ENGR-154: COMPUTER AIDED DRAFTING I

Effective Term
Fall 2024

BOT Approval Date
11/09/2023

Discipline
ENGR - Engineering Technology
Course Number
154

Course Title
Computer Aided Drafting I

Short Title
Computer Aided Drafting I

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
2.00

Lab Units
1.00

Total Units
3.00

Hours

Lecture Contact Hours
32-36
Out of Class Hours Lecture
64-72

Lab Contact Hours
48-54
Out of Class Hours Lab
0.00

Total Contact Hours
80 - 90

Total Out of Class Hours
64 - 72

Total Student Learning Hours
144 - 162

Is this an existing Extensive Lab?
No

Do you want to propose this for Extensive Lab?

No

Distance Education

Yes

Distance Education

Distance Education Type

Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:
a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course
b. Any planned face-to-face meetings, such as an orientation or study session, must be optional
c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods: • Orientation - Students must be oriented to the online and face-to-face portions at the start of the course. • Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc. • Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction. • MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students. • Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS. • Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Catalog Description

This course is an introductory course to Computer Aided Drafting (CAD). This course provides students with the necessary skills for entry level drafting careers in fields employing architectural and engineering drawings, surveying and planimetric mapping, and computer aided mapping skills, such as Mechanical Drafting Technicians, Cartography, Geographic Information Systems. Applying cutting edge technology in the field of drafting, students learn concepts of engineering drawing and drafting plans through digital manipulation of design elements.

Requisites

Recommended Preparation

Recommended Preparation (note that students can enroll in the class even if they haven't take the recommended course)
ENGL-C1000 or computer experience or the completion of CSIS-101.

Codes

TOP Code (CB 03)

0953.00* - *Drafting Technology

CIP Code

15.1302 - CAD/CADD Drafting and/or Design Technology/Technician.

Repeatability Code
No

Grading Option
Letter grade OR P/NP

Learning Objectives

Learning Objectives

Learning Objective
1. Demonstrate proficiency in basic computer operations, file management, and drawing assistance procedures, such as symbol libraries, layers, limits, units, drawing scales, and layouts, to set up and manage engineering drawings efficiently.
2. Apply various entity creation commands and keyboard input modes for 2D and 3D object creation, and skillfully modify drawing elements using standard commands like copy, scale, rotate, mirror, extend, fillet, stretch, and array.
3. Utilize identify, list, area, and distance commands to analyze spatial relationships, object properties, user coordinate systems, and dimensions in architectural and mechanical drawings, optimizing work processes.
4. Exhibit competency in creating and interpreting diverse architectural and mechanical drawings, including elevations, details, sectional drawings, and orthographic projections, while adhering to proper dimensioning techniques and text consistency within a drawing.
5. Analyze and evaluate the impact of cultural diversity on engineering drafting practices and the importance of adhering to international standards, such as ANSI, ISO, and JIS, in designing and communicating engineering drawings effectively across different cultures and regions.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will be able to create engineering drawings and designs that adhere to ANSI, ISO, and JIS standards, demonstrating their ability to effectively apply these standards in various engineering disciplines and cater to the needs of different cultures.
2. Students will create designs with respect to customer needs and requirements using available tools and functionality.
3. Students will compose and deliver designs with professional standards for format and data precision.

Program Learning Outcomes

Learning Outcome
Students will demonstrate technical skills used in the industry for engineering technology disciplines such as advanced manufacturing, civil and architectural, and electronics.
Students will use the principles of engineering design to develop a solution, device, or process that resolves or improve an existing solution.
Students will solve technical problems in engineering technology using a combination of mathematics, computer software, scientific principles, and relevant skills.

Institutional Learning Outcomes

Communication: The student will effectively express and exchange ideas through listening, speaking, reading, writing, visual works, and other modes of interpersonal expression.
Information and Technology Literacy: The student will access, interpret, evaluate, and apply relevant information sources and digital media effectively, and in an ethical and legal manner.
Scientific Awareness: The student will apply the scientific method of inquiry to assess potential solutions for real-life challenges by employing science-based knowledge and methodologies in daily life.

