

## ENGR117 : Introduction to Engineering Technology

### General Information

Author:	<ul style="list-style-type: none"><li>Christopher Herwerth</li></ul>
Course Code (CB01) :	ENGR117
Course Title (CB02) :	Introduction to Engineering Technology
Department:	ENGR
Proposal Start:	Spring 2025
TOP Code (CB03) :	(0924.00) Engineering Technology, General (requires Trigonometry)
CIP Code:	(15.0000) Engineering Technologies/Technicians, General.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000603901
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	10/15/2024
Last Cyclical Review Date:	06/12/2024
Course Description and Course Note:	ENGR 117 explores the professional activities and working environment of engineering technology, which is an emerging, hands-on discipline of applied engineering. The role of engineering technology in industry, the history of technology, and the future of the profession of engineering and engineering technology are covered. Students learn specific technical skills and tool use in this activity-based course. Safety and environmental sustainability concerns as well as the effects of technology on society are taught in a collaborative project-based class environment.
Justification:	Mandatory Revision
Academic Career:	<ul style="list-style-type: none"><li>Credit</li></ul>
Mode of Delivery:	No value
Author:	<ul style="list-style-type: none"><li>Christopher Herwerth</li></ul>
Course Family:	No value

### Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none"><li>Engineering Technology</li></ul>
Alternate Discipline:	No value
Alternate Discipline:	No value

## Course Development

### Basic Skill Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

### Course Special Class Status (CB13)

Course is not a special class.

### Pre-Collegiate Level (CB21)

Not applicable.

### Grading Basis

- Grade with Pass / No-Pass Option

### Course Support Course Status (CB26)

Course is not a support course

## General Education and C-ID

### General Education Status (CB25)

Not Applicable

### Transferability

Transferable to CSU only

### Transferability Status

Approved

## Units and Hours

### Summary

<b>Minimum Credit Units (CB07)</b>	3
<b>Maximum Credit Units (CB06)</b>	3
<b>Total Course In-Class (Contact) Hours</b>	90
<b>Total Course Out-of-Class Hours</b>	72
<b>Total Student Learning Hours</b>	162

### Credit / Non-Credit Options

#### Course Type (CB04)

Credit - Degree Applicable

#### Noncredit Course Category (CB22)

Credit Course.

#### Noncredit Special Characteristics

No Value

#### Course Classification Code (CB11)

Credit Course.

Variable Credit Course

#### Funding Agency Category (CB23)

Not Applicable.

Cooperative Work Experience Education

Status (CB10)

### Weekly Student Hours

	In Class	Out of Class
Lecture Hours	2	4
Laboratory Hours	3	0
Studio Hours	0	0

### Course Student Hours

<b>Course Duration (Weeks)</b>	18
<b>Hours per unit divisor</b>	0
<b>Course In-Class (Contact) Hours</b>	
Lecture	36

Laboratory	54
Studio	0
<b>Total</b>	<b>90</b>

**Course Out-of-Class Hours**

Lecture	72
Laboratory	0
Studio	0
<b>Total</b>	<b>72</b>

**Time Commitment Notes for Students**

No value

**Units and Hours - Weekly Specialty Hours**

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

**Pre-requisites, Co-requisites, Anti-requisites and Advisories**

**Advisory**

ESL141 - Grammar And Writing IV

Objectives

- Compose a 400 to 450-word thesis-based essay which: (a) summarizes and cites appropriately a reading passage provided as a prompt, (b) includes a clear thesis statement, (c) uses evidence to support the thesis, (d) shows clear organization into an introduction, body, and conclusion, and (e) uses appropriate rhetorical modes such as comparison/contrast, cause/effect, and persuasion in order to support a thesis.

**OR**

**Advisory**

ENGL101 - Introduction to College Reading and Composition

Objectives

- Read, analyze, and evaluate a variety of primarily non-fiction readings for content, context, and rhetorical merit with consideration of tone, audience, and purpose.

