Class Reference Number (CRN): 12261
Instructor: Methaq S. Abed, Ph.D., P.E.
Emails: msabed@utep.edu
Office Hours: Virtual office hours will be offered by appointment. You are welcome anytime to send your questions via email and allow 48 hrs to respond

Class Meeting Schedule: Online
Class Duration: August 24th, 2020 - Dec. 3rd, 2020

Course Description: An introduction to solid modeling concepts and software, dimensioning, and basic computer-aided engineering.

Course Objectives:

At the end of this class, the typical students should be well prepared to make drawing for any type of structures, machines, and any connection elements. The students will be able to sketch models that can be used for 3D print. Besides, the students will be able to run a simulation for their models to check the analysis required for design purposes. The objectives can be summarized as:

- Explain the design to the manufacturing process used to take a digital model to a physical part through CNC programming.
- Summarize the toolset available in Fusion 360.
- Demonstrate knowledge and skills in Fusion 360, applying design and manufacturing workflows to take digital parts to physical prototypes.

Course Content

- 2D Sketching
- 3D Modeling
- Drafting
- Parts Assembly
- Simulation (stress/thermal)
- Rendering and animation
- CAM and 3D Printing
- Design Projects

Course Requirements

Computer capable of running Autodesk's Fusion 360.
Limited-term laptop checkout is available at the Library and Engineering Technology Center. Desktops at Library may be used to complete assignments, but Laptops will be required for quizzes and assignments.
Software | Autodesk Fusion 360
---|---
Available at | Fusion 360 | Free Software for Students and Educators | [https://www.autodesk.com/education/education-software/overview?sorting=featured&page=1](https://www.autodesk.com/education/education-software/overview?sorting=featured&page=1)

<table>
<thead>
<tr>
<th>Grading</th>
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<tbody>
<tr>
<td>Homeworke (11)</td>
<td>1100</td>
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<tr>
<td>Discussion boards (6)</td>
<td>300</td>
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<tr>
<td>Assessments (quizzes-3)</td>
<td>300</td>
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<tr>
<td>Projects (2)</td>
<td>500</td>
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<td>Total Points</td>
<td>2200</td>
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**Grading Scale:**
The final grade will be calculated based on the points you have accumulated as follows:

- A $\geq$ 1900
- 1900 $\geq$ B $> 1700$
- 1700 $\geq$ C $> 1500$
- 1500 $\geq$ D $> 1275$
- 1275 $\geq$ F

The instructor reserves the right to revise this grading plan. However, the students will be informed of any changes during the semester.

**Homework:** The description for each homework assignment will be posted on Blackboard, and the due date for each assignment will be on Sunday at 11:59 pm.

**Projects:** There will be one individual and one team project in this course. Both projects will challenge you to apply the materials covered in class and force you to apply knowledge from outside the class to complete it. Project 1 (team effort) will cover all the fundamentals of Modeling, and it will include a functional assembly. Project 2 (individual effort), it will cover modeling and simulation fundamentals that will be applied to a real-life problem.

**Discussion boards:** for this online course, students will be required to participate in discussion boards – both an initial post and responses to their peers. Students will also have a collection of smaller assignments throughout the week that will work to build toward larger projects. Each of these activities will be given point values that add up to the total 300-point participation grade. These points cannot be made up.
Homework and Projects' Policy

To pass this class, the student MUST demonstrate proficiency with the concepts and software. If a student misses 50% of the assigned homework and one project, the instructor has the right to drop him/her from class or assign an "F" grade for the class.


Technology Requirements

Course content is delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP email account is working and that you have access to the Web. You may use any of the primary Web browsers—Explorer, Google Chrome, Firefox, Safari, etc. When having technical difficulties, try switching to another browser.

You will need to have or have access to a computer/laptop, printer, scanner, a webcam, and a microphone. You will need to purchase a USB (flash drive). You will need to download or update the following software: Microsoft Office, Adobe, Flashplayer, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course. If you encounter technical difficulties of any kind, contact the Help Desk.

Netiquette

o Always consider the audience. Remember that members of the class and the instructor will be reading any postings.

o Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.

o When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.

o Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professors only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

Drop Policy

To drop this class, please contact the Registrar's Office to initiate the drop process. If you cannot complete this course for whatever reason, please contact me. If you do not, you are at risk of receiving an "F" for the course.

Accommodations Policy
The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services.

Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more HOOP: Student Conduct and Discipline.

Student Resources

UTEP provides a variety of student services and support:

UTEP Library: Access a wide range of resources, including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.

