Introduction to Computing	3-4
or CS 1160	C/C++ Programming	
Required Core:		
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
TECH 1008	Basic Manufacturing Processes	3
TECH 1010	Fundamentals of Metal Removal	3
TECH 1024	Engineering Design with CAD	3
TECH 2024	Technical Drawing with GD&T	3
TECH 2036	Power Technology	3
TECH 2065	Industrial Robotics	3

TECH 2072	Engineering Materials	3
ENGR 2080	Statics	2
ENGR 2180	Strength of Materials	2
TECH 3024/5024	Solid Modeling and Additive Manufacturing for Design	3
TECH 3127	Applied Thermodynamics	3
TECH 3135/5135	Product Design	3
TECH 3136	Principles of Metal Casting	3
TECH 3148	Machine Design	3
TECH 4137	Tooling Practices in Metal Casting	3
TECH 4162	Hydraulics & Pneumatics	3
ENGR 4500	Senior Design [@]	3
Total Hours		**76-77**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

@ENGR 4500 meets the Bachelor of Science degree undergraduate research course requirement.

Technology and Engineering Education-Teaching Major

The B.S. Technology and Engineering Education-Teaching major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements, the Professional Experiences requirements, Educator Essentials requirements, and the following specified major requirements, to complete the minimum of 120 hours.

This major leads to Iowa BOEE endorsement #140: 5-12 Industrial Technology.

Math and Science:		
CHEM 1020	Chemical Technology	4
PHYSICS 1000 & PHYSICS 1010	Physics in Everyday Life and Physics in Everyday Life Laboratory [^]	4
or PHYSICS 1511	General Physics I	
MATH 1140	Precalculus [^]	4
or MATH 1150	Calculus for Technology	
Required Core:		
TECH 1008	Basic Manufacturing Processes	3
TECH 1010	Fundamentals of Metal Removal	3
TECH 1024	Engineering Design with CAD	3
TECH CM 1000	Fundamentals of Construction Management Materials & Methods	3
TECH 1055	Graphic Communications Foundations	3
TECH 1037	Introduction to Circuits	3
or TECH 3164	Programmable Logic Controllers (PLCs)	
or TECH 2036	Power Technology	
TECH 2065	Industrial Robotics	3
TECH TEE 2020	Transportation Technology	3
Total Hours		**36**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

Professional Experiences

Required:		
EDUC 2341	Teaching Methods l: Industrial Technology Curriculum Planning [*]	3
EDUC 2441	Teaching Internship l: Industrial Technology Instruction l	3
EDUC 3541/5541	Teaching Methods ll: Industrial Technology Lab Management [*, @]	3
EDUC 3641/5641	Teaching Internship ll: Industrial Technology Instruction ll	3
EDUC 4138	Secondary School Teaching	12
Total Hours		**24**

* A grade of C (2.00) or higher is required for all Methods courses.

@EDUC 3541/5541 meets the Bachelor of Science degree undergraduate research course requirement.

Educator Essentials

Required: [*]		
Select one of the following in each category:		
Category 1: The Learner		**3**
EDPSYCH 1500	Reflections on Learning	
EDPSYCH 2068	Development and Learning in Sociocultural Contexts	
EDPSYCH 2100	Creativity and Higher Order Thinking in the Classroom	
SOCFOUND 2243	Rethinking the Learning Society: Education and Its Future(s)	
Category 2: Social Contexts of Learning		**3**
SOCFOUND 2119	Social & Cultural Foundations of Education	
SOCFOUND 2134	A Modern History of Education in the United States	
SOCFOUND 2334	Education Policy and Politics of Education	
TESOL 2015	Language Today	
Category 3: Education for All		**3**
KINES 4152	Adapted Physical Education	
SOCFOUND 3334	Education, Power, and Change	
SOCFOUND 3434	Social Movements and Education	
SPIE 3140	Interdisciplinary and Intersectional Study of Education for All	
SPIE 3150	Meeting the Needs of Diverse Learners in Classrooms	