**AND**

**Advisory**

MATH100 - College Algebra for STEM

Objectives

- Perform operations on functions.
- Solve equations including: linear, polynomial, radical, rational, absolute value, exponential and logarithmic.

- Model and solve STEM application problems.

## Entry Standards

Entry Standards

## Course Limitations

Cross Listed or Equivalent Course

## Specifications

Methods of Instruction

Methods of Instruction

Lecture

Methods of Instruction

Laboratory

Methods of Instruction

Discussion

Methods of Instruction

Multimedia

Methods of Instruction

Collaborative Learning

Methods of Instruction

Demonstrations

Methods of Instruction

Guest Speakers

**Methods of Instruction**

Presentations

**Out of Class Assignments**

- Journal Writing (e.g. create entries in an engineering lab journal)
- Calculations (e.g. calculate the rotational speed of a wheel driven by an electric motor)
- Essay (e.g. summarize the steps of the engineering design project)
- Project (e.g. design a solar car from a kit and optimize its speed)
- Research Project with Technical Report (e.g. use library resources to research water filtration, build a water filter and conduct experiments on its effectiveness and then write a technical report or memo on the findings)

**Methods of Evaluation****Rationale**

Exam/Quiz/Test

Quizzes

Activity (answering journal prompt, group activity)

Collaborative Learning (e.g. small group discussion about the environmental effects of technology)

Project/Portfolio

Projects (e.g. program a microcontroller that uses an air pollution sensor to measure particulate matter)

Exam/Quiz/Test

Exams

Presentation (group or individual)

Presentation (e.g. write a technical poster and give an oral presentation on a specific field of engineering technology such as electro-mechanical engineering technology)

Exam/Quiz/Test

Final Exam (e.g. written final exam with an oral practicum component where students explain the proper use of engineering tools or measurement devices)

**Textbook Rationale**

Both books are highly valued and no recently published editions exist.

**Textbooks****Author****Title****Publisher****Date****ISBN**

Michael Hacker

Engineering &amp; Technology

Delmar Cengage Learning

2010

978-1-4180-7389-3

Raymond Landis

Studying Engineering: A Road Map to a Rewarding Career

Discovery Press

2018

978-0-9793487-2-3

**Other Instructional Materials (i.e. OER, handouts)**

No Value

**Materials Fee**

No value

## Learning Outcomes and Objectives

### Course Objectives

Explain the various disciplines and terminology of engineering technology.

Describe social, economic, environmental and ethical impacts of engineering.

Demonstrate safety practices and industry safety standards.

Work and collaborate in a diverse team environment.

Apply unit systems and use engineering measurement tools.

Reference engineering and technological industry standards.

Design, assemble, program and test a robot to perform autonomous tasks.

### SLOs

**Define the various disciplines of engineering technology and compare them to engineering disciplines.**

Expected Outcome Performance: 70.0

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<i>ILOs</i> Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
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	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
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<i>ENGR</i> Civil Engineering	Demonstrate introductory skills using modern engineering tools necessary for engineering practice.
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<i>ENGR</i> Engineering Technology - CAD & Design Drafting	Discuss how the design process and design/drawing techniques are used with other engineering processes to create a finished product.
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<i>ENGR</i> Engineering Entrepreneurship Skill Award	Learn hands-on skills and problem solving techniques for businesses related to engineering design, installation, manufacturing, testing, technical sales, maintenance, and other such topics in engineering technology.
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	Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.
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**Demonstrate the effective use of measurement tools employed by engineering technologists and technicians.**

Expected Outcome Performance: 70.0

ILOs  
Core ILOs

Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.

ENGR  
Civil Engineering

Apply knowledge of mathematics, science and engineering; identify, form and solve engineering problems

Demonstrate introductory skills using modern engineering tools necessary for engineering practice.