Content

Course Lecture Content

1. Personal Computer and Digital Equity
   a. Components of the computer.
   b. Basic computer operations and the use of common commands related to Windows and file management.

   c. The significance of copyright laws and the role of open-source software in promoting equity.
   d. Understanding how access to technology impacts diverse communities.
2. Drawing Standards and Cultural Diversity
   a. Differences between US, European, and Asian drawing standards, highlighting diverse cultural influences on drafting practices.
   b. Intercultural and cross-country communication of CAD data, promoting global collaboration and understanding.
3. Operation of the CAD System
   a. Limits, units drawing scales, layouts (paper space vs. model space) and layers to set up a drawing.
   b. The programs' menu structure.
   c. Drawing assistance procedures (i.e., snap, grid, ortho, polar and osnap)
   d. The geometrical/mathematical significance of object snaps.
   e. The operation of printers and plotters.
   f. Drawing entities using layers and properties.
4. Zooming and Manipulating Views
   a. Zoom in and out of drawings
   b. Viewports/orthographic views for navigating in 3-dimensional drawings.
   c. The difference between the zoom command and the scale command.
   d. Drawing Entities in AutoCAD
   e. Entity creation commands (i.e., line, polylines, insert, hatch, etc.)
   f. Geometrical/mathematical elements of entities.
   g. Keyboard input modes and their significance to object creating in 2D and 3D space.
   h. Absolute, incremental and polar modes to the fields of mechanical drafting, machining and/or architecture.
5. Modifying, Deleting and Editing Operations for the CAD System
   a. Edit using different selection methods.
   b. The undo command.
   c. Drawing elements using standard commands (i.e., copy, scale, rotate, mirror, extend, fillet, stretch, array, etc.)
6. Mathematical proportions for resizing objects.
   a. Properties of layers, line densities and types, and text sizes and styles.
7. Utility and Inquiry Commands
   a. The save command to update drawing files.
   b. Use the identify list, area, and distance commands for figuring point positions, object properties, area, and perimeter.
8. Orthographic Projection
   a. The composition of orthographic projection drawings such as placement of dimensions, line thicknesses and types, and view visualization.
9. Using Dimensions and Text
   a. Techniques for proper dimensioning, including consideration for different measurement systems.
   b. Dimensioning practices for both mechanical and/or architectural.
   c. Dimension and text constancy within a drawing.
   d. Text placement within drawings and understanding the impact of language diversity.
10. Working Drawings
   a. The purpose of working drawings.
   b. The components of a working drawing.
   c. Detailed drawings, with examples from diverse cultural (ANSI / ISO / JIS) and architectural styles.
   d. Assembly drawings.
   e. Revisions/Engineering Change Orders.
   f. Bill of material (material accounting and selection).
11. Sectional Views
   a. Cutting plan lines and section lining symbols for full, partial and offset sectional drawings.
   b. Isometric Drawings
   c. The difference between 3D and isometric drawings.
   d. Setting up the CAD system for creating drawing files for isometric drawings
12. 3D Drawings
   a. The difference between solid modeling and wire frame.
   b. The difference between 3D and isometric drawings.
   c. The function of user coordinate systems (UCS).
   d. Creating solid objects, attach materials
   e. Presenting drawings using lights and the render command.

13. Architectural/Structural Drawings
    a. The architectural floor plan drawing, incorporating designs from various cultures and regions.
    b. Symbol libraries that includes symbols used by different cultures (e.g. ANSI / ISO / JIS)
    c. The CAD system's multiline entity creation techniques.
    d. Architectural elevations, detail, sectional drawings, and schedules that showcase a range of cultural influences.
14. Portfolio
    a. The portfolio used for presenting best work.
    b. Techniques for presenting a portfolio at an employment interview, highlighting cultural competence and the ability to work with diverse teams.