TESOL 3710	Content Area Strategies for English Language Learners	
Category 4: The Classroom Environment		**3**
EDPSYCH 3200	Deeper Motivation and the Highly Engaged Classroom	
EDPSYCH 3300	Level Up: Gamified Learning Environments	
ELEMECML 4151	Early Childhood Curriculum Development and Organization	
RTNL 3360	Playful Learning and Project-Based Experiences: Techniques for Ed and Recreational Environments	
SOCFOUND 3219	Critical Perspectives on Technology and Education	
Category 5: Effective Pedagogy		**3**
ARTED 4600	Expressive Learning Assessment	
LRNTECH 3600	Technology, Pedagogy, and Learning in the Digital Age	
MEASRES 3510	Assessment for Learning	
TEACHING 3500	Effective Teaching through Differentiation, Technology and Assessment	
Category 6: The Professional Educator		**3**
ELEMECML 3149	Child, Family, School and Community Relationships	
SOCFOUND 3519	Teacher Leadership & Educational Change	
TEACHING 3177	Collaborative Partnerships for Educators	
Total Hours		**18**

* A grade of C (2.00) or higher is required in each Educator Essentials course.

Bachelor of Arts Degree Programs

Graphic Technology Major

The Graphic Technology major provides students with theoretical and hands-on experiences in the graphic communication industry and related disciplines. The Graphic Technology program is accredited by Accrediting Council for Collegiate Graphic Communications, Inc. (accgc.org).

The Graphic Technology major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus university electives, easily allowing students to double major and/or minor in other disciplines.

Required:		
CS 1100	Web Development: Client-Side Coding	3
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH CM 1015	Introduction to Sustainability	3
ENGR 1000	Introduction to Engineering & Professional Practice	3
TECH CM 1016	Computer Aided Design and Drafting	2
TECH 1055	Graphic Communications Foundations	3
TECH 2070	Digital Pre-Media	3
TECH 2114	Making Cool Stuff	3
TECH 2119	Computer Applications in Technology	3
TECH 2405	Introduction to Packaging; 3D Design and Package Prototyping	3
TECH 3131/5131	Technical Project Management	3
TECH 3150/5150	Graphic Communications Imaging	3
TECH 3169	Digital Imaging	3
TECH 3405	Packaging Design, Structure, and Production	3
TECH 4093/5093	Graphic Communications Estimating and Management I	3
TECH 4161	Digital Graphic Communications	3
TECH 4184	Digital Imaging II	3
TECH 4187	Applied Industrial Supervision and Management	3
ENGR 4500	Senior Design	3
Recommended Electives:		
TECH 3179 Cooperative Education		
Total Hours		**62**

Industrial Management Major

The Industrial Management major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

Integrating specific technical background, the Industrial Management major prepares students with a broad spectrum of management skills, critical thinking skills, organizational skills in technological systems for an entry level supervision/management position upon graduation.

Math and Science:		
STAT 1772	Introduction to Statistical Methods ^	3
CHEM 1010	Principles of Chemistry ^	3-4
or CHEM 1020	Chemical Technology	
or CHEM 1110	General Chemistry I	
or PHYSICS 1000	Physics in Everyday Life	
or PHYSICS 1511	General Physics I	
Required Core:		
ENGLISH 1005	College Writing and Research	3

ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH 3100/5100	Engineering Cost Analysis	3
TECH 3131/5131	Technical Project Management	3
TECH 3142	Statistical Quality Control	3
TECH 3143	Managing Operations and Manufacturing Systems	3
TECH 3180	Lean and Sustainable Operations	3
TECH 4187	Applied Industrial Supervision and Management	3
TECH 4225/5225	Integrated Logistics	3
Electives:		15
TECH 1008	Basic Manufacturing Processes	
TECH 1010	Fundamentals of Metal Removal	
TECH CM 1000	Fundamentals of Construction Management Materials & Methods	
TECH 1024	Engineering Design with CAD	
TECH 1055	Graphic Communications Foundations	
TECH 2036	Power Technology	
TECH 2065	Industrial Robotics *	
TECH 2114	Making Cool Stuff	
TECH 3169	Digital Imaging *	
TECH 3179 Cooperative Education		
TECH 3196	Industrial Safety	
Total Hours		**51-52**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

* TECH 3169 has prerequisite of TECH 2070.
TECH 2065 has a prerequisite of CS 1510 or CS 1160; sophomore standing.

Minors

Electrical and Electronics Technology Minor

The Electrical and Electronics Technology minor provides basic theory and hands-on experience in the field of electrical circuits, electrical power and machinery, analog/digital electronics, PLCs and their applications.

