

AEROSPACE DESIGN 1
EAS4700 Section 1029(30070)
Class Periods: **Monday periods 9-10** (4:05pm-6:00pm)
Wednesday period 9 (4:05pm – 4:55pm).
Location: CSE E221
Academic Term: Spring 2022

Instructor:

Mr. Michael Generale

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Campus Office: NEB 125

Office Hours: Mondays and Wednesdays 1:00 – 3:00 pm

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

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Please contact through the Canvas website

Course Description

Applications of the principles of analysis and design to aerospace vehicles. Emphasizes astronautics.

Course Pre-Requisites

[EAS 4510](#) and [EML 4312](#).

Course Objectives

By the end of this course, you should be able to do the following:

1. Prepare technical documents in aerospace industry.
2. Give technical presentations, develop communication skills.
3. Work in team and lead a team.
4. Seek, find, and assimilate the knowledge you need to solve new problems.

COURSE ASSESSMENT MEASURES FOR ABET:

The following are the applicable Accreditation Board for Engineering and Technology (ABET) Student Outcomes and UF Student Learning Outcomes (SLO)

ABET Information – Criterion 3 – Student Outcomes

The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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 draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Aerospace Engineering UF Student Learning Outcomes:

(SLO 1) Apply knowledge of mathematics, science, and engineering principles to aerospace engineering problems (ABET Outcome (1))
(SLO 2) Design and conduct aerospace engineering experiments and analyze and interpret the data (ABET Outcome (6))
(SLO 3) Design an aerospace engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints (ABET Outcome (2))
(SLO 4) Communicate technical data and design information effectively in speech and in writing to other aerospace engineers (ABET Outcome (3))

The following tables shows how SLOs and ABET criteria are supported in this class and the mapping with assignments.

ASE Specific Courses	1 SLO1	2 SLO3	3 SLO4	4	5	6 SLO2	7
EAS4700 Aerospace Design 1	H	H-A	H	H-A	H-A	M	L

Legend: H = outcome strongly supported, M = moderately supported, L minimally supported; A = outcome assessed; 1-7 = ABET outcomes; SLO = UF Student Learning Outcome

Assessment	Student Learning Outcomes
Final Report	SLO1, 2, and 3 – ABET criteria 4 and 7
Mid-term and Final Presentations	SLO4 – ABET criterion 2,4 and 5
Peer grading	SLO4 – ABET criterion 5
STK Certification	SLO1

The rubric for evaluation of the mid-term and final presentations as well as the final report are provided on the course CANVAS website.

Materials and Supply Fees

List if applicable

Required Textbooks and Software

The following texts will be referred to in class and provide additional insight into topics covered in lecture.

Required:

Elements of Spacecraft Design by Charles D. Brown

ISBN (print): 978-1-56347-524-5

eISBN: 978-1-60086-179-6

Publication Date: January 1, 2002

Recommended:

Human Spaceflight Mission Analysis and Design 2nd edition by Larson, McQuade & Pranke

Publication Date 2014

NOTE: Even though I made it optional for this course, I cannot recommend Human Spaceflight Mission Analysis and Design strongly enough. It is a relatively expensive text, however, the wealth of knowledge it contains will serve you well in your design careers whether you enter into human or robotic spaceflight.

You must have access to the following software:

- MATLAB and a CAD program.
- Microsoft Project (available for download from UF)

The following software is strongly suggested:

- Satellite Tool Kit (STK) installed on individual machines.

Microsoft Project is a project management tool for generating schedules, tracking resources and project status.

STK is a tool for simulating orbital mechanics on your computer. It is an industry standard for simulating spaceflight and vehicle performance.

STK DOWNLOAD INSTRUCTIONS:

1. Go to www.agi.com and create an account (needed for certification later, etc.).
2. Download and install STK from <http://agi.com/resources>

Additional information will be provided if licensing is needed. You should be able to do all the analysis you need using the trial version.

