ENGR-756: SOLIDWORKS I

Effective Term
Fall 2024

BOT Approval Date
12/14/2023

Discipline
ENGR - Engineering Technology
Course Number
756

Course Title
SolidWorks I

Short Title
Solidworks 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 designed to introduce the student to three-dimensional parametric solid modeling with SolidWorks. Students will begin with basic parametric solid modeling techniques advancing into complex assemblies. This course will prepare students for the Certified SolidWorks Associate (CSWA) exam.

Requisites

Recommended Preparation

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

Codes

TOP Code (CB 03)
0953.40* - *Mechanical Drafting

CIP Code
15.1306 - Mechanical Drafting and Mechanical Drafting CAD/CADD.

Repeatability Code
No

Grading Option
Letter grade OR P/NP

Learning Objectives

Learning Objectives

Learning Objective
1. Demonstrate proficiency in SolidWorks operations, file management, and sketching techniques, such as geometric relations, dimensions, and construction geometry, to create and manage 3D models and 2D drawings efficiently.
2. Apply various feature creation tools and commands for 3D model creation, and skillfully modify 3D models using standard commands like extrude, revolve, sweep, loft, fillet, chamfer, and draft.
3. Utilize assembly management, mates, constraints, and exploded views to analyze and optimize component relationships, spatial arrangements, and design intent in complex assemblies, enhancing overall design functionality and performance.
4. Exhibit competency in creating and interpreting 3D models and 2D drawings from various engineering disciplines, including applying international drawing standards, geometric dimensioning and tolerancing (GD&T), and proper annotation techniques to ensure clear communication and collaboration in design projects.
5. Demonstrate proficiency in communicating CAD data across diverse cultures and regions, emphasizing the importance of understanding and respecting regional nuances, practices, and standards. Apply best practices for multicultural collaboration in engineering projects, ensuring equity and inclusion in interactions and decision-making processes.
6. Understand the significance of incorporating gender, ethnicity, and cultural diversity in engineering teams, employing inclusive communication strategies to counteract groupthink and enrich engineering project outcomes with a wide array of perspectives.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will be able to design and develop 3D models and 2D drawings using SolidWorks, demonstrating proficiency in sketching, feature creation, and assembly management while adhering to best practices in engineering and design.
2. Students will effectively apply various international drawing standards, including ANSI, ISO, and JIS, in their engineering projects, enabling clear communication and collaboration in diverse engineering disciplines.
3. Students will demonstrate the ability to use SolidWorks Simulation and analysis tools to optimize designs, considering factors such as functionality, sustainability, and aesthetics to create high-quality products.
4. Students will showcase their SolidWorks skills and knowledge through a course project and portfolio, effectively presenting their work during job interviews and professional development opportunities to demonstrate their ability to work in diverse engineering environments.

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

Aesthetic Awareness: The student will identify and evaluate how aesthetic expression leads to an appreciation of social and cultural context as well as the values of art and nature.
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. Introduction to SolidWorks
   a. Overview of SolidWorks software
   b. Understanding the SolidWorks interface
   c. Navigating the SolidWorks environment
   d. Importance of diversity in the field of engineering and design
      i. Includes the importance of diverse teams, in terms of race, gender, culture, and how to avoid groupthink.
2. Basic SolidWorks Operations and File Management
   a. Creating and managing files
   b. Saving, exporting, and importing files
   c. Understanding SolidWorks file types and extensions
   d. Promoting inclusive collaboration and communication in design projects
3. Sketching in SolidWorks
   a. 2D sketching tools and techniques
   b. Applying geometric relations and dimensions
   c. Using construction geometry
   d. Mirroring, patterning, and offsetting sketches
4. SolidWorks Drawing Standards and International Manufacturing Collaboration
   a. Understanding drawing standards in SolidWorks
   b. Comparing ISO and ANSI standards and their implications in cross-country manufacturing
   c. ISO GPS vs. ASME Y14.5 and challenges in communication between cultures
   d. Strategies for effective cross-cultural collaboration with CAD data and drawings
   e. SolidWorks templates and sheet formats
   f. Embracing multicultural design perspectives and standards (ANSI / ISO / JIS / ASME / GB)
5. Creating and Modifying 3D Models
   a. Creating basic 3D models using extrude, revolve, sweep, and loft features
   b. Adding and modifying fillets, chamfers, and drafts
   c. Using patterns and mirrors to create complex models
   d. Understanding parametric modeling and design intent
6. Assemblies and Mates
   a. Creating assemblies and sub-assemblies
   b. Applying and managing mates and constraints
   c. Troubleshooting assembly issues
   d. Exploded views and assembly animations
7. 2D Drawings from 3D Models and Bill of Material Management
   a. Creating 2D drawings from 3D models
   b. Adding views, dimensions, and annotations
   c. Understanding and applying geometric dimensioning and tolerancing (GD&T) with a focus on ISO GPS vs. ASME Y14.5 D. Managing drawing sheets and formats
   d. Creating and managing bills of materials (BOMs) in SolidWorks
   e. Ensuring clear communication across multinational teams
8. Simulation and Analysis
   a. Introduction to SolidWorks Simulation
   b. Running basic static analysis
   c. Interpreting simulation results
   d. Using simulation for design optimization
   e. Evaluating designs for diverse populations and environments
9. Sheet Metal and Weldments
   a. Creating sheet metal parts
   b. Unfolding and flattening sheet metal
   c. Creating weldment structures
   d. Understanding weldment profiles and cut lists
   e. Considering environmental and cultural factors in material selection
10. Surface Modeling

