



AESP 350 Aerospace Systems

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Course Information

Course Description

Aerospace Systems is a three-credit course that presents the physics and the physical design of aircraft subsystems such as the control system, the engine and fuel control systems, the landing gear, avionics, electrical system, environmental control system, emergency systems, avionics, and rotary wing systems. It will also touch on aerospace systems design and development methodology. The course will also introduce embedded software development. The propulsion system and airframe will be only briefly discussed since they are extensively discussed in other AESP courses.

Pre-requisites: AESP101 (D or better) or ENCP101 (D or better)

Co-requisites: None

Contact hours – 3

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Instructor Information

Wout De Backer

Email: wbacker@cec.sc.edu

Phone: 803-629-4498

Office Location: McNair Center, 1000 Catawba St., Ste 151D

Office Hours: Wednesdays 5:40 – 6:40 PM, after class

Other: Emails/Posts will be replied to within 40 business hours.

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Textbook

Primary Material:

- Selected course presentations and handouts

Primary Textbook:

- Ian Moir, Allan Seabridge, Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration 3rd Edition, John Wiley & Sons, ISBN-13: 978-0470059968, ISBN-10: 0470059966

Additional Information:

- Ian Moir, Allan Seabridge, Malcolm Jukes, Civil Avionics Systems, 2nd edition, John Wiley & Sons, ISBN: 978-1-118-34180-3

4**Meeting Time/Location****Meeting Time**

Mondays & Wednesdays | 03:55pm - 05:10pm

Meeting Location

300 Main St., Room B213

5**Course Topics**

1. Fundamentals of flight control systems
2. Landing gears
3. Engine control systems
4. Fuel systems
5. Hydraulic systems
6. Pneumatic systems
7. Emergency systems
8. Electrical systems
9. Environmental control systems
10. Rotary wing systems
11. Advanced systems
12. Environmental conditions affecting aerospace systems
13. Avionics Technology
14. Aerospace systems design and development methodology

6**Course Outcomes**

1. Students will describe and explain the workings of and physics behind aerospace systems to include flight control systems, engine control systems, fuel systems, hydraulic systems, landing gears, electrical systems, environmental control systems, emergency systems, and rotary wing systems
2. Students will describe systems design and development methodology.
3. Students will describe and explain the workings of avionics technology.
4. Students will describe how environmental conditions affect aerospace systems.

Topics for each class meeting are listed below. However, circumstances may call for a departure from this schedule. Any changes to the schedule will be made in advance. Quizzes will be posted at the end of a new topical cluster of lectures.

Day	Date	Topic	Book	Due Today
First Day of Classes M, 1/12				
1	M, 01/12	<i>No class, Conference Travel</i>		
2	W, 01/14	01 - Introduction	Intro	
3	M, 01/19	<i>No class, MLK Day</i>		
T, 01/20 Last day to change/drop a course without a grade of "W" being recorded				
4	W, 01/21	02 - Flight Control Systems	Ch. 1	
5	M, 01/26	03 - Rotorcraft Control systems	Ch. 1	
6	W, 01/28	04 - Landing gears	Ch. 4.17	Team Formation Due
7	M, 02/02	04 - Landing gears	Ch. 4.17	Quiz 1 (02, 03)
8	W, 02/04	05 - Engine control systems	Ch. 2	
9	M, 02/09	05 - Engine control systems	Ch. 2	
10	W, 02/11	06 - Fuel systems	Ch. 3	
11	M, 02/16	06 - Fuel systems	Ch. 3	
12	W, 02/18	07 - Hydraulic systems	Ch. 4	Quiz 2 (04, 05, 06)
13	M, 02/23	07 - Hydraulic systems	Ch. 4	
14	W, 02/25	08 - Pneumatic Systems	Ch. 6	Project Proposal
15	M, 03/02	09 - Emergency systems	Ch. 8	
16	W, 03/04	09 - Emergency systems	Ch. 8	
Th,03/05 Semester Midpoint				
Su-Su, 03/08 - 03/15 Spring Break				