Course Lab Content

1. Introduction to AutoCAD and Basic Drawing Tools
    a. Familiarizing with the AutoCAD interface
    b. Using basic drawing tools (line, circle, rectangle, arc, etc.)
    c. Coordinate systems (absolute, relative, polar)
    d. Basic object selection and modification commands (move, copy, rotate, scale, etc.)
2. Layers, Linetypes, and Lineweights
    a. Understanding layers and their importance
    b. Creating and managing layers
    c. Working with linetypes and lineweights
    d. Assigning properties to objects
3. Precision Drawing and Object Snapping
    a. Using object snaps (endpoint, midpoint, center, etc.)
    b. Drawing with precision using object snap tracking
    c. Introduction to construction lines and rays
    d. Working with the 'Ortho' and 'Polar' modes
4. Advanced Drawing and Editing Techniques
    a. Advanced drawing tools (polyline, spline, ellipse, etc.)
    b. Array command (rectangular, polar, and path array)
    c. Fillet, chamfer, and blend curve
    d. Trim, extend, and break commands
5. Blocks and Groups
    a. Creating and managing blocks
    b. Inserting blocks and using block attributes
    c. Creating and managing groups
    d. Exploding and purging blocks
6. Dimensioning and Annotation
    a. Introduction to dimensioning and dimension styles
    b. Creating linear, aligned, angular, and radial dimensions
    c. Adding leaders, notes, and text
    d. Using multileaders and tolerances
7. Hatching and Gradients
    a. Understanding hatch patterns and their application
    b. Creating and editing hatches
    c. Working with gradients
    d. Using the boundary command
8. 2D Isometric Drawing
    a. Introduction to isometric drawing in AutoCAD
    b. Setting up an isometric grid
    c. Creating isometric objects using 2D drawing tools
    d. Dimensioning and annotating isometric drawings
9. Drawing Standards and Diversity, Equity, and Inclusion
    a. Understanding and comparing ISO, ANSI, and JIS drawing standards
    b. Implementing standard practices in drawings
    c. Promoting diversity, equity, and inclusion in engineering and design
    d. Adapting to international drawing standards and communication

10. Layouts, Viewports, and Plotting
    a. Introduction to layouts and viewports
    b. Creating and managing layout tabs
    c. Setting up viewports and controlling their properties
    d. Plotting and exporting drawings (DWG, PDF, etc.)
11. Introduction to 3D Drawings
    a. Understanding the 3D workspace and navigation
    b. Creating basic 3D shapes (box, cylinder, sphere, etc.)
    c. Using extrude, revolve, loft, and sweep commands
    d. Modifying 3D objects (move, rotate, scale, etc.)
    e. Introduction to 3D visualization and rendering
12. Architectural and Structural Drawings
    a. Creating architectural floor plans, elevations, and sections
    b. Drawing structural elements (columns, beams, footings, etc.)
    c. Using external references (xrefs) and collaboration
13. Portfolio Creation, Presentation, and Working in Diverse Teams
    a. Selecting and organizing your best work from previous labs
    b. Formatting and annotating drawings for portfolio presentation
    c. Creating a digital portfolio using PDF, online portfolio platforms, or personal websites
    d. Tips for presenting your portfolio during interviews and networking events
    e. Best practices for maintaining and updating your portfolio over time
    f. Developing effective communication skills for working in diverse teams
    g. Understanding cultural sensitivity and its importance in a globalized work environment
    h. Strategies for collaborating with overseas manufacturers, including communication etiquette, time zone management, and file-sharing practices.

Methods of Instruction

Method

Individualized Instruction

Integration

Individualized instruction occurs during lecture and lab as the students attempt to learn a new skill in the software while the instructor walks from student to student assisting as necessary to provide individual attention as they work on Lab content creating drawings and/or 3D Parametric models

DE Adaptations for MOI

Video tutorials on topics such as "Zooming and Manipulating Views" will be created with high-quality visuals and clear audio narration. These tutorials will be broken down into bite-sized segments, allowing students to focus on specific skills. Interactive quizzes will be embedded at the end of each segment to reinforce learning. Dedicated virtual office hours will be scheduled at varied times, accommodating different time zones and schedules. During these sessions, students can join video calls with the instructor, share their screens, and receive real-time feedback.

