

AAE 45100: Aircraft Design

Credit Hours	3
Offered	Fall and Spring
Pre-requisites	None
Co-requisites	Senior standing in AAE
Instructional Method	3 hours of lecture and lab per week
Required	Choice between AAE 45000 or AAE 45100

1. Course Description

This course will offer students the opportunity to define an aircraft concept, starting from a basic opportunity description. Students will work in teams to identify customers, formulate a basic business case, establish a basic concept of operations, develop the system requirements, generate concepts, conduct trade studies and sizing to determine the most promising aircraft design, and pursue conceptual design of the aircraft, with as much detail as time permits. The course will try to replicate industry or government conceptual aircraft design studies as closely as possible in a 15-week semester.

2. Instructor Information

Prof. William Crossley
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3. Topics Covered

- Requirements development
- Concept development-structured design methods

- Team formation and interaction
- Weight estimation, cost estimation and constraint diagrams
- Concept generation and selection; preliminary sizing - Design requirement sensitivities, weight estimation, wing area selection, power/propulsion system requirements
- Design refinement and optimization via carpet plots
- Technical writing and presentations; design reviews (oral and written reports)
- Stability and control surface sizing
- Mission simulation and performance verification
- Prototype development; real or virtual models and products
- Design justification via analyses and / or flight verification and
- Final report

4. Intended Learning Outcomes

The course is intended to help you to:

- deepen your knowledge of topics relevant to aircraft design
- identify and formulate the design requirements for an aircraft
- conduct a set of trade studies to make decisions about the aircraft design
- describe an aircraft design that is likely to meet the set of requirements
- use modern engineering tools to complete the design process
- apply engineering knowledge and skills acquired in previous classes to the design problem
- solve problems as part of a team
- effectively communicate by giving oral design reviews and writing design reports / proposals

5. Assessment Method

Three major design deliverables (System Requirement Review, System Definition Review, and Conceptual Design Review). Peer evaluations. Short quizzes.

6. Relation to ABET Outcomes

	Program Learning Outcomes	Included?
1.	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	Yes
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.	Yes
3.	An ability to communicate effectively with a range of audiences.	Yes
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.	No
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.	Yes
6.	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	No
7.	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Yes