Technology:		
TECH 1037	Introduction to Circuits	3
TECH 1039	Circuits and Systems	3
TECH 2051	Analog Electronics	4
TECH 2053	Digital Electronics	4
TECH 2055	Electrical Power Systems & Machinery	4
TECH 3164	Programmable Logic Controllers (PLCs)	3
Mathematics (take one of the following):		4
MATH 1150	Calculus for Technology	
or MATH 1420	Calculus I	
Computer Science take one of the following)		3
CS 1130	Visual BASIC Programming	
or CS 1160	C/C++ Programming	
Physics (take one of the following):		4
PHYSICS 1511	General Physics I ^	
or PHYSICS 1701	Physics I for Science and Engineering	
Total Hours		**32**

^ Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

Graphic Technology Minor

Required:		
TECH 1055	Graphic Communications Foundations	3
TECH 2070	Digital Pre-Media	3
TECH 2119	Computer Applications in Technology	3
TECH 2405	Introduction to Packaging; 3D Design and Package Prototyping	3
TECH 3150/5150	Graphic Communications Imaging	3
TECH 3169	Digital Imaging	3
TECH 4093/5093	Graphic Communications Estimating and Management I	3
TECH 4161	Digital Graphic Communications	3
Total Hours		**24**

Manufacturing Technology Design Minor

Available to all UNI majors except Manufacturing Technology majors.

Required:		
Technology:		
TECH 1024	Engineering Design with CAD	3
TECH 2024	Technical Drawing with GD&T	3
TECH 3024/5024	Solid Modeling and Additive Manufacturing for Design	3
TECH 3135/5135	Product Design	3
Mathematics and Science:		
MATH 1150	Calculus for Technology	4
or MATH 1420	Calculus I	
CHEM 1020	Chemical Technology	4
or CHEM 1110	General Chemistry I	
PHYSICS 1511	General Physics I	4
or PHYSICS 1701	Physics I for Science and Engineering	
Total Hours		**24**

Materials Science and Technology Minor

This is an interdisciplinary minor that is jointly offered by the Departments of Chemistry and Biochemistry, Physics, and Applied Engineering.

Materials science and the use of materials in technology requires the use of concepts from multiple disciplines. This interdisciplinary minor gives students the broad foundation they need to learn about the science of materials and an introduction to how these scientific principles are used in the development and application of materials in new technology. This minor is complementary preparation to a major in Chemistry and Biochemistry, Physics or Manufacturing Engineering Technology for students who are interested in working in industry or going on to advanced study in materials science.

Required:		
Choose one of the following three options: +		**5-8**
Option 1 Chemistry (8 hours)		
CHEM 1110	General Chemistry I	
CHEM 1120	General Chemistry II	
OR		
Option 2 Chemistry (5 hours)		
CHEM 1130	General Chemistry I-II	
OR		
Option 3 Chemistry/Technology (7 hours)		
CHEM 1020	Chemical Technology &	
TECH 3127	Applied Thermodynamics &	
Additional requirements (all three options)		
Choose one of the following sets of Physics courses:		8
PHYSICS 1511 & PHYSICS 1512	General Physics I and General Physics II	
OR		
PHYSICS 1701 & PHYSICS 1702	Physics I for Science and Engineering and Physics II for Science and Engineering	
Additional required (all three options)		
CHEM 4200/5200 or PHYSICS 4200/5200	Nanoscience * Nanoscience	3
TECH 2072	Engineering Materials	3
Electives (all three options) - choose one of the following:		**3-4**
Note: in order to earn the Materials Science and Technology minor, the elective course students take for the minor cannot be a required course for their primary major.		
CHEM 2110	Descriptive Inorganic Chemistry *	
CHEM 2320	Chemical Analysis #	
CHEM 4210/5210 or PHYSICS 4210/5210	Nanotechnology * Nanotechnology	
PHYSICS 4750/5750	Physics of Modern Materials #	
TECH 3132/5132	Metallurgy and Phase Transformation	
Total Hours		**22-26**

+ **There are additional prerequisite courses that must be taken along with the required courses in some options – choose the option that aligns with the courses for your major.**
Prerequisites for TECH 3127: TECH 1024; MATH 1150 or MATH 1420.
Prerequisite or corequisites for PHYSICS 1701: MATH 1420.
Prerequisite or corequisites for PHYSICS 1702: MATH 1421.

* Students who have declared a Materials Science and Technology Minor may take these courses after completing CHEM 1020 Chemical Technology and TECH 3127 Applied Thermodynamics in place of the usual CHEM 1120 General Chemistry II prerequisite.

& These courses are taken by students in the Manufacturing Engineering Technology major.

