ENG ME 410 Flight Vehicle Design II

2008 - 2009 Catalog Data:
ENG ME 410 Flight Vehicle Design II Prereq: ENG ME 409. Continuation of ENG ME 409, focusing on the senior design project in which students conceive, plan, and carry out a significant aerospace vehicle design project, working in groups. Each group member concentrates on a separate technical area for the design: propulsion and performance, aerodynamics, control and stability, structures, and design and layout (for aircraft); propulsion, telecommunications, power and thermal control, structures and layout, attitude determination and control (for satellites). Teams build a test model and design an experiment to test some aspect of their design. Includes coverage of professional topics, such as effective communication skills and ethics. Written reports and oral presentations required. 4 cr.

Class/Lab Schedule: 4 lecture hours per week

Status in Curriculum: Required in Aerospace Program

Textbook(s) and/or Other Required Material: Daniel P. Raymer, Aircraft Design: A Conceptual Approach, 3rd Edition, AIAA, 1999.

Coordinator: Donald Wroblewski, Associate Professor, Mechanical Engineering

Prerequisites by Topic:
1. Aircraft conceptual design
2. Aerodynamics
3. Atmospheric flight mechanics
4. Propulsion (lo-reg.)
5. Structural mechanics

Goals:
This is the second in the two-term "capstone" design sequence for seniors majoring in Aerospace Engineering. The main activity in this course is a preliminary design of an aircraft to be accomplished as a group. The main goal is to provide each student with an in-depth design experience within the context of the group effort. Through this exercise, the students are expected to develop the ability to:
1. Utilize basic engineering science and tools to seek the optimum design solutions
2. Manage an engineering project, including decision making and meeting deadlines
3. Work within a group environment to accomplish an individual task as part of a common design goal
4. Communicate results through a series of oral and written reports.

Course Learning Outcomes:
As an outcome of completing this course, students will:

i. Gain experience working on a major group design of an aircraft, incorporating real constraints, including: preliminary subsystem design and integration, performance estimation, production of workable engineering drawings and scale model fabrication.

(Continuation of group project from AM 409 Flight Vehicle Design I). (A, C, E, AE:M,N)

ii. Become proficient at synthesizing basic engineering science and application tools learned in previous coursework to seek optimum solutions for design of an aircraft. (A, C, E, K, AE:M,N)

iii. Gain experience working within a team environment to accomplish an individual task (subsystem design) as part of a common design goal (mission-driven preliminary design of an aircraft) including: interfacing with team members to assure subsystem design meets requirements for overall mission, attending and participating in group meetings, participating in peer review assessments, and contributing to team oral and written reports. (D, AE:M,N)

iv. Gain appreciation for manufacturing issues by designing and fabricating a mock-up model of the design. (C, L).

v. Gain experience for the professional aspects of an engineering project including: developing and using Gantt charts and responsibility tables , meeting deadlines and properly documenting work through an organized design notebook. (G, H)

vi. Gain experience in self-instruction and independent inquiry, particularly the learning of software tools required for effective design analysis. (I, K)

vii. Become proficient at effectively communicating results of design work, through a series of oral and written reports, incorporating effective graphical representations of data and results and by maintaining an organized design notebook. (G, L)

viii Gain an appreciation for professional, ethical a**nd contemporary issues** in Aerospace Engineering through class discussions and written assignments. (F, J)

Course Learning Outcomes mapped to Program Outcomes:
(For Program Outcomes, please see attached page or Department Web Site)

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	i,ii		i,ii, iv	iii	i,ii	viii	v, vii	v	vi	vii	ii, vi	iv, vii		
Emphasis:	4	1	5	4	5	4	4	2	3	2	4	4	1	1

Topics (time spent in weeks):
1. Progress meetings (5)
2. Oral Presentations (2)
3. Design topics (4)
4. Professional topics and communication skills (1)
5. Cost analysis (1)
6. Ethics and Safety (1.5)

Contribution of Course to Meeting the Professional Component:
Engineering Topics: 100%

Status of Continuous Improvement Review of this Course:
Date: January 5, 2009 **Reviewed by:** Design Subcommittee
Prepared by: Donald Wroblewski **Date:** April 9, 2009