a. Introduction to surface modeling in SolidWorks
b. Creating and modifying surfaces
c. Converting surfaces to solids and vice versa
d. Using surfaces for complex model creation
e. Embracing diverse aesthetic preferences in design

11. Advanced Modeling Techniques
    a. Working with large assemblies
    b. Configurations and design tables
    c. Importing and repairing non-native CAD files
    d. Using SolidWorks add-ins and third-party tools
12. Preparing for the CSWA Exam
    a. Overview of the CSWA exam and requirements
    b. Strategies for successful exam completion
    c. CSWA practice exercises and sample questions
    d. Review and discussion of key exam topics
13. Course Project and Portfolio
    a. Creating a course project to showcase skills
    b. Assembling a SolidWorks portfolio
    c. Techniques for presenting a portfolio at an employment interview, highlighting cultural competence and the ability to work with diverse teams.
    d. Preparing for job interviews and professional development

Course Lab Content

1. Getting Started with SolidWorks
    a. Exploring the SolidWorks interface
    b. Customizing the interface and setting preferences
    c. Opening and navigating existing models
    d. Discussing the importance of diverse representation in engineering and design
2. Sketching Practice
    a. Creating 2D sketches using various tools
    b. Applying geometric relations and dimensions
    c. Practicing sketch modification techniques
3. Basic 3D Modeling
    a. Creating basic 3D models using extrude and revolve features
    b. Modifying models with fillets and chamfers
    c. Creating patterns and mirrors to replicate features
4. Intermediate 3D Modeling
    a. Creating models using sweep and loft features
    b. Utilizing reference geometry and planes
    c. Creating complex models with multiple features
    d. Emphasizing cultural and environmental considerations in design
5. Assemblies and Mating
    a. Building a basic assembly with multiple components
    b. Applying various mate types and constraints
    c. Creating and managing sub-assemblies
    d. Exploding assemblies and generating animations
    e. Addressing diverse user needs in assembly design
6. 2D Drawings from 3D Models
    a. Generating 2D drawings from 3D models
    b. Adding views, dimensions, and annotations
    c. Customizing drawing templates and sheet formats
    d. Ensuring clear communication in diverse teams through standardized drawings
7. Introduction to Simulation
    a. Setting up a basic static analysis
    b. Applying loads and constraints for simulation
    c. Analyzing and interpreting simulation results

8. Sheet Metal and Weldments
    a. Designing a sheet metal part
    b. Unfolding and flattening sheet metal components
    c. Creating a basic weldment structure
    d. Generating weldment cut lists and drawings
9. Surface Modeling
    a. Creating basic surface models
    b. Modifying and repairing surfaces
    c. Converting surfaces to solid models
    d. Encouraging diverse aesthetic preferences in surface design
10. Advanced Modeling Techniques
    a. Working with large assemblies and best practices
    b. Creating configurations and design tables
    c. Importing and repairing non-native CAD files
    d. Promoting equity in access to design resources and tools
11. CSWA Exam Preparation
    a. Completing CSWA practice exercises
    b. Discussing strategies for successful exam completion
    c. Reviewing key exam topics and sample questions
    d. Providing targeted support for underrepresented groups in exam preparation
12. Course Project and Portfolio
    a. Developing a course project to demonstrate skills
    b. Assembling a SolidWorks portfolio
    c. Presenting and discussing portfolio work
    d. Developing effective communication skills for working in diverse teams
    e. Understanding cultural sensitivity and its importance in a globalized work environment
    f. Strategies for collaborating with overseas manufacturers, including communication etiquette, time zone management, and file-sharing practices