\# Prerequisite for CHEM 2320: CHEM 1120 or CHEM 1130.
Prerequisite for PHYSICS 4750/5750: PHYSICS 4100/5100 and PHYSICS 4110/5110.

Metal Casting Minor

Math and Science:		
CHEM 1110	General Chemistry I	4
PHYSICS 1511	General Physics I	4
or PHYSICS 1701	Physics I for Science and Engineering	
MATH 1150	Calculus for Technology	4
or MATH 1420	Calculus I	
Technology:		
TECH 1008	Basic Manufacturing Processes	3
TECH 1024	Engineering Design with CAD	3
TECH 2072	Engineering Materials	3
TECH 3192/5192	Non-Destructive Evaluation of Materials/Scanning Electron Microscopy	3
TECH 3136	Principles of Metal Casting	3
TECH 3196	Industrial Safety	3
TECH 4137	Tooling Practices in Metal Casting	3
TECH 4198	Independent Study (Or TECH 3179 Co-op/Internship)	6
Total Hours		**39**

Technology Education Minor-Teaching

This minor leads to Iowa BOEE endorsement #140: 5-12 Industrial Technology.

Required:		
Technology:		
TECH 1008	Basic Manufacturing Processes	3
TECH 1010	Fundamentals of Metal Removal	3
TECH 1024	Engineering Design with CAD	3
TECH CM 1000	Fundamentals of Construction Management Materials & Methods	3

TECH 1055	Graphic Communications Foundations	3
TECH 1037	Introduction to Circuits	3
or TECH 2036	Power Technology	
TECH TEE 2020	Transportation Technology	3
TECH 2065	Industrial Robotics	3
Professional Experieneces:		
EDUC 2341	Teaching Methods l: Industrial Technology Curriculum Planning	3
EDUC 2441	Teaching Internship l: Industrial Technology Instruction l	3
EDUC 3541/5541	Teaching Methods ll: Industrial Technology Lab Management	3
EDUC 3641/5641	Teaching Internship ll: Industrial Technology Instruction ll	3
Total Hours		**36**

**TECH TEE 4200/5200 has prerequisite of TECH TEE 1000.
**TECH 1019 can also be substituted for this course.

Master of Science Degree Program

Major in Applied Engineering

The MS Applied Engineering program is designed to prepare and develop professionals to perform and function as leaders and skilled technologists in the industrial or educational environments. The program includes four emphases: Engineering Management, Information and Electrical Engineering Technology, Metal Casting, and Applied Systems Engineering Management. The curriculum offers both online and face-to-face classes, which are taught by UNI faculty. The program's core courses offer knowledge and skills in research methods, engineering cost analysis, and advanced project management, while the emphasis courses offer in-depth technical contents in specific technology areas. The program promotes a greater depth of understanding of applied technology and management, and technical and professional competency development. It provides opportunities to develop research and application skills directly related to individual competencies, needs, and objectives.

Students interested in this program must submit a completed Application for Admission to Graduate Study and should refer to their MyUNIverse Student Center To-Do list or contact the Department of Applied Engineering for other application requirements. Graduate information and application for graduate admission can be found at https://admissions.uni.edu/application.

The Graduate Record Examination (General Test) **is not** required for admission to the program.

This degree offers a **thesis and non-thesis option**. The four emphases are the following:

1. Information & Electrical Engineering Technology Emphasis - available in both **thesis** and **non-thesis** options;
2. Metal Casting Emphasis - available in both **thesis** and **non-thesis** options;
3. Engineering Management Emphasis - available in both **thesis** and **non-thesis** options;
4. Applied Systems Engineering Management Emphasis - available in **non-thesis** option only.

This major requires as a prerequisite a bachelor's degree with a major in engineering or technology field. Degree admission to the Master of Science in Technology requires an applicant to have:

1. Earned a minimum of 6 semester hours of college mathematics or statistics related content and 6 semester hours of college physics and/or chemistry and biochemistry or other science related content (this may be either graduate or undergraduate credit);
2. Earned a minimum of 15 semester hours in a major technical field and 8 semester hours in supporting technical subjects;
3. A personal statement;
4. Online Application for Graduate Study;
5. TOEFL score of 550 (paper-based) or 79 iBT;
6. Three professional references; and
7. A minimum cumulative undergraduate grade point average of 2.75.

Only graduate courses (course numbers 5000 or above) will apply to a graduate program, even if the undergraduate course number (4999 or less) is listed. No exceptions will be made.