Day	Date	Topic	Book	Due Today
17	M, 03/16	10 - Electrical Systems	Ch. 5	
18	W, 03/18	10 - Electrical Systems	Ch. 5	
19	M, 03/23	11 - Environmental control systems	Ch. 7	
20	W, 03/25	11 - Environmental control systems	Ch. 7	
M, 03/30 Last day to change/drop a course without a grade of “WF” being recorded				
21	M, 03/30	12 - Rotary wing systems	Ch. 9	Quiz 3 (07, 08, 09, 10)
22	W, 04/01	13 - Advanced systems	Ch. 10	
23	M, 04/06	14 - Environmental conditions affecting aerospace systems	Ch. 13	
24	W, 04/08	15 - Avionics technology	Ch. 12	Project report
25	M, 04/13	16 - Systems Design and Development methodology	Ch. 11	
26	W, 04/15	17 - Review & Reserve		Quiz 4 (11, 12, 13, 14, 15)
27	M, 04/20	17 - Project presentations*		Presentations
28	W, 04/22	17 - Project presentations*		Presentations
29	M, 04/27	17 - Project presentations *		Presentations
M, 04/27 Last Day of Classes				
30	T, 04/28	Reading Day & Senior Design Showcase		
31	W, 04/29	Final Exam; 4:00pm – 6:30pm		Final Exam (01-16)

*Note: attendance is mandatory for the project presentations

The course is designed to provide students with an overview of aircraft and spacecraft systems and related technology. The course is preparing students for the aircraft design course and for the capstone design project. The typical class session will consist of:

- Presentation of new material
- Assignment of reading work
- Discussing quiz and homework results
- Question/answer session

Course Requirements: Students are required to take examinations, complete assigned quizzes and homework, and take the final exam. Students are expected to attend class, complete the weekly readings before class, ask questions, and turn in assignments on time. Students should be able to respond to short-answer questions on the assigned material frequently during the semester. The students are encouraged to read the course materials, and to look up the definitions for words or concepts they do not understand. The instructor is available to further clarify complex subjects. Class sessions are recorded online and available through blackboard and contain important content that is not always on the provided lecture notes.

Quizzes: On-line quizzes and tests will cover one or multiple topical clusters and may take the up a part of the time allotted for a class session. The time limit for the quizzes will be announced before starting the quiz. The quizzes are an important part of the course grade and assess if students understand the course content. If students miss a quiz; a valid reason needs to be presented to the instructor, and resolution for the missing grade will be on a case-by-case basis.

Examinations: The final exam will consist of True/False, Multiple Choice and Short Answer questions. The final exam is comprehensive. Exam questions/answers are randomly displayed and drawn from substantial test banks. The final exam will be comprehensive and should take approximately 1.5 hours to complete.

Project: Students are to select an aircraft/spacecraft of their choosing and describe key systems of that aircraft and how they are connected. Project submission will be in the form of the presentation at the end of the semester and written report due before the presentation. Project proposal (with aircraft selection) is due as indicated in the schedule. The presentation section of the project will be held in person, and attendance is mandatory.

Course Policies: Quizzes will not be accepted after the due date. Exceptions will only be made in extenuating circumstances and at the discretion of the instructor. The examinations must be taken as scheduled on this syllabus and as announced in class. Make-up exams will differ from those given in class but will cover the same material.

Students who have disabilities requiring special arrangements for class participation or test administration should notify the instructor of the need for such arrangements at the beginning of the semester.

Students in this course should be familiar with the university policies on Academic Responsibility contained in the Carolina Community: Student Handbook & Policy Guide, 2005-2006, or any more recent edition, if available. Violations of academic responsibility in this course will be handled as stipulated in that publication.

