

ENGR101 : Engineering Drafting And Basic Design

General Information

Author:	• Christopher Herwerth
Course Code (CB01) :	ENGR101
Course Title (CB02) :	Engineering Drafting And Basic Design
Department:	ENGR
Proposal Start:	Spring 2025
TOP Code (CB03) :	(0953.00) Drafting Technology
CIP Code:	(15.1301) Drafting and Design Technology/Technician, General.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000604036
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	07/16/2024
Last Cyclical Review Date:	06/12/2024
Course Description and Course Note:	ENGR 101 covers the fundamentals of traditional board drafting, descriptive geometry, orthographic projection and the graphical communication of technical engineering information. Students learn to create complete and accurate drawings that concisely communicate an engineering design. Topics include freehand drawing, lettering, and theory of orthographic and multi-view projections. Basic drafting skills, industry standards and technical graphics practices, and engineering and architecture scales are presented. The glass box theory is used to visualize orthographic projection as well as the fundamentals of auxiliary views, coordinate systems, sectioning, dimensioning, intersection of planes, visibility, lines and order of precedence of line types. Coordination dimensioning and geometric dimensioning and tolerancing (GD&T) subjects are covered including location tolerance, datum reference, tolerance symbols and feature control frames.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	No value
Author:	• Christopher Herwerth
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Engineering Support (Surveying, engineering aides)
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 both UC and CSU

Transferability Status

Approved

Units and Hours**Summary****Minimum Credit Units (CB07)** 3**Maximum Credit Units (CB06)** 3**Total Course In-Class (Contact) Hours** 108**Total Course Out-of-Class Hours** 54**Total Student Learning Hours** 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	1.5	3
Laboratory Hours	4.5	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	27
Laboratory	81
Studio	0
Total	108

Course Out-of-Class Hours

Lecture	54
Laboratory	0
Studio	0
Total	54

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

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.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Find, evaluate, analyze, and interpret primary and secondary sources, incorporating them into written essays using appropriate documentation format.

OR

Advisory

ESL151 - Reading And Composition V

Objectives

- Read and critically analyze various academic readings.
- Summarize readings.
- Compose a 500 to 550-word essay which: summarizes and cites appropriately a reading passage; includes a clear thesis statement; uses evidence to support the thesis; shows clear organization into an introduction, body, and conclusion.

Entry Standards

Entry Standards

Course Limitations

Cross Listed or Equivalent Course

STV 151

Specifications

Methods of Instruction

Methods of Instruction	Lecture
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Methods of Instruction	Laboratory
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Methods of Instruction	Multimedia
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Methods of Instruction	Demonstrations
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Methods of Instruction	Presentations
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Out of Class Assignments

- Drawings (e.g. create an engineering drawing)
- Essay (e.g. write a brief summary of an industry organization such as the American Society of Civil Engineers ASCE)

Methods of Evaluation

Rationale

Exam/Quiz/Test	Exams
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Project/Portfolio	Projects (e.g. create a set of engineering drawings of each part of a machinist's vise)
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Exam/Quiz/Test	Final Exam
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Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Kirstie Plantenberg	Engineering Graphics Essentials with AutoCAD 2024 Instruction	SDC Publications	2024	978-1-63057-604-2

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

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Demonstrate rules of orthographic projection by creating detailed multi-view drawings.

Analyze an object and create auxiliary and section views of its features when necessary.

Explain the glass box theory and the geometric relationships of orthographic views.

SLOs

Complete a series of basic drafting assignments utilizing lecture and text information.

Expected Outcome Performance: 70.0

<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.
<i>ENGR</i> Civil Engineering	Demonstrate introductory skills using modern engineering tools necessary for engineering practice.
<i>ENGR</i> Engineering Technology - CAD & Design Drafting	Demonstrate skills in the production of working drawings of engineering structures
<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. Learn the engineering design process and how technical products are made, assembled, and integrated into complex systems.
<i>ENGR</i> Computer Engineering AS	demonstrate appropriate technical written, verbal, drawing, and communication skills;
<i>ENGR</i> Mechanical Engineering - A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;

ENGR demonstrate appropriate technical written, verbal, drawing, and communication skills;
Electrical Engineering A.S.
Degree Major

Produce a series of engineering drawings using orthographic projection theory.

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.

ENGR
Civil Engineering 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
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.

ENGR
Mechanical Engineering - A.S.
Degree Major demonstrate appropriate technical written, verbal, drawing, and communication skills;
use science and mathematical skills required for occupational needs;

ENGR
Computer Engineering AS demonstrate appropriate technical written, verbal, drawing, and communication skills;

ENGR
Electrical Engineering A.S.
Degree Major demonstrate appropriate technical written, verbal, drawing, and communication skills;
use science and mathematical skills required for occupational needs;

Apply basic knowledge of industrial drafting practices through tests and lecture information.

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.

ENGR
Civil Engineering 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
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.