Methods of Instruction

Method

Film/video Viewing and Discussion

Integration

Utilizing film and video in the classroom offers students a visual insight into the real-world applications of SolidWorks and CAD within the industry. By viewing these materials, students can better contextualize the lecture content, witnessing firsthand how CAD design principles are employed in professional settings and understanding the broader implications of their coursework.

DE Adaptations for MOI

For the SolidWorks course, instructional videos demonstrating CAD techniques and design principles will be uploaded to the CMS. To foster collaborative learning and deepen understanding, students are encouraged to engage in discussions on these topics through the CMS Discussion boards, sharing insights and seeking clarifications related to their CAD projects.

Method

In-class Exercises

Integration

In-class exercises will consist of opportunities to draw a variety of alternate design problems, while providing a time for individualized learning opportunities reinforcing lecture material.

DE Adaptations for MOI

In-class exercises can be converted into interactive online activities or assignments, with step-by-step instructions provided through the CMS. Students can complete these tasks independently and upload their work for instructor and peer review. Discussion forums can be utilized to facilitate discussion and provide support during the exercise.

Method

Lab Activities

Integration

Lab activities will reinforce lecture presentation by exposing the student to situations/problems in projects and guided problems. Lab activities will include 2D and 3D modeling and plotting of plans.

DE Adaptations for MOI

Virtual labs can be created to mimic in-person lab experiences. These labs can include guided tutorials, video demonstrations, and downloadable resources for students to follow. Students can work on lab assignments individually or in small groups, and submit their work through the CMS for evaluation and feedback.

Method

Lecture

Integration

Lecture will consist of reviewing relevant course content to assist students in achieving learning outcomes. Lecture topics will include an introduction to SolidWorks commands and icons, 2D and 3D modeling, and solid parts.

DE Adaptations for MOI

Traditional in-person lectures can be replaced with pre-recorded video lectures. These lectures can be broken into shorter, more digestible segments, and uploaded to the CMS for students to watch at their convenience. PowerPoint slides, notes, and transcripts can also be provided to enhance student comprehension.

Method

Visiting Lecturers

Integration

Visiting lecturers will include active professionals from the industry who will instill their experience directly into the classroom and help students gain a workplace perspective on the lecture material. This will assist students in the working environment and real life applications.

DE Adaptations for MOI

Guest lecturers can be invited to present remotely via video conferencing platforms, like Zoom, and recorded for asynchronous viewing. These sessions can be scheduled in advance, with an opportunity for students to submit questions beforehand or engage in live Q&A sessions. The recorded sessions can be uploaded to the CMS for students who cannot attend in real-time or for later review.

Methods of Evaluation

Method

Capstone Project

Integration

The capstone project serves as a culminating experience for students to demonstrate their proficiency in SolidWorks, encompassing part creation, assemblies, and drawings. The evaluation method is designed to assess both technical skills and soft skills, ensuring a holistic assessment of students' capabilities.

DE Adaptations for MOE

For the SolidWorks capstone project in a distance education format, students will access all necessary materials and instructions through the CMS. Detailed video tutorials and resources will guide them in creating parts, assemblies, and drawings. As they progress, students can submit milestones or drafts to dedicated folders within the CMS, receiving feedback from the instructor at predefined intervals. Collaboration will be facilitated through asynchronous discussion boards, where students can post queries, share insights, and provide peer feedback. The final project, along with any accompanying documentation, will be submitted via the CMS, where it will be evaluated based on the established criteria. Throughout the project's duration, students can access supplementary resources,

FAQs, and instructor-recorded clarifications to common challenges, ensuring they have comprehensive support as they navigate the capstone project remotely.

Method

Class Work

Integration

During class sessions in the SolidWorks course, students are evaluated based on their ability to solve assigned problems using CAD software. The focus is on both the accuracy of their designs and their proficiency with the software tools. Immediate feedback ensures they effectively integrate design principles with practical application.

