ENGR 113.01E,.02E,.03E,-Product Design & Development

COURSE SYLLABUS: Spring 2024

INSTRUCTOR INFORMATION

Instructor: Dr. Perry Moler Assistant Professor
Office Location: Charles J. Austin Engineering & Technology Building, Room 213A
Office Hours: M, T, W, R 9:30-10:30 a.m. F 10:00 a.m.-11:00 a.m. or by appointment
Office Phone: 903-886-5361
Office Fax: 903-886-5960
University Email Address: Perry.Moler@tamuc.edu
Preferred Form of Communication: Email
Communication Response Time: Max 48 hours

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Textbook(s) Required: Learning Autodesk Inventor 2022: Modeling, Assembly, and Analysis, By Randy Shih, SDC Publication.
ISBN-13: 978-1-63057-441-3
ISBN-10: 1-63057-441-4

Required Materials:

1) Bound notebook, such as a composition notebook (Available at the A&M-Commerce bookstore or any office supply store)
2) Scientific or Graphing Calculator
3) **Memory stick or portable storage device**

Course Description

Product development and design processes and methods, including product specifications, concept development, engineering drawings, design for prototyping, and manufacturing.

The *syllabus/schedule are subject to change.*

Student Learning Outcomes

1. Describe an engineering design and development process
2. Create 3D solid models of mechanical components using CAD software
3. Demonstrate individual skill using selected manufacturing techniques, including drilling, pressing, tapping, and rapid prototyping
4. Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
5. Fabricate an electromechanical assembly from engineering drawings
6. Work collaboratively on a team to successfully complete a design project
7. Effectively communicate the results of projects and other assignments in a written and oral format

COURSE REQUIREMENTS

Minimal Technical Skills Needed

The following technologies will be required for this course.

- Internet access / connection
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

The following technologies will be provided and utilized in the course.

- Inventor
- MultiSIM
- Prototype machines
- Manual manufacturing tools

Instructional Methods

This course will be taught face-to-face during the scheduled course time. The semester project MUST BE completed during schedule class time as provided by the instructor or independent time for the student can be scheduled in the Makerspace. This is a project-based course and will be presented using formats that include lectures, discussions, laboratory work, and/or group participation. Student participation and interaction is required.

Student Responsibilities or Tips for Success in the Course

The student has the responsibility to arrive on time, ready to work this includes having material to take notes from the lectures.

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GRADING

The ***final course grade*** will be based upon the following:

Assessments		Grading Scale	
Homework/Quizzes	**20%**	90 – 100	A
Module 1	**20%**	80 – 89	B
- *Top/bottom plate solid model (5%)*		70 – 79	C
- *Top/bottom plate drawing. (5%)*		60 – 69	D
- *Plate manufacturing (5%)*		<59	F
- *Engineering notebook (5%)*			
Module 2	**20%**		
- *Impeller solid model (3%)*			
- *Impeller mfg. drawing (5%)*			
- *DC Motor solid model (3%)*			
- *DC Motor drawing (5%)*			
- *Engineering notebook (4%)*			
Module 3	**30%**		
- *Assembly solid model (5%)*			
- *Assembly drawing w/parts list (10%)*			
- *Mfg. process plan (10%)*			
- *Engineering notebook (5%)*			
Final product demonstration	**10%**		

Late work will not be accepted and a grade of "0" will be assigned, unless prior arrangements are worked out with the instructor. The instructor has the final decision on whether late work will be accepted. Late penalties will be assessed to any approved late work.

Assessments

Homework/Class Assignments: 20% of total course grade

Student Learning Outcomes #2, #3, #4

Problems from the textbook or other resources will be assigned to support the instructional material. Students will apply theory and mathematical principles to solve applied engineering problems.

Assessment Method: Points will be allocated to each homework / classroom assignment. The total points per assignment will be based upon the number and complexity of the problems. Assignments will be graded both for accuracy as well

as demonstrated knowledge of the topic being addressed. Students may work in groups to complete assignments unless otherwise specified by the instructor.

Laboratories / Engineering Notebook: 70% of total course grade

Student Learning Outcomes #1, #2, #3, #4, #5, #6, #7

Student teams will develop, design, manufacture, and test an electromechanical system (water pump). Hands-on experiences in the interpretation of product/customer specifications, concept development, engineering drawings, design for prototyping, and manufacturing will be utilized in the instruction of the engineering design process. Students will accurately document their product design experience through an engineering notebook.

