Mechanical Engineering Dept. Department

Syllabus
ME 428: Structures of Flight Vehicles (3-0-3)

Course Catalog Description:

This course will provide the students with knowledge about the fundamental concepts of the mechanics of flight structures.

Course Pre-requisites:

- CE 202: Statics & Strength of Material
- MATH 201: Calculus III

Course Objectives:

1. To provide students with the fundamental knowledge and techniques to analyze and design the structural components of flight structures.
2. To enable students to have high communication skills.

Course Learning Outcomes:

CLO1. Identify the components of the flight structures and demonstrate the ability to know the function of each of these components.

CLO2. Apply the theory of elasticity to determine analytical solutions for the basic plane stress problems, and to analyze and design thin-walled structures and stiffened shear panels used in aircraft structural components (wing and fuselage).

CLO3. Apply the work-energy principles and finite element method to solve basic aircraft structural problems.

CLO4. Demonstrate the ability to use software such as Matlab, Excel, and ANSYS as a tool for structural analysis of airframes.

CLO5. Demonstrate the ability to write a technical report and/or to give professional and well-organized presentations.

Learning Resources:

- T.H.G. Megson "Aircraft Structures for Engineering Students", 6th Edition, Butterworth Heinenmann, 2015.
- 1) T.H.G. Megson “An Introduction to Aircraft Structural Analysis”, 1st Edition, 2010 2) H.D. Curtis, “Fundamentals of Aircraft Structural Analysis,” 1st Edition, McGraw-Hill, 1996. 3) R. Budynas "Advanced Strength and Applied Stress Analysis", Mc-Graw Hill, 1998. 4) D.J. Peery and J.J. Azar, "Aircraft Structures", McGraw-Hill, 1982

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Attendance and Participation	None	10.0%
Homeworks	None	10.0%
ANSYS in-class Assignments	None	10.0%
Quizes	None	10.0%
Major Exams	None	30.0%
Final Exam	None	30.0%

Lecture Weekly Schedule:

Week#	Topics
1	Introduction and Review of Bending, Shear and Torsion of Thin-walled Beams
2	Stress Analysis of Aircraft Components
3	Stress Analysis of Aircraft Components (Continue)
4	Stress Analysis of Aircraft Components (Continue)
5	Stress Analysis of Aircraft Components (Continue)
6	Summary of Work and Energy Principles
7	Summary of Work and Energy Principles (Continue)
8	Introduction to the Finite Element Method & ANSYS
9	Introduction to the Finite Element Method & ANSYS (Continue)
10	Introduction to the Finite Element Method & ANSYS (Continue)
11	Introduction to the Finite Element Method & ANSYS (Continue)
12	Analysis of Composite Structures
13	Analysis of Composite Structures (Continue)
14	Introduction to Aeroelasticity
15	Review