ENGR  
Engineering Technology - CAD &  
Design Drafting

Demonstrate skills in the production of working drawings of engineering structures

ENGR  
Computer Engineering AS

demonstrate appropriate technical written, verbal, drawing, and communication skills;

use science and mathematical skills required for occupational needs;

ENGR  
Electrical Engineering A.S. Degree  
Major

use science and mathematical skills required for occupational needs;

ENGR  
Mechanical Engineering - A.S.  
Degree Major

use science and mathematical skills required for occupational needs;

**Analyze the positive and negative effects of engineering and technological designs and developments in the context of environmental sustainability and human and animal safety.**

Expected Outcome Performance: 70.0

ILOs  
Core ILOs

Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.

ENGR  
Civil Engineering

Apply knowledge of mathematics, science and engineering; identify, form and solve engineering problems

Demonstrate introductory skills using modern engineering tools necessary for engineering practice.

ENGR  
Engineering Technology - CAD &  
Design Drafting

Discuss how the design process and design/drawing techniques are used with other engineering processes to create a finished product.

ENGR  
Engineering Entrepreneurship Skill  
Award

Learn hands-on skills and problem solving techniques for businesses related to engineering design, installation, manufacturing, testing, technical sales, maintenance, and other such topics in engineering technology.

Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.

ENGR  
Computer Engineering AS

analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;

design a system, component, or process with supervision of a licensed engineer to meet desired needs.

## Additional SLO Information

**Does this proposal include revisions that might improve student attainment of course learning outcomes?**

No

**Is this proposal submitted in response to learning outcomes assessment data?**

No

**If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.**

No Value

**SLO Evidence**

No Value

## Course Content

### Lecture Content

#### Introduction (2 hours)

- Definition of engineering technology
- Relationship to engineering
- History of engineering and engineering technology
- Engineering technology as an emerging profession

#### Sustainability and Society (2 hours)

- Environmental issues and developmental sustainability
- Effects of technology on the environment and society
- Social justice issues in technological development
- Ethical considerations of engineering design and technology

#### Safety (2 hours)

- Industry standards and governmental regulations (OSHA)
- Workplace safety practices
- Personal protective devices (PPD)
- Industry and corporate attitudes and best practices

#### Careers in Engineering and Engineering Technology (2 hours)

- Engineering technology disciplines
- Job functions and work environment
- Roles of people who work in industry
- Student preparation and study skills
- Academic success strategies for careers in technology
- Time management
- Goals and commitment to your training

#### Measurement and Analysis (3 hours)

- Unit systems. System Internationale (SI) and U.S. Customary
- Precision and accuracy
- Instruments and tools
- Data acquisition, calculations and analysis
- Graphing
- Material properties

#### Design Process (3 hours)

- Engineering design process steps
- Reverse engineering
- Economic, environmental and societal influences on the engineering design process
- Working in teams of diverse individuals
- Harnessing diversity, equity and inclusion in engineering and technology teams for optimized technical designs and outcomes

#### Engineering and Engineering Technology Systems (3 hours)

- Mechanics
- Thermodynamics
- Fluids
- Electrical
- Control systems



- Electro-mechanical
- Mechatronics and robotics
- Computer systems

**Mechanical and Chemical Engineering Technology Oriented Industry Sectors (4 hours)**

- Materials
- Manufacturing
- Processes
- Energy and energy efficiency
- Biotechnology
- Chemical
- Biomedical
- Agricultural
- Aerospace
- Mechatronics and robotics
- Technical drafting and graphics
- Automotive
- Mining
- Robotics

**Civil Engineering Technology Oriented Industry Sectors (4 hours)**

- Construction
- Transportation
- Environmental
- Water resources
- Land surveying and geomatics

**Electrical Engineering Technology Oriented Industry Sectors (4 hours)**

- Energy and Power
- Electronics
- Automotive
- Aerospace
- Communications
- Computer
- Systems engineering technology
- Biomedical
- Robotics