Method

Lab Activities

Integration

The Instructor can incorporate hands-on activities during lab sessions. For example, when teaching about 2D isometric drawing, students can be guided to practice creating isometric objects using 2D drawing tools. By doing so, students can apply their knowledge in a practical context and enhance their understanding of the concepts.

DE Adaptations for MOI

Virtual labs will be designed using state-of-the-art CAD software, replicating real-world drafting scenarios. Each lab will come with a set of objectives, a step-by-step guide, and a list of expected outcomes. Students will have the opportunity to practice, make errors, and iterate in a risk-free setting. Peer reviews can be organized, where students can critique each other's work, provide constructive feedback, and learn from diverse approaches.

Method

Discussion

Integration

The Instructor can encourage students to engage in open discussions during lectures and labs. By fostering a classroom environment that values diverse perspectives and experiences, students can learn from each other's understanding of the material. The Instructor can initiate discussions on topics such as comparing drawing standards, sharing experiences working with different cultures, and reflecting on the importance of diversity, equity, and inclusion in engineering and design.

DE Adaptations for MOI

Online discussion forums will be structured around weekly themes, encouraging students to engage deeply with the content. Each week, students might be presented with real-world scenarios or case studies related to topics like "Drawing Standards and Cultural Diversity". To foster active participation, students will be graded based on the quality of their contributions, responses to peers, and ability to introduce new, relevant topics.

Method

Lecture

Integration

The Instructor can utilize traditional lectures to introduce and explain important concepts and techniques. Lectures should be engaging and interactive, with opportunities for students to ask questions and seek clarification. The Instructor can incorporate real-world examples and case studies from diverse cultural backgrounds to help students better understand the impact of their work in a global context. Topics such as GD&T, parametric modeling, and bills of materials can be explained before students put them into practice in their drawing assignments.

DE Adaptations for MOI

Asynchronous online lectures will be enriched with interactive CAD software simulations, allowing students to practice skills at their own pace. These lectures will be available on-demand, segmented by specific CAD functions for easy navigation. Real-world CAD design examples will be showcased through video demonstrations, emphasizing the practical applications of the skills being taught. Following each lecture, students can access CAD-specific challenges and quizzes on the course platform. Automated feedback mechanisms will immediately address misconceptions and reinforce learning, ensuring that students can review and understand the material without real-time instructor intervention.

Methods of Evaluation

Method

Capstone Project

Integration

Students will be asked to create a portfolio showcasing their best work from the course, including drawings, designs, and projects that demonstrate their understanding and application of CAD techniques. The Instructor can assess the quality, creativity, and technical proficiency of students' work, as well as their ability to present their portfolio effectively during employment interviews or networking events.

DE Adaptations for MOE

Digital portfolios will be hosted on platforms that allow for rich media integration. Students can upload CAD designs, video walkthroughs, and reflective essays. Each portfolio entry will require annotations and narratives, pushing students to articulate their design choices and processes. Peer evaluations will be structured, with students using predefined rubrics to assess each other's work. This peer review process will be facilitated through the CMS, ensuring anonymity and constructive feedback. Instructors will also provide detailed feedback, highlighting strengths and areas for improvement.

Method

Class Work

Integration

In-class activities, such as hands-on practice sessions, group discussions, and peer reviews provide opportunities for the Instructor to assess students' engagement, participation, and application of course content in real-time. The Instructor can offer immediate feedback and guidance, helping students to improve their understanding and performance in the course.