DE Adaptations for MOE

Assigned problems and tasks related to the effective use of CAD software tools can be provided to students via the CMS. Students can work on these assignments at their own pace and submit their solutions through the CMS for evaluation. Instructor and peer feedback can be facilitated through discussion forums, individual messages, or even peer-review assignments.

Method

Exams/Tests

Integration

For exams and tests in the SolidWorks course, students are assessed on their comprehensive understanding of design principles and their aptitude in applying these concepts within the CAD environment. The evaluations not only measure theoretical knowledge but also practical skills, ensuring students can seamlessly transition from concept to digital design. Immediate feedback post-assessment highlights areas of strength and opportunities for improvement.

DE Adaptations for MOE

Online quizzes and exams can be created within the CMS to assess students' conceptual understanding and their proficiency in CAD software applications. These assessments can be timed and auto-graded, with multiple attempts allowed if desired. Detailed feedback and explanations can be provided for incorrect answers, allowing students to learn from their mistakes.

Method

Projects

Integration

For projects in the SolidWorks course, students undertake tasks mirroring real-world industry assignments, emphasizing CAD design and modeling. Evaluations are benchmarked against industry standards, ensuring students not only demonstrate proficiency in SolidWorks but also align their work with professional expectations in the CAD domain. Feedback is provided to guide them closer to industry best practices and excellence in CAD design.

DE Adaptations for MOE

Industry-based projects can be assigned to students through the CMS, with clear instructions, guidelines, and deadlines. Students can work on these projects independently or in virtual groups, using collaborative tools such as Google Workspace. Completed projects can be submitted through the CMS for evaluation based on industry standards and expectations. Instructors can provide detailed feedback and grading rubrics to help students understand areas of improvement and success.

Assignments

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

1. SolidWorks Portfolio and Written Reflection

Objective: The objective of this assignment is for students to showcase their skills and understanding of SolidWorks by assembling a portfolio of their work completed throughout the course. Additionally, students will compose a written reflection discussing their experience with SolidWorks, the challenges they faced, and the lessons they learned.

Instructions:

Select at least 3 different projects or exercises that you have completed during the course, representing a range of skills and techniques in SolidWorks. These projects should demonstrate your proficiency in various aspects of SolidWorks, such as sketching, 3D modeling, assemblies, drawings, and more.

For each selected project or exercise, include the following in your portfolio:
a. A brief description of the project and its objectives.
b. Relevant SolidWorks files (.sldprt, .sldasm, or .slddrw) and/or screenshots showcasing your work.
c. A summary of the specific SolidWorks tools and techniques you used in the project.
d. Any challenges you faced during the project and how you overcame them.

Write a reflection (approximately 200-350 words) discussing your overall experience with SolidWorks throughout the course. In your reflection, consider addressing the following topics:
a. Your prior experience with CAD software and how it influenced your learning process.
b. The most challenging aspects of SolidWorks you encountered and how you addressed them.
c. The most valuable lessons or techniques you learned during the course.
d. Any insights or realizations about the importance of diversity, equity, and inclusion in the field of engineering and design.
e. How you plan to apply the skills and knowledge gained in this course to future projects or career opportunities.

Compile your selected projects and written reflection into a single PDF file or a neatly organized folder.

Submit your completed portfolio and written reflection through the designated assignment submission area on the CMS.

Grading Criteria:

Your portfolio and written reflection will be assessed based on the following criteria:

The variety and complexity of the projects selected for the portfolio.
The clarity and organization of the portfolio, including descriptions, summaries, and visuals.
The depth and thoughtfulness of the written reflection, including your understanding of SolidWorks, your learning process, and the relevance of diversity, equity, and inclusion in engineering and design.
The overall presentation and professionalism of the portfolio and written reflection.
Feedback from the instructor will be provided on the submitted work, focusing on the quality of the portfolio, the written reflection, and the student's overall understanding of SolidWorks.

How assignment will be adapted in online format

For this assignment, students will compile a portfolio showcasing their CAD designs and projects. Portfolios should be uploaded directly to the CMS. Upon submission, each portfolio will be evaluated for its adherence to design principles, technical accuracy, and innovative use of SolidWorks tools. Graded assignments, along with detailed feedback, will be returned to students via the CMS, highlighting strengths and areas for improvement.