Assessment Method: The student design project will be broken into three modules. Points will be allocated to each module based upon the complexity of the exercise. The total points will include the required documentation in an engineering notebook.

Module 1: 20%

- *Introduction to product design and development*
- *Fundamentals of 3D modeling*
- *Basic manufacturing processes*

Module 2: 20%

- *Engineering design process*
- *Proof of concept*
- *Prototyping*

Module 3: 30%

- *Assembly modeling*
- *Assembly drawings*
- *Manufacturing process plan*
- *Final assembly*
- *Testing and troubleshooting*

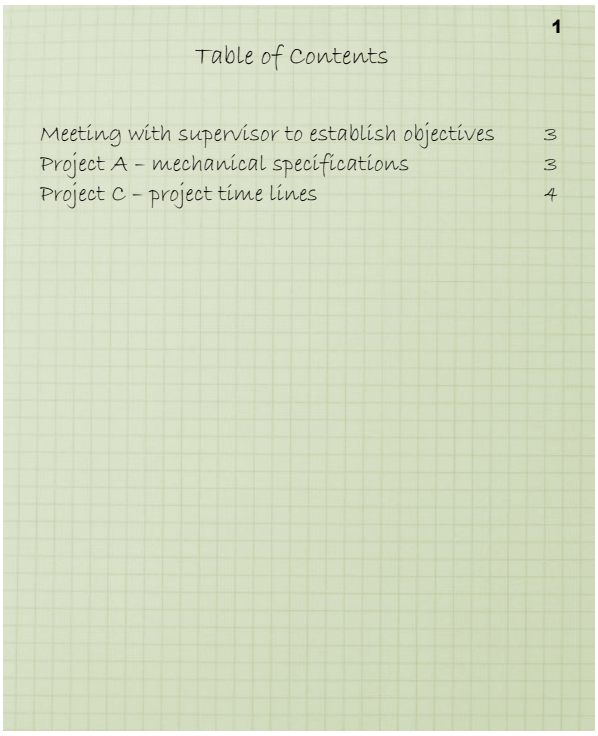
Laboratory work will be graded both for accuracy as well as demonstrated knowledge of the topic being addressed. Students will work in groups of two or three to develop teamwork skills. Each group will keep an accurate record of the design project in an engineering notebook. The notebook must be bound with page numbers. The notebook should be used to record key meetings as well as ideas, results, observations, references, and any other information related to a project. This includes all design ideas and tests, whether they were successfully implemented or not.

Sufficient detail should be included, which would allow someone to replicate the design and/or project with limited or no prior knowledge of the project.

Key Guidelines:

- Entries should be legible and made in ink.
- Entries should be made at the time the work is completed rather than taking notes on scratch paper and transferring it at a later time.
- The first few pages should be reserved for the Table of Contents. The description title and associated page number should be included separately for each entry made in the notebook. Ensure the title of the entry is used in the Table of Contents.
- Date each entry in the notebook.
- Title each entry so it can be easily associated with a given project.
- For every entry, list each person who participated in the meeting, test, or effort being documented. Ideally, each lab partner will initial and date following each entry but this is not required as long as the individuals are clearly identified.
- Include all design iterations and tests, whether they were successfully implemented or not. The notebook should be a history of the project not just a report on the characteristics of the final product.
- Include descriptions of the equipment and/or software used in tests and/or analyses. Software versions are critical as later versions may or may not perform in the exact same manner.
- Line out errors, never erase.
- Include graphics, schematics, and tables as appropriate.

A format similar to the one shown in the following examples should be used for the Table of Contents and journal entries, unless otherwise specified by the instructor. The examples are intended to represent two random pages out of a notebook.



Final Product Demonstration: 10% of total course grade

Student Learning Outcome #1, #4, #5, #6, #7

The final demonstration will include two elements: 1) an oral presentation 2) functional demonstration of the electromechanical system operation.

Assessment Method: Each portion of the final demonstration will be worth 50 points. The oral presentation will be treated as the final design review for a customer with the grade based upon organization, technical content, time management, and basic presentation skills. The functional demonstration will verify the electromechanical system meets customer specifications. The grade will be based upon documented design specifications and pump performance.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Zoom Video Conferencing Tool
https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom_Account.aspx?source=universalmenu

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu**.**

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Outside of the classroom, email will be the primary communication tool. Students should communicate with the instructor via email at the address provided in this syllabus. The instructor will communicate with students via email through their myLeo email address.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Late work will not be accepted and a grade of "0" will be assigned, unless prior arrangements are worked out with the instructor. The instructor has the final decision on whether late work will be accepted. Late penalties will be assessed to any approved late work.