DE Adaptations for MOE

Asynchronous classwork assignments will be designed to mirror real-world drafting scenarios. Students might be tasked with creating detailed CAD designs based on specific requirements or replicating existing designs with modifications. Interactive CAD simulations will be embedded within assignments, allowing students to practice and apply the techniques they've learned. Peer review sessions will be facilitated through the course platform, where students can critique each other's CAD designs, provide constructive feedback, and learn from diverse approaches. Additionally, collaborative group tasks may involve students working together on larger CAD projects, leveraging online collaboration tools to coordinate and share their work. Feedback tools within the CMS will allow instructors to provide point-by-point feedback, highlighting areas of excellence and suggesting improvements.

Method

Exams/Tests

Integration

The Instructor can administer written exams or quizzes during the course to evaluate students' understanding of key concepts, techniques, and drawing standards. These exams can include multiple-choice questions, short-answer questions, and practical problem-solving exercises that require students to demonstrate their knowledge and skills in AutoCAD.

DE Adaptations for MOE

Online exams will be designed to test both theoretical knowledge and practical skills. A mix of question types, from multiple-choice to interactive drag-and-drop, will be used. Scenario-based tasks will present students with real-world challenges, assessing their problem-solving abilities. Proctoring tools, integrated with the CMS, will ensure academic integrity during these exams. Feedback will be comprehensive, with instructors providing insights into correct answers and common mistakes. Review sessions can be organized post-exams, addressing common areas of confusion.

Method

Projects

Integration

Throughout the course, students will complete individual and group projects that require them to apply the concepts and techniques they have learned in practical, real-world situations. The Instructor can evaluate students' projects based on criteria such as accuracy, attention to detail, adherence to drawing standards, and effective collaboration with team members. These projects also allow the Instructor to assess students' ability to adapt to international drawing standards and communicate effectively in diverse teams.

DE Adaptations for MOE

Students will complete individual and group projects remotely, using collaboration tools and project management platforms. The Instructor can evaluate students' projects based on the same criteria as in a face-to-face course, while also considering their ability to collaborate effectively in a virtual environment. Projects can be submitted through the CMS or shared directly with the Instructor for assessment.

Method

Homework

Integration

The Instructor can assign regular homework tasks that require students to practice the techniques and concepts they have learned in class. These assignments can include drawings, designs, or other practical exercises that reinforce the course content. By evaluating students' homework, the Instructor can monitor their progress, provide constructive feedback, and identify areas where additional support or clarification may be needed.

DE Adaptations for MOE

Homework assignments will be contextual, often tied to real-world applications. Detailed instructions, along with grading criteria, will be provided for each assignment. Feedback tools within the CMS will allow instructors to provide point-by-point feedback, using features like inline comments. Students will also have opportunities to resubmit assignments post-feedback, emphasizing the learning process. Collaboration will be encouraged, with students working in pairs or small groups on certain assignments, leveraging online collaboration tools.

Assignments

Assignment Type

Reading

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Formative

Assignment

Formative Reading Assignment: "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny

Objective: Read the article "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny and be prepared to participate in an in-class discussion about the similarities and differences between the ISO GPS and ASME Y14.5 geometric dimensioning and tolerancing systems, as well as their implications for engineering drafting and design.

Instructions:
Read the article

Carefully read the article "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny. (https://www.mdpi.com/2076-3417/11/17/8269)

As you read, take notes on key points, similarities, and differences between the ISO GPS and ASME Y14.5 GD&T and their potential impact on your engineering drafting and design.

Reflect on the article
Reflect on the article's main points and consider how the tolerancing systems might impact your drafting work, particularly when collaborating with international teams who may use a different GD&T System than your company.

Prepare for in-class discussion
Review your notes and reflections from the article, and think about questions or points you would like to bring up during the in-class discussion.

Be prepared to share your understanding of the article's content, the similarities and differences between the ISO GPS and ASME Y14.5 geometric dimensioning and tolerancing systems, and your thoughts on how these differences might impact your approach to making drawings.

Participate in the in-class discussion
Actively engage in the in-class discussion, sharing your thoughts and reflections on the article.
Listen to your classmates' perspectives and contribute to the conversation by asking questions, providing feedback, and offering additional insights.