Assignment Title: SolidWorks Portfolio and Written Reflection (Asynchronous Online Version)

Objective: The objective of this assignment is for students to showcase their skills and understanding of SolidWorks by assembling a portfolio of their work completed throughout the course. Additionally, students will compose a written reflection discussing their experience with SolidWorks, the challenges they faced, and the lessons they learned.

Instructions:

Select at least 3 different projects or exercises that you have completed during the course, representing a range of skills and techniques in SolidWorks. These projects should demonstrate your proficiency in various aspects of SolidWorks, such as sketching, 3D modeling, assemblies, drawings, and more.

For each selected project or exercise, include the following in your portfolio:
a. A brief description of the project and its objectives.
b. Relevant SolidWorks files (.sldprt, .sldasm, or .slddrw) and/or screenshots showcasing your work.
c. A summary of the specific SolidWorks tools and techniques you used in the project.
d. Any challenges you faced during the project and how you overcame them.

Write a reflection (approximately 200-350 words) discussing your overall experience with SolidWorks throughout the course. In your reflection, consider addressing the following topics:
a. Your prior experience with CAD software and how it influenced your learning process.
b. The most challenging aspects of SolidWorks you encountered and how you addressed them.
c. The most valuable lessons or techniques you learned during the course.
d. Any insights or realizations about the importance of diversity, equity, and inclusion in the field of engineering and design.
e. How you plan to apply the skills and knowledge gained in this course to future projects or career opportunities.

Compile your selected projects and written reflection into a single PDF file or a neatly organized folder.

Submit your completed portfolio and written reflection through the designated assignment submission area on the CMS.

Grading Criteria:

Your portfolio and written reflection will be assessed based on the following criteria:

The variety and complexity of the projects selected for the portfolio.
The clarity and organization of the portfolio, including descriptions, summaries, and visuals.
The depth and thoughtfulness of the written reflection, including your understanding of SolidWorks, your learning process, and the relevance of diversity, equity, and inclusion in engineering and design.
The overall presentation and professionalism of the portfolio and written reflection.
Feedback from the instructor will be provided on the submitted work, focusing on the quality of the portfolio, the written reflection, and the student's overall understanding of SolidWorks.

Assignment Type
Other

In-class and/or outside of class
In-class

Formative or Summative
Formative

Assignment
2. Assignment Title: 3D Modeling of a Tic-Tac-Toe Board

Objective: The objective of this assignment is for students to develop their skills in 3D modeling using SolidWorks by creating a tic-tac-toe board. This exercise will allow students to apply basic SolidWorks operations and techniques, as well as receive formative assessment through instructor feedback.

Instructions:

Watch the provided tutorial on how to create a 3D model of a tic-tac-toe board in SolidWorks. This tutorial will guide you through the necessary steps, tools, and techniques required for this assignment.

Open SolidWorks and follow along with the tutorial to create your own 3D model of a tic-tac-toe board. Make sure to apply the appropriate dimensions, extrusions, and other features as demonstrated in the tutorial.

Save your progress frequently, and create multiple versions of your model if needed to ensure you have a backup in case of technical issues.

Formative Assessment:

During the lab session, the instructor will monitor students' progress and provide real-time feedback on their 3D models. The instructor will assess the accuracy and quality of the models, as well as the application of SolidWorks techniques.

The instructor may provide feedback on the following aspects:

Proper use of sketching tools and techniques in creating the initial 2D sketch of the tic-tac-toe board.
Correct application of extrusions, fillets, chamfers, and other features to create a 3D model from the 2D sketch.
Adherence to the design specifications and dimensions provided in the tutorial.
Effective utilization of SolidWorks tools and techniques, as well as the incorporation of design intent in the model.
Based on the formative assessment, the instructor may provide additional guidance or resources to help students improve their skills and understanding of SolidWorks. Students are encouraged to ask questions and seek clarification as needed during the lab session.

How assignment will be adapted in online format

For the "3D Modeling of a Tic-Tac-Toe Board" assignment, students are required to submit their completed SolidWorks files through the designated submission area on the CMS. Once uploaded, each submission will undergo a thorough evaluation by the instructor, focusing on the accuracy, quality, and application of SolidWorks techniques. After the assessment, students will receive their grades and comprehensive feedback directly within the CMS. This feedback will highlight specific areas of the design, offering insights into strengths and suggesting improvements where necessary. Students are encouraged to review this feedback carefully to enhance their understanding and skills in SolidWorks.