**Computer Engineering Technology Oriented Industry Sectors (4 hours)**

- Information and computer technology
- Networking and communications
- Systems engineering technology, internet of things (IOT)
- Computer architecture
- Robotics and artificial intelligence (AI)

**Applied Science and Engineering (optional topics) (3 hours)**

- Basic and applied statics
- Basic and applied thermodynamics
- Basic and applied fluid control and hydraulic systems
- Control systems for electro-mechanical systems
- Materials and material properties

**Total Hours: 36**

**Laboratory/Studio Content**

**Introduction (2 hours)**

- Definition of engineering technology
- Relationship to engineering
- History of engineering and engineering technology
- Engineering technology as an emerging profession

**Sustainability and Society (5 hours)**

- Environmental issues and developmental sustainability
- Effects of technology on the environment and society
- Social justice issues in technological development

- Ethical considerations of engineering design and technology

**Safety (5 hours)**

- Industry standards and governmental regulations (OSHA)
- Workplace safety practices
- Personal protective devices (PPD)
- Industry and corporate attitudes and best practices

**Careers in Engineering and Engineering Technology (5 hours)**

- Engineering technology disciplines
- Job functions and work environment
- Roles of people who work in industry
- Student preparation and study skills
- Academic success strategies for careers in technology
- Time management
- Goals and commitment to your training

**Measurement and Analysis (6 hours)**

- Unit systems. System Internationale (SI) and U.S. Customary
- Precision and accuracy
- Instruments and tools
- Data acquisition, calculations and analysis
- Graphing
- Material properties

**Design Process (5 hours)**

- Engineering design process steps
- Reverse engineering
- Economic, environmental and societal influences on the engineering design process
- Working in teams of diverse individuals
- Harnessing diversity, equity and inclusion in engineering and technology teams for optimized technical designs and outcomes

**Engineering and Engineering Technology Systems (5 hours)**

- Mechanics
- Thermodynamics
- Fluids
- Electrical
- Control systems
- Electro-mechanical
- Mechatronics and robotics
- Computer systems

**Mechanical and Chemical Engineering Technology Oriented Industry Sectors (4 hours)**

- Materials
- Manufacturing
- Processes
- Energy and energy efficiency
- Biotechnology
- Chemical
- Biomedical
- Agricultural
- Aerospace
- Mechatronics and robotics
- Technical drafting and graphics
- Automotive
- Mining
- Robotics

**Civil Engineering Technology Oriented Industry Sectors (4 hours)**

- Construction
- Transportation
- Environmental
- Water resources
- Land surveying and geomatics

**Electrical Engineering Technology Oriented Industry Sectors (4 hours)**

- Energy and Power

- Electronics
- Automotive
- Aerospace
- Communications
- Computer
- Systems engineering technology
- Biomedical
- Robotics

**Computer Engineering Technology Oriented Industry Sectors (4 hours)**

- Information and computer technology
- Networking and communications
- Systems engineering technology, internet of things (IOC)
- Computer architecture
- Robotics and artificial intelligence (AI)

**Applied Science and Engineering (optional topics) (5 hours)**

- Basic and applied statics
- Basic and applied thermodynamics
- Basic and applied fluid control and hydraulic systems
- Control systems for electro-mechanical systems
- Materials and material properties

**Total Hours: 54**

**Additional Information**

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

No

**GCC Major Requirements**

No Value

**GCC General Education Graduation Requirements**

No Value

**Repeatability**

Not Repeatable

**Justification (if repeatable was chosen above)**

No Value

**Resources**

Did you contact your departmental library liaison?

No

**If yes, who is your departmental library liason?**

No Value

**Did you contact the DEIA liaison?**

No

**Were there any DEIA changes made to this outline?**

No Value

**If yes, in what areas were these changes made:**

No Value

**Will any additional resources be needed for this course? (Click all that apply)**

No Value

**If additional resources are needed, add a brief description and cost in the box provided.**

No Value