How assignment will be adapted in online format

In an online format, this assignment is adapted to use CMS's discussion board system:

Formative Reading Assignment: "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny

Objective: Read the article "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny and be prepared to participate in an in-class discussion about the similarities and differences between the ISO GPS and ASME Y14.5 geometric dimensioning and tolerancing systems, as well as their implications for engineering drafting and design.

Instructions:
Read the article

Carefully read the article "Can ISO GPS and ASME Tolerancing Systems Define the Same Functional Requirements?" by Zbigniew Humienny. (https://www.mdpi.com/2076-3417/11/17/8269)

As you read, take notes on key points, similarities, and differences between the ISO GPS and ASME Y14.5 GD&T and their potential impact on your engineering drafting and design.

Reflect on the article
Reflect on the article's main points and consider how the tolerancing systems might impact your drafting work, particularly when collaborating with international teams who may use a different GD&T System than your company.

Post an initial response on CMS discussion board.
Navigate to the CMS discussion board for this assignment.

Write a response (150-200 words) that demonstrates your understanding of the article's content, the similarities and differences between the ISO GPS and ASME Y14.5 geometric dimensioning and tolerancing systems, and your thoughts on how these systems might impact engineering drafting and design. Can the differences between GPS and ASME Y14.5 be resolved?

Post your response on the CMS discussion board following any additional formatting and submission guidelines.
Engage with your classmates' posts
Read and respond to at least two of your classmates' posts (50-100 words per response).

Provide thoughtful comments, ask questions, or offer additional insights.
Engage in respectful and constructive dialogue to deepen your understanding and foster a collaborative online learning environment.

Assignment Type

Writing

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Summative

Assignment

Semester Portfolio Assignment: Engineering Drafting Course

Objective: Create a comprehensive semester portfolio that demonstrates your understanding of drafting techniques, proficiency in working with different international standards (US, European, and Asian), and cultural sensitivity in handling data and collaborating with diverse teams.

Instructions:

1. Introduction
Write a brief introduction (100-150 words) presenting your portfolio, and summarizing your key learnings about drafting techniques, international standards, and cultural sensitivity throughout the course.

2. Work Samples
- Select three work samples from the projects you have completed during the course.

- Ensure that each sample demonstrates your ability to create engineering drawings using a different international standard (US, European, and Asian).

For each work sample, provide the following information:
- Project description (50-100 words)
- Standard used (e.g., ANSI, ISO, DIN, JIS)
- Challenges and unique considerations encountered (50-100 words)

3. Cultural Sensitivity
- For each work sample, discuss how you incorporated cultural sensitivity into your handling of data and collaboration with team members or clients from different regions (100-150 words per sample).
- Include considerations such as design preferences, units of measurement, or communication styles.

4. Reflection
- Write a reflection (200-300 words) on your learning experiences throughout the course, focusing on how your understanding of international drafting standards and cultural sensitivity has evolved.
- Discuss the key skills and knowledge you have gained and their relevance to your future engineering career.

5. Feedback and Improvement
- Include any feedback you have received from your instructor or peers on your work samples.
- Discuss any revisions you have made based on that feedback (100-200 words).
- Explain how this feedback has contributed to your learning and growth as an engineering drafting student.

6. Conclusion
- Write a conclusion (100-150 words) summarizing your semester portfolio, highlighting your key achievements and areas for future improvement.
- Discuss your plans for continued learning and professional development in the field of engineering drafting.

Submission Guidelines:

- Compile your semester portfolio as a single PDF document, ensuring that all components are organized and formatted consistently.
- Include a cover page with your name, course name, and the date of submission.
- Submit your completed semester portfolio through the CMS by the due date listed in the CMS

By following these instructions, you will create a comprehensive semester portfolio that showcases your understanding of different international drafting standards and demonstrates your cultural sensitivity in handling data and working with diverse teams. This assignment will allow you to reflect on your learning experiences and receive valuable feedback to support your ongoing growth and development in the engineering drafting field.