Assignment Title: 3D Modeling of a Tic-Tac-Toe Board (Asynchronous Online Class)

Objective: The objective of this assignment is for students to develop their skills in 3D modeling using SolidWorks by creating a tic-tac-toe board. This exercise will allow students to apply basic SolidWorks operations and techniques, as well as receive formative assessment through instructor feedback.

Instructions:

Watch the provided tutorial on how to create a 3D model of a tic-tac-toe board in SolidWorks. This tutorial will guide you through the necessary steps, tools, and techniques required for this assignment.

Open SolidWorks and follow along with the tutorial to create your own 3D model of a tic-tac-toe board. Make sure to apply the appropriate dimensions, extrusions, and other features as demonstrated in the tutorial.

Save your progress frequently, and create multiple versions of your model if needed to ensure you have a backup in case of technical issues.

Once you have completed your 3D model, save it as a SolidWorks file (.sldprt) and submit it through the designated assignment submission area on the CMS.

Formative Assessment:

After submitting your 3D model, the instructor will review your work and provide feedback on the accuracy and quality of the models, as well as the application of SolidWorks techniques.

The instructor may provide feedback on the following aspects:

Proper use of sketching tools and techniques in creating the initial 2D sketch of the tic-tac-toe board.

Correct application of extrusions, fillets, chamfers, and other features to create a 3D model from the 2D sketch.

Adherence to the design specifications and dimensions provided in the tutorial.
Effective utilization of SolidWorks tools and techniques, as well as the incorporation of design intent in the model.

Based on the formative assessment, the instructor may provide additional guidance or resources to help students improve their skills and understanding of SolidWorks. Students are encouraged to ask questions and seek clarification through CMS discussion boards or email as needed.

Assignment Type

Reading

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Formative

Assignment

3. Reading Assignment: "Multicultural Manufacturing: Navigating the Global Engineering Landscape"

Objective: This reading assignment aims to provide students with a comprehensive understanding of the challenges and opportunities in multicultural manufacturing and engineering, highlighting the importance of effective communication and collaboration in a diverse, global context.
Instructions: Read the following articles and be prepared to discuss the key takeaways and insights during the next class session. Reflect on how these insights apply to your work in SolidWorks and the engineering design process.

Title: " Research: How Cultural Differences Can Impact Global Teams"
Source: Harvard Business Review
Link: https://hbr.org/2021/06/research-how-cultural-differences-can-impact-global-teams
Summary: Diversity can be both a benefit and a challenge to virtual teams, especially those which are global. The authors unpack their recent research on how diversity works in remote teams, concluding that benefits and drawbacks can be explained by how teams manage the two facets of diversity: personal and contextual. They find that contextual diversity is key to aiding creativity, decision-making, and problem-solving, while personal diversity does not. In their study, teams with higher contextual diversity produced higher-quality consulting reports, and their solutions were more creative and innovative. When it comes to the quality of work, teams that were higher on contextual diversity performed better. Therefore, the potential challenges caused by personal diversity should be anticipated and managed, but the benefits of contextual diversity are likely to outweigh such challenges.

Title: " Introduction to Global Engineering: Use of Standards and Cultural Differences"
Source: IEEE
Link: https://ieeexplore.ieee.org/document/4117207
Summary: This paper describes how selected engineering standards may be used to introduce students to engineering aspects of the business environment in global manufacturing. Background of the need for inclusion of global aspects of various engineering and technical cultures in engineering curriculum is included.

Title: "How Diversity And Innovation Drive Great Cultures In The Future Of Work"
Source: Forbes
Link: https://www.forbes.com/sites/nataliapeart/2021/03/17/how-diversity-and-innovation-drive-great-cultures-in-the-future-of-work/?sh=70fa04fc3f9b
Summary: This article explores the impact of cultural diversity on innovation, arguing that a multicultural approach to design can lead to more creative, effective, and sustainable solutions. The article also provides examples of successful global collaborations and insights for fostering a diverse and inclusive engineering environment.

After completing the readings, consider the following questions for class discussion:
What are the main challenges faced by engineering teams in multicultural manufacturing environments?

How can cross-cultural communication be improved in the context of global engineering projects?

In what ways can embracing cultural diversity in design lead to better engineering solutions and innovations?