NO Extra Credit will be given.
There will be NO re-do's, do overs or re-submits in ENGR 113.01,.02,.03.

Attendance:

Attendance is a vital part of this project-based course. A point deduction will be assessed to the final grade average based on the following number of absences and/or tardy:

0-1absences	0 pt deduction
2 absences	5 pt deduction
3 absences	10 pt deduction
4 absences	20 pt deduction
5 or more	50 pt deduction

In rare cases there may be special circumstances that justifies an excused absence. The instructor has the final decision on whether an absence is excused or not. Contact the instructor if you know that you will be absent.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

The *syllabus/schedule are subject to change.*

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:
https://www.britannica.com/topic/netiquette

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedures 13.99.99.R0.01
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03
Undergraduate Student Academic Dishonesty Form

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf

Graduate Student Academic Dishonesty Form

http://www.tamuc.edu/academics/graduateschool/faculty/GraduateStudentAcademicDishonestyFormold.pdf

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Velma K. Waters Library Rm 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148

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Email: studentdisabilityservices@tamuc.edu

Website: Office of Student Disability Resources and Services

http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

A&M-Commerce Supports Students' Mental Health

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit **www.tamuc.edu/counsel**

AI use policy [Draft 2, May 25, 2023]

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors 'guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

n any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

13.99.99.R0.10 Graduate Student Academic Dishonesty

COURSE OUTLINE / CALENDAR

	Topic	Assignment(s)
Week 1	**Module 1** - Course introduction - Engineering notebooks/documentation - Shop safety	Reading:Safety information Lab:SDS Lab Assignment: Safety quiz
Week 2	- Overview of engineering design process - Overview of manufacturing fundamentals - Electrical fundamentals	Reading: Lab: Assignment: Ohm's Law HW, Electrical Fundamentals HW
Week 3	- Fundamentals of 3D modeling	Reading: Project 1 Chapter Lab: Project 1 tutorial Assignment:
Week 4	- Fundamentals of 3D modeling - Formatting drawing sheets	Reading: Project 1 Chapter Lab: Project 1 tutorial Assignment:
Week 5	- Component development from customer specifications - Basic manufacturing processes	Reading: Lab: Top plate, bottom plate, bushing drawings; mfg top & bottom plate Assignment:

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Week 6	**Module 2** - DC motors - Modeling existing components	Reading: Lab: DC Motor 3D model and part drawing Assignment: DC motor HW
Week 7	- Development of a product concept	Reading: Research impeller designs Lab: Impeller 3D conceptual model Assignment: Hand drawn sketch of impeller concept Project 2 tutorial
Week 8	- Proof of concept	Reading: Project 2 chapter Lab: Impeller prototype; fit test Assignment: Project 2 tutorial
Week 9	- New product design and development from conceptual model - Product manufacturing	Reading: Project 2 chapter Lab: Production impeller; drawings Assignment: Project 2 tutorial
Week10	- Rapid prototyping - Product test	Reading: Project 2 chapter Lab: Functional test motor/impeller assembly Assignment: Project 2 tutorial 3D model + Quiz
Week 11	**Module 3** - Component sourcing - Final assembly	Reading: Component Sourcing Handout Lab: Drawings - screws, o-rings, & threaded fittings drawings Assignment:
Week 12	- Assembly modeling - Assembly testing	Reading: Project 3 chapter – Exploded View – Bill of Materials Lab: Pump 3D assembly model Assignment: Portion of project tutorial 3
Week 13	- Assembly drawing with bill of materials - Assembly testing	Reading: Project 3 chapter – Exploded View – Bill of Materials Lab: Pump assembly drawing Assignment: Portion of project tutorial 3
Week 14	- Final product testing - Manufacturing Process plan	Reading: Project 3 chapter – Exploded View – Bill of Materials

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		Lab: Pump assembly; Manufacturing process plan for pump assembly Assignment: Portion of project tutorial 3
Week 15	- Final project demonstration – Oral Presentations	Reading: Lab: Assignment:
Week 16	**Final**	Functional project demonstration

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