Help Desk: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in-person if on campus.

University Writing Center (UWC): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.

Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.

History Tutoring Center (HTC): Receive assistance with writing history papers, get help from a tutor, and explore other history resources.

Military Student Success Center: UTEP welcomes military-affiliated students to its degree programs, and the Military Student Success Center and its dedicated staff (many of whom are
veterans and students themselves) are here to help personnel in any branch of service to reach their educational goals.

**RefWorks**: A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

**ACES & Tutoring Center**

Please note there are tutoring services available in the ACES center. Tutoring is free to you; the Department pays them. If tutors are not used, the Department may stop funding them. Check the schedule of the tutors and make use of the services. For more details, visit the

**ME Advising Blackboard -> cc mech acadav: MECH Academic Advising -> Tutoring & Resources**

At the link, you can find tutor schedules, location of the ACES center, and the list of tutors available. For more information, send email to METutors@utep.edu

**Harassment Policy**

The Department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the Department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made, or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment, but repeated questions about a grade or an administrative decision are.

- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.

**Tentative Class Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Reading/Watch</th>
<th>Assessments</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Assignments</td>
<td>Watch videos in the link/Complete lessons 1-4</td>
<td>Sunday at 11:59 pm.</td>
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<td>Administraton</td>
<td>Link: <a href="https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing">https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing</a></td>
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</tr>
<tr>
<td>2</td>
<td>-2D Sketches</td>
<td>-Create a Sketch.</td>
<td>H.W.#1 due on Sunday, Sept 6th, at 11:59 pm</td>
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<tr>
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<td>-Fully Define a Simple Sketch</td>
<td>-Submit a screenshot of your model after step 2 in lesson 5</td>
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<td>-Define Constraints with Example</td>
<td>-Submit a screenshot of your final model after lesson 3.</td>
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<td>-Polygon Tools</td>
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<td>-Gear Example</td>
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<td>-iPhone Example</td>
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<td>Watch videos in the link/Complete lesson 5</td>
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<td>Link: <a href="https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing">https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing</a></td>
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<tr>
<td>3</td>
<td>2-3D Sketches</td>
<td>-Extrude</td>
<td>H.W.#2 due on Sunday, Sept.13th, at 11:59 pm</td>
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<td>-Revolve</td>
<td>Submit a screenshot of your model after lesson 7, and the final model for the attached Crankshaft.</td>
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<td>-Sweep</td>
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<td>-Create and Shell Drafted Part.</td>
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<td>-Create a Revolve</td>
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<td>-Apply Fillets to a Model</td>
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<td>-Create a Feature Pattern</td>
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<td>Watch videos in the link/Complete lessons-6&amp;7.</td>
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<td>Link: <a href="https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing">https://academy.autodesk.com/course/137992/introduction-mechanical-engineering-design-and-manufacturing</a></td>
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<tr>
<td>4</td>
<td>- Saving an STL File for 3D Printing</td>
<td>-Export an STL File</td>
<td>H.W.#3 due on Sunday, Sept 20th, at 11:59 pm</td>
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<td>-Apply an as-Built Joint</td>
<td>Complete the challenging assignment in</td>
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<td>-Drive and Animate a Joint</td>
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<td>-Edit a Joint Limit</td>
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<td>-Explode a Component</td>
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<td>-Create a Rendering</td>
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<td>-Create a Detailed Drawing from the Animations.</td>
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<td>-Add Parts of a Table</td>
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<tr>
<td>Week</td>
<td>Topic</td>
<td>Details</td>
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</table>
| 5 | Integrated Manufacture Workspace | - Define a New Tool  
- Create a Facing Toolpath  
- Create a Contour Toolpath  
- Simulate a Program  
- Export an NC File  
- Use Simplify to Remove Bodies  
- Select a Simulation Material  
- Activate Automatic Contacts  
- Solve and Review a Simulation  
- Add Load Conditions  
- Clone a Simulation Model  
Watch videos in the link/Complete lessons 12 & 13  
H.W. #4 due on Sunday, Sep. 27th, at 11:59 pm  
Complete the challenging assignment in step 10 from lesson 13  
Discussion board due on Saturday, at 11:59 pm. |
| 6 | Course Challenge Assignment | Course Challenge Assignment in lesson 14  
Note: data resources are available for students in lesson 1 step 4.  
Quiz (1)  
H.W. #5 due on Sunday, Oct. 4th, at 11:59 pm.  
Complete the course challenge assignment in lesson 14  
Discussion board due on Saturday, at 11:59 pm. |
| 7 | 3D Modeling | - Enroll in this course/  
H.W. #6 due on Sunday, |
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignments</th>
<th>Deadlines</th>
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<tbody>
<tr>
<td>8</td>
<td>-3D Modeling</td>
<td>-Intro to CAD 2D/3D Modeling Freeform Sculpt</td>
<td>H.W.#7 due on Sunday, Oct 18&lt;sup&gt;th&lt;/sup&gt;, at 11:59 pm</td>
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<td>-Intro to CAD 2D/3D Modeling_Direct Modeling</td>
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<td>Watch videos in the link/Complete lessons 7&amp;8</td>
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<td>Link: <a href="https://academy.autodesk.com/course/126271/introduction-3d-modeling">https://academy.autodesk.com/course/126271/introduction-3d-modeling</a></td>
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<tr>
<td>9</td>
<td>-Assembly</td>
<td>-Intro to CAD 2D/3D Modeling__Assembly Modeling</td>
<td>H.W.#8 due on Sunday, Oct 25&lt;sup&gt;th&lt;/sup&gt;, at 11:59 pm</td>
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<td>-Intro to CAD 2D/3D Modeling__ Drawing Documentation</td>
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<td>Watch videos in the link/Complete lessons 9&amp;10</td>
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<td>Link: <a href="https://academy.autodesk.com/course/126271/introduction-3d-modeling">https://academy.autodesk.com/course/126271/introduction-3d-modeling</a></td>
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<td><strong>Quiz (2)</strong></td>
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<td>Complete week -4 lessons</td>
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<td>-Assemblies Lecture</td>
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<td>-Assemble References</td>
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<td><strong>Complete the assignment in step-6 from week-4 in this course</strong></td>
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<td>Week</td>
<td>Topic</td>
<td>Assignments</td>
<td>Due Date</td>
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| 11   | Simulation – Static Stress                 | - Linear Structural Analysis _Lecture  
- Linear Structural Analysis _References  
Watch videos in the link/Complete lessons in week-8  
Complete the assignment in step-6 from week-8 in this course |
| 12   | Simulation – Thermal – and Thermal Stress  | - Simulation CFD and Thermal Analysis Lecture  
- Simulation –Thermal- Reference  
Watch videos in the link/Complete lessons in week-10  
Complete the assignment in step-6 from week-10 in this course |
| 13   | CAM and CNC Manufacturing                  | - CAM and CNC Manufacturing- Lecture  
- CAM 1- Tool Library Steps  
- CAM 2- Setup Steps  
- CAM 3- Adaptive Overview Steps  
- CAM 4- 2D Finishing Steps  
- CAM 5- Finishing Steps  
- CAM 6- Stock Simulation  
- CAM 7- Toolpath Management Steps  
- CAM 8- Post Process Steps  
Watch videos in the link/Complete lessons in week-12  
Discussion board due on Sunday at 11:59 pm  
Post on discussion board the team's project progress |