Course Schedule

Week / Dates	Topic	Notes
1 05 JAN 22	Module 1 <ul style="list-style-type: none">• Course, project and instructor introduction.• Introduction to Project Management principles• Project overview• The importance of scheduling and tracking open work	Introduction to Spacecraft Design in industry. Reading reference: Elements of Spacecraft Design (ESD) Ch. 2 Systems Engineering

		Human Spaceflight Mission Analysis and Design (HSMAD) Ch. 1 An Introduction to Human Spaceflight Ch.2 Designing Human Space Missions
2 10 /12 JAN 22	<u>Module 2</u> <ul style="list-style-type: none"> • Requirements development • Operations Concept / CONOPS development • Assessing risk: Problem Analysis-Decision Analysis • Designing for Operability • Designing for EVA Support 	Reading reference: HSMAD Ch. 22 Extravehicular Activity (EVA) Systems
3 19 JAN 22	<u>Module 3</u> <ul style="list-style-type: none"> • Space / mission environment special considerations • Attitude Control • Designing the Propulsion System and Selecting Elements • Mission Flight Profile 	Reading reference: ESD Ch. 3 Orbital Mechanics ESD Ch. 5 Attitude Control ESD Ch. 4 Propulsion HSMAD Ch. 24 Propulsion Systems
4 24 / 26 JAN 22	<u>Module 4</u> <ul style="list-style-type: none"> • Monday 24 JAN: Guest Lecturer – Dr. John Carson of JPL, SPLICE Principle Investigator • Thermal Control Methods • Structural design considerations • Power management system design • Communications and data systems 	Reading Reference: ESD Ch. 7 Thermal Control
5 31JAN/ 02 FEB 22	<u>Module 5</u> <ul style="list-style-type: none"> • Designing an Effective Test Plan 	
6 4/7 FEB 22	<u>Module 6</u>	
7 14 / 16 FEB 22	<u>Module 7</u>	ALL PDR PRESENTATIONS MUST BE UPLOADED TO CANVAS NO LATER THAN: 3 PM 18 FEB 2022 <u>NO EXCEPTIONS</u>
8 21 / 23 FEB 22	PDR Presentations	Each team will be given the same amount of time to make their presentations. Presentation time will be limited to allow all groups to present within the limitations of the scheduled class periods.

9 28 FEB / 02 MAR 22	<u>Module 8</u>	Lectures in the last half of the semester will be targeted to meet the class needs.
10 14 / 16 MAR 22	<u>Module 9</u>	
11 21 / 23 MAR 22	<u>Module 10</u>	
12 28 / 30 MAR 22	<u>Module 11</u>	
13 04 / 06 APR 22	<u>Module 12</u>	
14 11 / 13 APR 22		ALL CDR PRESENTATIONS MUST BE UPLOADED TO CANVAS NO LATER THAN: 3 PM 15 APR 2022 <u>NO EXCEPTIONS</u>
15 18 / 20 APR 22	CDR Presentations	Each team will be given the same amount of time to make their presentations. Presentation time will be limited to allow all groups to present within the limitations of the scheduled class periods.
16 27 APR	Final Reports Due	ALL FINAL REPORTS MUST BE UPLOADED TO CANVAS NO LATER THAN MIDNIGHT 27 APR 2022 <u>NO EXCEPTIONS</u>

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is required. This class is HIGHLY participative and group work intensive. There will be NO early/late presentations granted

Attendance will be taken each class period. Excused absences may be granted with a minimum of 24 hours' notice. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Preliminary Design Review	20	20%
Critical Design Review	20	20%
Final Report	40	40%
Attendance	10	10%
Peer Evaluation	10	10%
	100	100%

Optional extra credit is available as follows:

GatorEval Survey Bonus: A voluntary course and instructor evaluation in GatorEvals is requested and is valued as a 5 point bonus on your individual grade.

Grading Policy

The grading scale is as follows:

A: 94 to 100	C: 65 to 69.99
A-: 90 to 93.99	C-: 60 to 64.99
B+: 85 to 89.99	D+: 55 to 59.99
B: 80 to 84.99	D: 50 to 54.99
B-: 75 to 79.99	D-: 45 to 49.99
C+: 70 to 74.99	E: Less Than 45

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.