ENGR102 : Engineering Print Reading For Industry

General Information

Author:	• Christopher Herwerth
Course Code (CB01) :	ENGR102
Course Title (CB02) :	Engineering Print Reading For Industry
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) :	Possibly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000583854
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 102 covers the fundamentals of orthographic drawings for visualizing and interpreting engineering print drawings. Students developing skills in welding, machining, manufacturing and computer aided design (CAD) may benefit from this course. Drawing types, symbols, SI and U.S. Customary unit systems, terminology and industry standards such as ASME Y14.5, geometric dimensioning and tolerancing (GD and T) are covered.
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 CSU only

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	54
Total Course Out-of-Class Hours	108
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	3	6
Laboratory Hours	0	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	0
Studio	0

Total	54

Course Out-of-Class Hours

Lecture	108
Laboratory	0
Studio	0
Total	108

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

ESL151 - Reading And Composition V

Objectives

- 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.

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.

Entry Standards

Entry Standards

Course Limitations

Cross Listed or Equivalent Course

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations
Methods of Instruction	Presentations

Out of Class Assignments

- Reading assignments
- Blueprint interpretations
- Essay (e.g. research and write about an industry standard)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Other	Drawing assignments (e.g. creating and isometric view of a machinist vise)
Exam/Quiz/Test	Final examination

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Brown, Walter C. and Ryan K. Brown.	Print Reading for Industry	Goodheart-Willcox	2022	978-1-64564-672-3

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

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Recognize various drafting standards employed in prints.

Demonstrate a knowledge of basic drafting through a series of drawings.

Explain GD&T symbols and terminology referenced in a feature control frame such as, datums, features and features of size, material conditions, form tolerances, and location.

Apply different techniques and drawing symbols to create a blueprint drawing.

Read dimensions to determine the size of a feature in a drawing.

Explain model-based design and electronic 3D print reading.

Interpret technical blueprints including machine shop methods for forming and finishing metals, including holes and gears.

Apply types of dimensions and rules of dimensioning to prints.

Translate auxiliary views, section views, fasteners and threads, and types of fasteners.

Interpret welding drawings including symbols, notes and processes typically found on welding drawings.

Discuss electronics drawings including symbols, notes and procedures included in electrical engineering and electronics design drawings.

SLOs

Interpret orthographic projection drawings in the context of various industry standards in order to successfully communicate the design intent of the project print.

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	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.
ENGR Electrical Engineering A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Mechanical Engineering - A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Computer Engineering AS	demonstrate appropriate technical written, verbal, drawing, and communication skills;
WELD Welding - Certificate	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.
WELD Welding - A.S. Degree Major	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.

Distinguish various types of drawings from different industries such as welding, electronics, machining, architecture, construction and engineering to effectively communicate details of the print. 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	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 Electrical 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 Mechanical Engineering - A.S. Degree Major	demonstrate appropriate technical written, verbal, drawing, and communication skills;
WELD Welding - A.S. Degree Major	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.

WELD Welding - Certificate	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.

Translate basic terminology of geometric dimensioning and tolerancing (GD&T) from a print in order to critically assess the design.

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	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.
ENGR Computer Engineering AS	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Electrical Engineering A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
ENGR Mechanical Engineering - A.S. Degree Major	analyze engineering problems and make appropriate decisions with the supervision of a licensed engineer;
	demonstrate appropriate technical written, verbal, drawing, and communication skills;
WELD Welding - Certificate	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.
WELD Welding - A.S. Degree Major	demonstrate the skills necessary to read engineering drawings, solve technical mathematics problems as they relate to welding tasks.

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 Print Reading (5 hours)

- History of prints including blueprints
- Scope and value of drafting to the technician
- Drawing reproduction processes
- Types and care of prints
- Drawing scales
- Electronic formats for prints
- Engineering drawings and design process
- Industry organizations and standards
- Importance of drawing and reading prints
- Metric and U.S. Customary unit measurement
- Sketching and lettering

Line Conventions (6 hours)
- Types of lines; edge or object lines, hidden, center line, construction lines
- Section view lines, dimension lines
- Lettering standards
- Line quality and consistency
- Surface finish symbols
- Templates
- Measurement tools
- Industry and proprietary rules

Title Block and Annotations (6 hours)
- Title block styles and templates
- Sheet size standards and format
- Title block contents and definition
- Revision history
- Drawing symbols overview
- Drawing scales
- Parts lists and Bill of Materials (BOM)
- Dimensions and surface finish symbols
- Electrical and electronic symbols
- Welding symbols
- Architectural symbols
- Notes
- Welding, architectural, and construction notes and processes
- Trade terms and abbreviations

Geometric Construction (6 hours)
- Parallel and perpendicular lines
- Tangents involving straight lines, circles, arcs
- Bisecting lines and arcs
- Ellipse
- Identification of geometric shapes on drawings
- Two-dimensional shape terminology
- Three-dimensional form orientation
- Industry shop related calculations and math such as multiplication, division, fractions, and word problems

Orthographic Projection (7 hours)
- Definition of orthographic projection
- Glass box concept
- Multiview drawings
- First angle and third angle projections
- Projection lines
- Reference planes
- Selection of views for drawing and layout
- The meaning of lines and surfaces
- Cutting planes and sectional views
- Pictorials; isometric and oblique views

Auxiliary Views and Section Views (6 hours)
- Inclined and oblique surfaces and planes
- Visualizing auxiliary views
- Use of auxiliary views
- True size and shape and foreshortening
- Types of section views; full, half, broken
- Exceptions in section views
- Hatching and material representation

Fasteners (6 hours)
- Standard notation for fasteners
- Types of fasteners
- Metric and U.S. Customary Units

- Fastener materials and mechanical properties
- Pipe thread
- Computer data base and generation of fastener features
- Machining standards, metal finishes, holes and gears

Dimensioning and Tolerancing (7 hours)

- Types and rules of dimensions
- Location and size dimensions
- Dimension lines and extension lines
- Arrow head types
- Industry definitions of tolerance
- Tolerancing methods, standard fits, allowance and tolerance calculations, and feature control frames.
- Geometric dimensioning and tolerancing GD&T
- Symbols and G D & T terminology, datums, features and features of size, material conditions, form tolerances, orientation, profile, runout, and location and composite tolerancing.

Model Based Design (5 hours)

- 3D and electronic prints
- Model based definition and model-based engineering
- Manufacturing and production drawings
- Design revisions and updates
- Communication between designers, technicians, technologists, engineers and managers

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