**Model and Assemble a 3D Printer –z Axis**
<table>
<thead>
<tr>
<th>Week</th>
<th>Assignment</th>
<th>Details</th>
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</thead>
</table>
| 14   | Generative Design | - Generative Design Mindset  
- Shape Optimization vs. Generative Design  
- Preserve Geometry  
- Create Obstacle Geometry for Motor Mounts  
- Create Obstacle Geometry for the Gas Tank and Motor  
- Generative Design Loads and Constraints  
- Set Generative Design Objectives  
- Understanding Manufacturing Design Objectives  
- Solve a Generative Study  
- Explore Generative Outcomes  
- Explore Manufacturing Outcomes  
- Create a 3D Design from a Generative Outcome  
- Review a Generative Model  
- Edit a Generative Model  
- Setup a Simulation Study  
- Analyze Simulation Results  

OR  
Complete the lessons (1,3,4,5,& 6) in the link below:  
https://academy.autodesk.com/course/134986/introduction-generative-design  

Discussion board due on Sunday at 11:59 pm  
Post on discussion board the team's project progress |
| 15   | Design Project #1 | (Team project)  
- The description listed in the project's file.  
Submit it by Thursday, Dec.3rd, at 11:59 pm. |
| 16   | Design Project #2 | (Individual project)  
- The description listed in the project's file.  
(This is the week of the final exam)  
Submit it by Tuesday, Dec.8th, at 11:59 pm |

*The above schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and the students.*