

AE 6362 - Syllabus

Safety by Design- 4 Credits

General Information

Description

Aerospace vehicle safety, reliability, and certification considerations within the vehicle design process. Students will be introduced to core safety principles and the fundamental methods for incorporating safety analysis of aerospace systems alongside system design and engineering.

Pre- &/or Co-Requisites

No pre-requisite

Course Goals and Learning Outcomes

This project-oriented course is aimed at introducing students to a functional safety management (FSM) approach for integrating complex aerospace system development with safety by design and flight certification processes. The FSM approach has been well accepted in many industries through the use of various industry standards and regulations. It is implemented through joint industry and government led Aerospace Recommended Practices (ARPs) and Document Orders (DOs).

This interactive approach between aircraft and system development and safety assessment begins with an initial Concept of Operations (CONOPS). Aircraft level requirements are identified and leveraged for architecture selection and vehicle sizing. In parallel, aircraft-level Function Hazard Analysis (FHA) provides initial insight into the vehicle's safety requirements, which are carried forward and refined through later stages of the vehicle, system, and item design and analysis.

There are three sections to the Course, which will introduce the overall FSM approach and provide insight into its various components and applications:

1. Introduction to FSM standards and to Reliability, Availability & Maintainability Fundamentals. At the completion of this section, students will be familiar with functional safety and reliability concepts and their relationship to the development of aerospace systems.
2. Education on the Development Assurance approaches in Aerospace Recommended Practices (ARPs) and DO standards. At the completion of this section, students will be understand industry standard practices for incorporating safety assessment methods into the system design process.
3. Application to Aircraft and Spacecraft of Interest, both civil, military and autonomous UAS, to include a flight certification planning. At the completion of this section, students will be able to apply their understanding of functional safety approaches, reliability, and standard practices to an aerospace system of interest.

Course Requirements & Grading

Note: Graded components of a course may vary with each offering. The example below is typical but subject to change.

Description of Graded Components

Students are expected to attend course meeting times, which will include lectures, class discussions, case studies, and method demonstrations. Student participation in discussions and case studies is expected and questions during lectures are encouraged.

Over the course of the semester students will work in groups to conduct functional safety analysis on a relevant aerospace vehicle. The results of these analyses will be presented in a midterm and final presentation over the course of the semester.

A representative distribution of the course grade between these aspects is provided for reference below:

Attendance - 5%

In-class participation - 15%

Midterm Project Review - 35%

Final Project Review - 45%

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Topics Covered

Note: The exact topics covered in a course may vary with each offering. The example below is typical but subject to change.

- Reliability
- Functional Safety Analysis
- Development Assurance Process
- Operational Risk, Target Level of Safety
- Preliminary Safety Analysis
- Hardware and Software Safety Assessments
- Model-Based Safety Analysis
- Methods and Tools for Safety Analysis \\hline
- Special Topics in Safety
- Emerging Safety Considerations

Course Materials

Last modified: October 10, 2024

Note: Course materials may vary with each offering. The example below is typical but subject to change.

Textbook

No textbook is used for this course.

Course notes

Course notes will be provided through the course website, typically in the form of PDF copies of lecture material.