Assessment and Grading Policy: Students will be evaluated on homework/quiz assignments, one final exam and one project with a presentation. The examinations will be objectively scored using a scoring key.

The quizzes will be graded on a scale from 0 to 10, reflecting percent of points earned.

Assignment	Percent
Quiz 1	10%
Quiz 2	10%
Quiz 3	20%
Quiz 4	20%
Team Project Proposal	5%
Team Project Report	15%
Team Project Presentation	5%
Final Exam	15%
Total	100%

Grades will be assigned using the following weights and ranges in the scale from 0 to 100:

Grade	Points
A	90-105
B+	85-89
B	80-84
C+	75-79
C	70-74
D+	65-69
D	60-64
F	< 60

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Attendance Policy

When you miss class, you miss valuable information. If you are absent, you are responsible for learning material covered in class. If you are absent when an assignment is due, you must submit the assignment prior to the due date to receive credit.

Attendance is required during group meetings, as agreed upon within the group. Individual performance within the group will be a portion of your peer review grade.

Attendance is mandatory for the project presentations. See lecture schedule for items marked with "*"

Accommodating Disability

Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Student Disability Resource Center: 777-6142, email sasds@mailbox.sc.edu, or stop by 1705 College Street, Close-Hipp building, Suite 102. All accommodations must be approved through the Student Disability Resource Center.

Diversity

To learn, course participants must be open and respectful to the views of others such as colleagues or instructors. Participants are expected to respect fellow classmates and learn from one another, respect each other's opinions and refrain from personal attacks or demeaning comments of any kind.

Academic Integrity

University policies and procedures regarding academic integrity are defined in policy STAF 6.25, Academic Responsibility - The Honor Code (see <http://www.sc.edu/policies/ppm/staf625.pdf>). Prohibited behaviors include plagiarism, cheating, falsification, and complicity. All potential Honor Code violations will be reported to the Office of Academic Integrity, which has the authority to implement non-academic penalties as described in STAF 6.25. Academic penalties for Honor Code violations range from a zero on the assignment to failure of the course.

Generative Artificial Intelligence

Any submission is considered a pure reflection of your or your team's work and understanding. The use of artificial intelligence (OpenAI Chat GPT, Gemini, Copilot...) to complete academic work should not jeopardize your learning and robs you of the ability to engage in deep, critical reflection. Misuse or misrepresentation of artificial intelligence aids will be referred to the Office of Academic Integrity as alleged violations of either of the following: Cheating, defined as "unauthorized assistance in connection with any academic work" and/or Falsification, which includes "academic misrepresentation for an academic advantage".

Students are not permitted to use AI tools during quizzes or examinations.
Students are permitted limited use of AI tools for the course project.

AI tools should be used wisely and reflectively with an aim to deepen understanding of subject matter. Please contact the instructor in before assignment due dates if you have questions on what constitutes acceptable use.

Online Learning Outcomes: All LOs are equivalent of those of a face-to-face (F2F) version of the course.

Fair Policy: All readings/materials comply with copyright/fair use policies.

Technology: Course delivery will be conducted in person and through Blackboard.

Software Requirements: None

Interactions:

S2I: Blackboard announcements will be used with a combination of emails/teams for further interaction.
S2C: All course material is posted on Blackboard.

SO/CO Table	CO 1	CO 2	CO 3	CO 4
SO 1 - Complex Problems	1	1	1	1
SO 2 - Design	3	3	3	2
SO 3 - Communication	2	2	2	2
SO 4 - Judgement	3	3	3	3
SO 5 - Teams	2	2	2	2
SO 6 - Experiments	3	3	3	3
SO 7 - Knowledge	2	2	2	2

SO 1 - Complex Problems

an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

SO 2 - Design

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

SO 3 - Communication

an ability to communicate effectively with a range of audiences

SO 4 - Judgement

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

SO 5 - Teams

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

SO 6 - Experiments

an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

SO 7 - Knowledge

an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.