ENGR
Mechanical Engineering - A.S.
Degree Major demonstrate appropriate technical written, verbal, drawing, and communication skills;

ENGR
Computer Engineering AS demonstrate appropriate technical written, verbal, drawing, and communication skills;

ENGR
Electrical Engineering A.S.
Degree Major demonstrate appropriate technical written, verbal, drawing, and communication skills;

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 to Graphic Representation of Physical Objects (2 hours)

- History of drafting and engineering graphics
- Drafting and design
- Civil engineering applications
- Mechanical engineering applications
- Engineering design
- Importance of fundamentals to modern computer aided design
- Industry standards ASME 14.5
- American Design Drafting Association (ADDA)
- American Society of Mechanical Engineers (ASME)
- American Society of Civil Engineers (ASCE)

Instruments and Drafting Tools (2 hours)

- Units of measurement
- Reading scales
- Drafting board, drafting machine, drawing head
- Compass and protractor
- Calipers and micrometers

Geometric Construction (2 hours)

- Geometry of straight line
- Geometry of curves
- Bisecting lines and curves
- Tangencies

Standard Lettering (1 hour)

- Upper case Gothic and other fonts
- Free hand lettering uses in industry today
- Mark ups, field notes and corrections

Theory of Orthographic Drawing (2 hours)

- Glass box theory or concept
- Six principal views and their relationships
- Projection plane and visual rays
- Assumption of infinite distance to a plane
- Normal view

Process and Practice of Orthographic Projection Drawing (2 hours)

- Selection of views
- Projection of views
- Orthographic freehand sketching
- Reading orthographic projection
- Projection of normal surfaces
- Projection of inclined surfaces
- Projection of skewed surfaces
- Projection of curved surfaces

Pictorial Drawing and Sketching (2 hours)

- Axonometric projection
- Isometric projection
- Dimetric projection
- Trimetric projection
- Oblique projection
- Perspective drawing

Auxiliary Views (2 hours)

- Descriptive geometry

- Fold lines
- True length
- True size and shape
- When to create an auxiliary view

Sectioning (1 hour)

- Types of sections
- Standard Full and half sections
- Revolved sections
- Cross hatching conventions and standards

Lines and Line Types (1 hour)

- Solid or edge lines
- Hidden or dashed lines
- Center lines and center marks
- Construction and projection lines
- Line quality and thickness

Civil Engineering Applications (2 hours)

- Elevations
- Topographical maps
- Surveying
- Definition of Geographic Information systems (GIS)
- Definition of Building Information Management (BIM)
- Title block

Mechanical and Manufacturing Engineering Applications (2 hours)

- Fasteners
- Basic hole and shaft systems
- Standard notation for fasteners
- Production drawings
- Drawing notes
- Title block

Engineering Design Process (2 hours)

- Engineering design process steps
- Iteration
- Drawing revision
- Roles of engineers, designers, technologists and technicians

Dimensioning (2 hours)

- Dimension standards
- Coordinate dimensioning
- Arrows and leaders
- Fully defined dimensions
- Clarity and order of dimensions

Geometric Dimensioning and Tolerancing (GD&T) (2 hours)

- Fundamental rules
- GD&T symbols
- Feature control frames
- Datums
- Material condition modifiers
- Maximum and least material conditions
- Importance of GD&T in manufacturing

Total Hours: 27

Laboratory/Studio Content

Introduction to Graphic Representation of Physical Objects (2 hours)

- History of drafting and engineering graphics
- Drafting and design
- Civil engineering applications
- Mechanical engineering applications
- Engineering design
- Importance of fundamentals to modern computer aided design
- Industry standards ASME 14.5
- American Design Drafting Association (ADDA)
- American Society of Mechanical Engineers (ASME)
- American Society of Civil Engineers (ASCE)

Instruments and Drafting Tools (5 hours)

- Units of measurement
- Reading scales
- Drafting board, drafting machine, drawing head
- Compass and protractor
- Calipers and micrometers

Geometric Construction (5 hours)

- Geometry of straight line
- Geometry of curves
- Bisecting lines and curves
- Tangencies

Standard Lettering (2 hours)

- Upper case Gothic and other fonts
- Free hand lettering uses in industry today
- Mark ups, field notes and corrections

Theory of Orthographic Drawing (7 hours)

- Glass box theory or concept
- Six principal views and their relationships
- Projection plane and visual rays
- Assumption of infinite distance to a plane
- Normal view

Process and Practice of Orthographic Projection Drawing (7 hours)

- Selection of views
- Projection of views
- Orthographic freehand sketching
- Reading orthographic projection
- Projection of normal surfaces
- Projection of inclined surfaces
- Projection of skewed surfaces
- Projection of curved surfaces

Pictorial Drawing and Sketching (7 hours)

- Axonometric projection
- Isometric projection
- Dimetric projection
- Trimetric projection
- Oblique projection
- Perspective drawing

Auxiliary Views (7 hours)

- Descriptive geometry
- Fold lines
- True length
- True size and shape
- When to create an auxiliary view

Sectioning (6 hours)

- Types of sections
- Standard Full and half sections
- Revolved sections
- Cross hatching conventions and standards

Lines and Line Types (2 hours)

- Solid or edge lines
- Hidden or dashed lines
- Center lines and center marks
- Construction and projection lines
- Line quality and thickness

Civil Engineering Applications (6 hours)

- Elevations
- Topographical maps
- Surveying
- Definition of Geographic Information systems (GIS)
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Mechanical and Manufacturing Engineering Applications (6 hours)

- Fasteners
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Engineering Design Process (5 hours)

- Engineering design process steps
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Dimensioning (7 hours)

- Dimension standards
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- Fully defined dimensions
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Geometric Dimensioning and Tolerancing (GD&T) (7 hours)

- Fundamental rules
- GD&T symbols
- Feature control frames
- Datums
- Material condition modifiers
- Maximum and least material conditions
- Importance of GD&T in manufacturing

Total Hours: 81

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?

Yes

If yes, who is your departmental library liaison?

Adina Lerner (Technology & Aviation, Visual & Performing Arts)

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