How can the insights from these articles be applied to your work in SolidWorks and the engineering design process?

How assignment will be adapted in online format

For the reading assignment titled "Multicultural Manufacturing: Navigating the Global Engineering Landscape," students are expected to delve into the provided articles and subsequently participate in an online discussion via the CMS. After thoroughly engaging with the readings, students should navigate to the dedicated discussion forum on the CMS to post their reflections and responses to the posed questions. The instructor will review each student's contribution, assessing their comprehension of the material, the depth of their insights, and their engagement with peers. Feedback, highlighting key takeaways and areas for deeper exploration, will be provided directly within the CMS discussion thread. This asynchronous discussion format not only facilitates a deeper understanding of multicultural manufacturing but also encourages students to apply these insights to their SolidWorks projects and broader engineering practices.

Reading Assignment: "Multicultural Manufacturing: Navigating the Global Engineering Landscape"

Objective: This reading assignment aims to provide students with a comprehensive understanding of the challenges and opportunities in multicultural manufacturing and engineering, highlighting the importance of effective communication and collaboration in a diverse, global context.

Instructions: Read the following articles and participate in the online discussion forum on the course management system. Reflect on how these insights apply to your work in SolidWorks and the engineering design process.

Title: "Research: How Cultural Differences Can Impact Global Teams"
Source: Harvard Business Review
Link: https://hbr.org/2021/06/research-how-cultural-differences-can-impact-global-teams
Summary: This article discusses how diversity can be both a benefit and a challenge to virtual teams, especially those which are global. It focuses on the importance of managing both personal and contextual diversity to maximize creativity, decision-making, and problem-solving in diverse teams.

Title: "Introduction to Global Engineering: Use of Standards and Cultural Differences"
Source: IEEE
Link: https://ieeexplore.ieee.org/document/4117207
Summary: This paper describes how selected engineering standards may be used to introduce students to engineering aspects of the business environment in global manufacturing. It highlights the need for inclusion of global aspects of various engineering and technical cultures in engineering curriculum.

Title: "How Diversity And Innovation Drive Great Cultures In The Future Of Work"
Source: Forbes
Link: https://www.forbes.com/sites/nataliapeart/2021/03/17/how-diversity-and-innovation-drive-great-cultures-in-the-future-of-work/?sh=70fa04fc3f9b
Summary: This article explores the impact of cultural diversity on innovation, arguing that a multicultural approach to design can lead to more creative, effective, and sustainable solutions. It also provides examples of successful global collaborations and insights for fostering a diverse and inclusive engineering environment.

After completing the readings, go to the discussion forum dedicated to this assignment and answer the following questions:

What are the main challenges faced by engineering teams in multicultural manufacturing environments?
How can cross-cultural communication be improved in the context of global engineering projects?
In what ways can embracing cultural diversity in design lead to better engineering solutions and innovations?
How can the insights from these articles be applied to your work in SolidWorks and the engineering design process?
Please post your responses to the discussion forum and engage with your classmates' posts by commenting, asking questions, or providing additional insights. This will create a dynamic and interactive learning environment that fosters understanding and application of the concepts covered in the reading assignment.

Course Materials

Textbooks

Bethune, J. D. (2023). Engineering Design and Graphics with SolidWorks 2023, Pearson. ISBN: 9780138104450

Tran, P. (2023).SOLIDWORKS 2023 Basic Tools, SDC Publications. ISBN: 9781630572280

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.

Diversity and inclusion are infused into the course through various aspects of the curriculum, ensuring that students not only develop technical proficiency in SolidWorks but also an understanding of the importance of diverse perspectives in engineering and design. Some examples include:

In course content 1d, the importance of diverse representation in engineering and design is discussed, highlighting the value of diversity in teams and avoiding groupthink.

In course content 4f, the course emphasizes cultural and environmental considerations in design, ensuring students understand the importance of incorporating diverse perspectives when creating complex models.

In course content 4d, the course addresses diverse user needs in assembly design, promoting the creation of inclusive and accessible products.

In course content 7d, the course focuses on ensuring clear communication in diverse teams through standardized drawings, emphasizing the importance of effective communication across different cultural backgrounds.

In the 12d, the course provides targeted support for underrepresented groups in exam preparation, ensuring that all students have an equal opportunity to succeed in the CSWA exam.