How assignment will be adapted in online format

In a DE environment the assignment is the same, the only difference is students will submit the PDF to the CMS instead of in person.

Course Materials

Textbooks

Shumaker, Terence M.; Madsen, David A.; Madsen David P. (2019). AutoCAD and Its Applications Comprehensive 2020 27th Edition. Goodheart-Willcox Publisher. ISBN: 1635638666

Leach, James A.; Lockhart, Shawna; (2023) AutoCAD 2023 Instructor: A Student Guide for In-Depth Coverage of AutoCAD's Commands and Features; SDC Publications; ISBN978-1-63057-493-2

Open Educational Resources

AutoDesk University: https://www.autodesk.com/autodesk-university/?source=footer
AutoDesk Learn Lab: https://blogs.autodesk.com/learn-lab/

Class Size Information

Class Size

32

Class Size Category

G - Large lab 32

Diversity and Inclusion

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

ENGR-154 Computer Aided Drafting, diversity and inclusion are infused throughout the course content and learning activities. This is achieved by incorporating various perspectives and examples, emphasizing the importance of understanding different cultural approaches to engineering, and promoting an inclusive learning environment. The following are ways in which diversity and inclusion are integrated into the course:

1. Drawing Standards: The course covers the differences between US, European, and Asian drawing standards, highlighting the importance of intercultural communication of CAD data and the implications of sharing that data across different cultures and countries. (See Course Lecture Content Areas 2.a, 2.b, 9.d, 10.c, 13.c; Course Lab Content Areas: 9, 13.g,13.h, See Learning Objective #5, and Learning Outcome #1)

2. Global manufacturing comparison: Students are exposed to a reading assignment comparing low-cost countries of manufacturing such as Mexico, China, Vietnam, and India, focusing on how they handle engineering drawings, geometric dimensioning and tolerancing, units, and standards. This helps students understand the unique challenges and opportunities presented by working with manufacturers in these countries and the importance of adhering to international standards when collaborating on global engineering projects. (See Course Lecture Content Areas 2.a, 2.b, 9.d, 10.c, 13.c; Course Lab Content Areas: 9, 13.g,13.h, See the reading discussion on GPS vs ASME Y14.5, See the Portfolio Assignment)

3. Inclusive learning environment: The course encourages students to work in diverse teams, fostering collaboration and understanding among peers from different backgrounds. This promotes an inclusive learning environment where students can learn from each other's experiences and perspectives. (See course lab content 13.f, see the discussion in the reading assignment ASME Y14.5)

4. Discussion of equity and the digital divide: The course content incorporates discussions about the issues of equity related to the technological divide in the availability of machines capable of running CAD software. This helps students understand the challenges faced by engineers in different parts of the world and the importance of promoting access to technology for all. (See Course content 1.a)

By integrating these aspects, the Engineering Drafting course aims to create an inclusive and diverse learning experience that exposes students to a wide range of perspectives and prepares them to work effectively in a global engineering environment.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

The course includes multi-modal methods of instruction (visually, auditory, verbal, and hands-on) to accommodate diverse learners. Tutorials presented in multimodal ways help scaffold students before reaching a summative assessment.

In this course, students will be able to follow a combination of written tutorials CAD tutorials, follow Video CAD tutorials that relate to the different aspects of the class. For example, students will be able to follow a tutorial on creating section views either by following a video on the CMS, or following the written instructions supplement with pictures posted to CMS.

Students are provided a variety of means to interact with the material and instructors beyond class time to help students balance work, life, and academic obligations.

Interactions

Explain how the course will incorporate student-to-student interaction.

The course will heavily emphasize student-to-student interaction to promote collaboration and facilitate the exchange of ideas. Peer review sessions will be implemented to allow students to provide constructive feedback on each other's work, helping to improve the quality of their engineering drawings and designs. The instructor will also encourage students to participate in group projects to promote teamwork and foster an environment of shared learning. Additionally, discussions and activities will be incorporated into the

course to encourage students to share their experiences and collaborate with their peers on the use of CAD data by various cultures and the issues of equity related to the technological divide on the availability of machines capable of running CAD.