For both the thesis and non-thesis options, the Master of Science Technology degree program requires a **minimum of 30 semester hours. A minimum of 15 hours of 6000-level course work is required for this degree program.** For the thesis option, students must defend and present their research thesis to their committee members and the public.

MS Applied Engineering required core courses:

TECH 3100/5100	Engineering Cost Analysis	3
TECH 3131/5131	Technical Project Management	3
TECH 6292	Research Methods in Applied Engineering	3
TECH 6400	Introduction to Applied Systems Development & Management	3
Any 5000 or 6000 level math content course approved by adviser.		3
Select one of the emphases below (complete emphasis requirements based on choosing thesis or non-thesis option within emphasis).		15
Total Hours		**30**

Information and Electrical Engineering Technology Emphasis: Available in thesis and non-thesis options

TECH 4000/5000	Wind Energy Engineering	3
TECH 6242	Complex Digital System Design	3
TECH 6244	Applied Embedded Systems	3

Choose thesis or non-thesis option:		**6**
Thesis option:		
TECH 6299	Research (Master's Thesis) (- 6 hours)	
Non-thesis option:		
electives approved by advisor (6 hours)		
Total Hours		**15**

Metal Casting Emphasis: Available in thesis and non-thesis options

Take 3 of the following:		9
ENGR 4235/5235	Material Transformations & Modeling	
TECH 6231	Thermodynamics of Material Processing	
TECH 6239	Foundry Management	
TECH 6258	Total Quality Management	
Choose thesis or non-thesis option:		**6**
Thesis option:		
TECH 6299	Research (Master's Thesis) (6 hours)	
Non-thesis option:		
electives approved by advisor (6 hours)		
Total Hours		**15**

Engineering Management Emphasis: Available in thesis and non-thesis options

Take 3 of the following:		9
TECH 6258	Total Quality Management	
TECH 6275	Advanced Lean and Sustainable Operations	
TECH 6295	Advanced Management and Supervision Technology	
TECH 6300	Advanced Technical Project Management for Engineering and Technology	
Choose thesis or non-thesis option:		**6**
Thesis option:		
TECH 6299	Research (Master's Thesis) (6 hours)	
Non-thesis option:		
electives approved by advisor (6 hours)		
Total Hours		**15**

Applied Systems Engineering Management Emphasis: Available in non-thesis option

TECH 6420	Systems Architecture & Management	3
TECH 6440	Systems Engineering & Management	3
TECH 6460	Systems Life Cycle Management & Applications	3
TECH 6500	Applied Systems Development & Management Capstone	6
Total Hours		**15**

Program Certificates

The University of Northern Iowa makes available, in addition to traditional programs, the opportunity for students to earn program certificates. Program certificates provide an alternative to programs leading to a degree, a major, or a minor; they certify that an individual has completed a program approved by the university. For information on the following certificates, contact the Department of Applied Engineering or the Office of the Registrar, which serves as the centralized registry.

Applied Systems Engineering Management Certificate (graduate certificate)

Applied Systems Engineering Management provides a multidisciplinary set of tools and techniques for understanding, organizing, and managing the complexity of product/service solution development throughout the product life cycle. The program emphasis delivers the necessary skills and knowledge essential for successful systems of systems development in today's fast-paced environment. Students will learn a fundamental and systematic approach for a variety of essential elements, how they interact, how they are dependent upon one another leading to overall best practices. The content reflects an agile and lean approach to system development to meet specific business challenges. Students will learn current industry best practices to ensure robust, cost-effective approaches that meet stringent functional, performance, and cost requirements.

Required:		
TECH 6400	Introduction to Applied Systems Development & Management	3
TECH 6420	Systems Architecture & Management	3
TECH 6440	Systems Engineering & Management	3
TECH 6460	Systems Life Cycle Management & Applications	3
TECH 6500	Applied Systems Development & Management Capstone	6
Total Hours		**18**

Industrial Management Certificate

Required:		
STAT 1772	Introduction to Statistical Methods	3
TECH 3100/5100	Engineering Cost Analysis	3
TECH 3131/5131	Technical Project Management	3
or TECH 3143	Managing Operations and Manufacturing Systems	
TECH 3142	Statistical Quality Control	3
TECH 4187	Applied Industrial Supervision and Management	3

TECH 4225/5225	Integrated Logistics	3
Total Hours		**18**