In the 13c, the course project and portfolio development emphasize effective communication skills for working in diverse teams, understanding cultural sensitivity, and its importance in a globalized work environment. Additionally, strategies for collaborating with overseas manufacturers, including communication etiquette, time zone management, and file-sharing practices, are covered.

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

Assignments, instruction, evaluation, course content, and interactions in ENGR-756 are contextualized for diverse learners in the following ways, promoting an equitable learning experience for all:

Assignments: The assignments in ENGR-756 are designed to accommodate various learning styles and skill levels. They include practical, hands-on modeling tasks, written reflections on multicultural design considerations, and group discussions focusing on diverse user needs. This approach encourages students to incorporate diverse perspectives into their engineering work.

Instruction: ENGR-756 uses a variety of instructional methods, such as video tutorials, asynchronous lectures, and virtual lab activities, to cater to different learning preferences. Online adaptations ensure that asynchronous learners can access the course material at their own pace. Closed captioning and transcripts are provided for video content to enhance accessibility.

Evaluation: Evaluation methods in ENGR-756 are diverse, including project-based assessments, quizzes, and exams that test students' proficiency in the software, as well as their understanding of cultural and environmental considerations in design. For online asynchronous courses, time-flexible assessments and alternative evaluation methods accommodate different schedules and learning environments.

Course content: The ENGR-756 curriculum incorporates diverse perspectives in engineering and design, including multicultural design standards, communication strategies for global collaboration, and environmental and cultural considerations in material selection. This approach ensures that students develop an understanding of the importance of diversity and inclusion in the engineering field.

Interactions: The ENGR-756 encourages and facilitates interactions between students, instructors, and content. Peer-to-peer interactions are promoted through group projects, discussion forums, and collaborative assignments, fostering an inclusive learning environment. Instructor-to-student interaction is facilitated through virtual office hours, personalized feedback on assignments, and timely responses to questions or concerns. Student-to-content interaction is enhanced by providing diverse learning materials, such as videos, articles, and tutorials, to cater to different learning preferences.

By considering diverse learning styles, preferences, and backgrounds, the SolidWorks course ensures that all learners have an equitable opportunity to succeed and develop valuable skills in both software and multicultural engineering practices.

Interactions

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

The course will utilize in class (or online discussions) and peer review to facilitate student to student communication. Here are some specific examples of how that can be implemented in this course:

Design Critique Discussions: In the context of SolidWorks projects, students can share their designs or 3D models in the discussion forum. Peers can provide constructive feedback on the designs, suggest improvements, and discuss how different cultural perspectives may influence the final product.

GD&T Comparison Activity: Students can collaborate in pairs or small groups to compare the ISO GPS and ASME Y14.5 standards used in 2D drawings. They can discuss the challenges faced when working with different cultural norms and share strategies to overcome these challenges.

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

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

1. Live Q&A Sessions: The instructor can host live sessions where students can ask questions and seek clarification on course material, SolidWorks techniques, or project assignments.

2. Individual Feedback: The instructor can provide personalized feedback on submitted assignments, addressing each student's strengths and areas for improvement.

3. Discussion Forum Participation: The instructor can actively participate in discussion forums, offering insights, guidance, and further resources to foster deeper understanding.

4. Virtual Office Hours: The instructor can set up regular virtual office hours for students to seek one-on-one assistance or discuss any concerns they may have.

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).

This course encourages metacognition by asking students to monitor and modify their thought process. The student throughout the course is asked to evaluate if their process at producing the model is the "best" process and which alternative processes can be utilized for creating the same solid model. For some specific examples to this course:

1. Reflection Prompts: Throughout the course, students will be provided with prompts that encourage them to reflect on their understanding of SolidWorks tools, techniques, and the design process. This can also include reflecting on the impact of multicultural manufacturing in their work. (This is built into Assessment #1, Portfolio and Reflection).

2. Goal Setting: Students can set individual learning goals related to mastering specific SolidWorks features or techniques, such as creating complex assemblies or optimizing designs for various manufacturing contexts.

3. Self-Assessment: Students can engage in self-assessment activities to gauge their proficiency in SolidWorks, comparing their work to provided examples or industry standards. This can help them identify areas for improvement and further learning.

4.Design Journaling: Students can maintain a design journal to document their thoughts, challenges, and successes as they work on SolidWorks projects. This can help them track their progress in applying design principles and integrating multicultural perspectives in their work.

Key: 1522