Discussion Boards will be utilized to provide students with a platform to ask questions, discuss course material, and engage in collaborative learning. In-class activities such as group problem-solving exercises and interactive lectures will also be conducted to encourage student participation and promote interaction among classmates. Finally, the instructor will encourage students to form study groups and work collaboratively outside of class to enhance their understanding of course material.

Explain how the course will incorporate instructor-to-student interaction.

The instructors will facilitate communication with the students in a variety of ways depending on how modality of the course:

1. Office hours and one-on-one consultations: In both face-to-face and online settings, the Instructor can offer regular office hours or virtual consultations for students to ask questions, discuss concerns, and seek guidance on their work. This individualized attention allows the Instructor to provide personalized feedback and support tailored to each student's needs.

2. Active participation during lectures and labs: In a face-to-face setting, the Instructor can encourage active participation by asking questions, facilitating group discussions, and involving students in hands-on lab activities. In an online anytime setting, the Instructor can create interactive video lectures or host live virtual sessions to engage with students, answer questions, and provide real-time support.

3. Discussion forums and online collaboration: For both face-to-face and online courses, the Instructor can utilize online discussion forums or collaboration tools to interact with students, answer questions, and provide guidance on course content and assignments. These platforms facilitate ongoing communication between the Instructor and students and can help build a sense of community among learners.

4. Personalized feedback on assignments and projects: The Instructor can provide detailed, individualized feedback on students' assignments, projects, and exams to help them understand their performance, identify areas for improvement, and develop strategies for success. In both face-to-face and online settings, timely feedback is essential for promoting learning and growth.

5. Group projects and peer review: The Instructor can take an active role in facilitating group projects and peer review activities, offering guidance, addressing challenges, and ensuring that students are engaging in meaningful collaboration. In face-to-face settings, the Instructor can monitor group progress during class time, while in online anytime settings, the Instructor can provide support through virtual meetings or communication tools.

6. Check-ins and progress monitoring: In both teaching modalities, the Instructor can regularly check in with students to assess their progress, address concerns, and provide encouragement. These check-ins can take the form of individual meetings, progress reports, or targeted feedback based on students' performance in the course.

Explain how the course will incorporate student-to-content interaction.

Students will interact with the material in a number of ways. Typically the material will be presented to the students through the CMS, even in the face-to-face courses. Here are some specific examples to this course how the students will interact with the material:

1. Interactive Tutorials: Students can engage with SolidWorks tutorials that provide step-by-step guidance, allowing them to actively practice the software's features and tools. (See Assessment #3)

2. Reading Assignments: Students will read articles related to multicultural manufacturing, enhancing their understanding of the course material's broader context. (See Assessment #5)

3. Quizzes and Assessments: Students will complete quizzes and assessments to test their knowledge and understanding of the course content, receiving immediate feedback on their performance.

4. Project-based Learning: Students will work on a portfolio project that integrates the course content, allowing them to apply their knowledge and skills in a practical context.

Explain how the course will incorporate student-to-self interaction (metacognitive).

Engineering drawings require a great deal of self-assessment. It is common industry practice for drafters and engineers to check their own drawings before handing them to peer review. For many assignments, the instructor can provide rubrics, checklists, and self-assessment tools that enable students to evaluate their own work. This will allow them to identify their strengths and weaknesses, and encourage students to take responsibility for their own drawings.

This class also incorporates peer review, which is the time-honored engineering tradition of checking other peers' drawings. Incorporating peer review activities can help students gain insights into their own drawing processes by evaluating and learning from their classmates' work. As students provide constructive feedback on their peers' drawings, they can identify successful techniques, areas for improvement, and creative approaches, which can be applied to their own work. This process encourages students to think critically about their drawing processes and fosters a collaborative learning environment.

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