



## MECH 4338 - Capstone Design Projects

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### COSMIC Capstone Challenge

**CRN: 17302**

**Credit Hours: 3.0**

**Faculty Name: Angel Flores-Abad**

**Office Location: Engineering Building. A109**

**Email: [afloresabad@utep.edu](mailto:afloresabad@utep.edu)**

**Classroom Location: College of Engineering COBA 330**

**Meeting Time: 4:30 – 5:50 pm T.R.**

**Starting Date: 08/25/2025**

**End Date: 12/04/2025**

**Office hours: 300 PM – 4:00 PM MWs**

#### **Description:**

This course is a 3.0 credit hour program that aims to assess the work assigned during the semester, enhance the engineering skills of the students, and award credits for the completed design components. The course will cover key engineering aspects such as trade and feasibility studies, SWAP (size, weight and power) requirements, innovation, feasibility and utility, concept and mission design, and operations.

#### **Course Objectives:**

The project will enhance the student's skills in designing space systems based on system requirements. Students will learn the systems engineering approach to conceptualize, design and validate complex systems. Students will learn to design spacecraft payloads with high SWAP constraints.

#### **Teams**

The COSMIC team divided into sub-teams as listed below:

- Mission Design
- Systems Engineering
- Avionics
- Payload



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- Power
- Modeling
- Digital validation and demonstration

Please refer to the list below for the required documents and tasks that need to be completed as part of the project completion:

1. Actively collaborate with team members and meet with the leader at least twice a month.
2. Submit a monthly progress report as a team.
3. Attend the PDR meeting with the entire team.
4. Attend and participate in the final design presentation.
5. Submit an individual report using the template provided.
6. Submit all necessary forms required by faculty to meet the NSPE ethics requirements, which demonstrate the student's knowledge of professional ethics rules.
7. Write a recommendation for the next step in the design or if any revisions are required.
8. Submit a Peer-to-Peer evaluation.
9. Submit an animation of the conceptual design.

By participating in this project, individuals will gain a comprehensive understanding of basic engineering concepts and develop confidence while working with professionals from diverse backgrounds.

### **GRADING SCALE:**

A  $\geq$  90, B  $\geq$  80 but <90, C  $\geq$  70 but <80, D  $\geq$  60 but <70 and F <60

### **Grade Distribution:**

Three team progress reports (45 %), individual report (20%), participation and teamwork (10%), and final PDR presentation and animations(20%)

### **UTEP Advantage Edge Experience that applies to the course:**

- 1- Leadership
- 2- Critical Thinking
- 3- Problem Solving
- 4- Communication
- 5- Teamwork
- 6- Confidence



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### ABET Assessment Outcomes Expected :

2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to conclude.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### TECHNOLOGY REQUIREMENTS

Some course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP email account is working and you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have access to a computer/laptop. You will need to download or update the following software: Microsoft Office, Adobe Acrobat Reader, 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 do not have word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook, and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about [Microsoft Office 365](#) and follow the instructions.

**IMPORTANT:** If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP [Help Desk](#), as they are trained specifically in assisting with technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!



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### **ILLNESS PRECAUTIONS**

Please stay home if you have symptoms of a communicable illness. If you are feeling unwell, please let me know as soon as possible so that we can work on appropriate accommodation.

### **EXCUSED ABSENCES AND/OR COURSE DROP POLICY**

According to UTEP Catalog, "At the discretion of the instructor, a student can be dropped from a course because of excessive absences or lack of effort. A grade of "W" will be assigned before the course drop deadline and a grade of "F" after the course drop deadline." See Policies and Regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-performance in the course, you are at risk of failing, I will drop you from the course. I will provide 24-hour advance notice via email.

### **OR**

I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the [Registrar's Office](#) to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

### **INCOMPLETE GRADE POLICY**

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

### **ACCOMMODATIONS POLICY**

The University is committed to providing reasonable accommodations to students with documented disabilities. Students who become pregnant may also request reasonable accommodation, in accordance with state and federal laws and regulations and University policy. Accommodations that constitute undue hardship are not reasonable. To make a request, please register with the UTEP Center for Accommodations and Support Services (CASS). Contact CASS at 915-747-5148, email them at [cass@utep.edu](mailto:cass@utep.edu), or apply for accommodations online via the CASS portal.

### **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



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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, please visit [HOOP: Student Conduct and Discipline](#).

### GUIDANCE ON ARTIFICIAL INTELLIGENCE

AI. allowed with proper acknowledgement

Use of A.I. technologies or automated tools, particularly generative A.I. such as [ChatGPT](#) or [DALL-E](#), is ***only allowed with proper attribution given for its use.***

Students must properly cite and give full credit to the program used upon submission of every relevant assignment. For example, text generated using ChatGPT must be cited:

Chat-GPT(version). Date of query (year/month/day). "Text of your query."

Generated using OpenAI. <https://chat.openai.com/>

A short paragraph describing how the tool(s) was/were used for the assignment must be included.