

ME 409: Flight Vehicle Design I Information Sheet

INSTRUCTOR: Prof. Don Wroblewski
OFFICE: ENG 415

OFFICE HRS: TTh 11-12 **
PHONE/E-MAIL: 3-9739/ dew11@bu.edu

** Note: If you need to talk with me outside of office hours, you have three options:

- (1) **Open door policy:** If my office door is open, you are welcome to drop in without an appointment. My door is rarely closed when I'm in my office, so when it is, it's usually because I'm in a private meeting or because I'm working on a tight deadline. Please respect privacy during these times.
- (2) **E-mail:** I usually can answer it within ½ hour if I'm in my office.
- (3) **Blackboard Forums:** I have set up forums for questions—I will try to check these several times a day.
- (4) **Phone:** One way to get around a “closed door,” ... IF I decide to answer my phone ☺

TEXTBOOKS:

Required: *Aircraft Design: A Conceptual Approach*, Daniel Raymer, AIAA, 2006
Reference: *Design of Aircraft*, Thomas Corke, Prentice Hall, 2003
Airplane Design- Parts 1-8, Jan Roskam,

LECTURES:

It is important that you review the lecture slides prior to class. I will not have time to go through all the slides in detail in class. Instead, I will review them in class, focusing on those aspects that: (1) will help you to better understand the basis for the design methods and (2) help you understand how to apply the design methods for your capstone project. My hope is to include activities into lecture that will further assist you in assimilating the material. As such, your attendance is important.

DISCUSSION: W 1-2 PM MCS B31 (111 Cummington)

Discussion will be used for several purposes:

1. Quizzes will be given during discussion (see syllabus for dates).
2. Team Meetings with DEW
3. Q&A for assignments
4. Teaming exercises

BLACKBOARD SITE:

BlackBoard (BB) will be used extensively for this class:

- (1) Course administrative details (e.g., syllabus): posted under the Course Information tab.*
- (2) Requirements and formats for deliverables: posted under Assignments tab.*
- (3) Lecture slides and pre-lecture material: posted under Course Documents tab.
- (4) Course Calender
- (5) Announcements and updates to assignments or due dates: posted on Announcements page. Please check this regularly—I would prefer to use this as a means of communication rather than flooding your Inbox with repeated e-mails.
- (6) Group pages: found under Communications tab. Team members can communicate and share files, and submit electronic deliverables to me. I will also post feedback on deliverables to each team through their group page.
- (7) Forums for Q&A and for discussion of general topics related to aircraft an aviation.
- (8) Links to relevant information: found under External Links tab. May include pre-lecture material .

* For items (1) and (2): NO hard copies will be handed out in class

ASSIGNMENTS AND GRADING (SEE SYLLABUS FOR DUE DATES)

Individual assignments: (35% of grade)

These are done individually by each student. Each student receives his/her own grade.

1. Quizzes: (20 %) Two one-hour quizzes, to be given during the discussion section.
2. Oral Presentation: (8%) Based on oral presentation skills demonstrated during Design Review.
3. Class participation: (7 %)

This consists of three components:

1. (5%) Participation in class through informal discussions, Q&A, and in-class activities.
2. (2%) Technical Society enrollment. To emphasize the importance of professional societies, all students are required to join a technical society: e.g., AIAA, ASME, SWE, SAE or SAME. (NOTE: Students can join ASME for free; AIAA cost \$20). You must submit some evidence of your membership; e.g., a receipt acknowledging your application or a membership card. Those who are opposed to joining a technical society can satisfy this requirement by submitting a 1,000 word essay describing AIAA, what it has to offer to students and professionals, its role in the Aerospace industry and a well-formulated argument as to why you are opposed to joining. The essay will be graded and the grade will be used to pro-rate the 2% component of the grade.

Team Assignments--Capstone Project: (65% of grade)

All team members receive the same grade. Specific requirements will be posted on CourseInfo

NOTE: All team assignments will be due on Fridays by 4 PM (See syllabus for dates).

- 1) Formal deliverables:
 - a) Project Proposal: Written report describing mission, proof of relevance, performance targets/constraints, and details of team. (10%)
 - b) Interim Report: Written report containing updates to mission and design constraints/targets, and summary of all design analysis up through engine selection (15 %)
 - c) System Design Review: Oral presentation describing the “frozen” configuration, including analysis, trade studies and drawings. No formal report is required, but an e-ppendix (spreadsheets, MATLAB scripts, etc. will be required to support analysis. (25 %)

2) Project updates:

Details of analysis for various components of design. These will be electronic submissions, with no formal reports. .

- Project Update 1: T/W-W/S and initial sizing (5%)
- Project Update 2: Airfoil and wing design (5%)
- Project Update 4: Weights and refined sizing (5%)

CAPSTONE DESIGN NOTEBOOK

For your capstone project, it is expected that each student will maintain a Design Notebook, which documents work on his/her aspect of the design, as well as group progress. Although this notebook will be more appropriate for your work in ME 410, you should begin to use it this semester. Early in the conceptual design phase, it is important that you document the decisions made regarding configuration alternatives.

It is critical that you keep this notebook up to date. This may seem like an undue burden, but in the end it will save you an enormous amount of time when you need to prepare formal reports. **You should bring the notebooks to all meetings.**

- Type of Notebook
 - The type of notebook is not critical, as long as it used regularly.
 - Suggested type
 - Roaring Springs Composition Book 100 sheets
 - Green Cover
 - 5x5 Quad Ruled-- VSTYLE RR77255

- Guidelines for use
 - 1) All entries must be in (unerasable) ink -- cross out with a single line any mistakes (may not be a mistake!).

 - 2) Number each page, reserve the first few pages for a table of contents. You may keep a contact (telephone, email, etc) list at the back. The cover should indicate the project, sequential book number, your name, and period of use. Back reference can be made by book and page numbers.

 - 3) Write something in your notebook every day that you work on the project. Get in the habit of dating and signing (initializing) each page. For particularly important pages have someone else witness by signing and dating the date they sign. This type of record is important for patent and invention disclosures.

 - 4) Printed material may be taped into the logbook with the source noted and of course signed and dated, including computer analysis outputs.

 - 5) The content should be a work in progress not a finished tome, almost like an engineering diary. Include the following: notes on group meetings and meetings with advisors; design thoughts; sketches or drawings; documentation of analysis, especially computer analysis including listing of programs/scripts, results, and graphs; documentation of requests for information, including requests to other team members; descriptions and results of independent inquiries-- library searches, internet searches, contact with outside experts/vendors.

ME 409 Flight Vehicle Design I, Fall 2009

SYLLABUS Version 1.0

8/14/2009

Class	Day	Dates	Topic	Project Deliverables
DIS 1	W Th	9/2 9/3	SCuD Lab Intro.-- ENG 114 Introduction	
2	T	9/8	Mission design and requirements	
DIS 3		9/9	Team meetings	
	Th	9/10	Configuration and Design Features	
	M	9/14	<i>Formal Deliverable due by 4 pm</i>	<i>Team Project Proposal</i>
4	T	9/15	T/W & W/S	
5	Th	9/17	T/W & W/S and Initial Sizing	
6	T	9/22	Initial Sizing	
7	Th	9/24	Teaning skills	
	M	9/28	<i>Project update due by 10 AM</i>	<i>T/W-W/S & Initial Sizing</i>
8	T	9/29	Airfoil & wing design	
9	Th	10/1	Wing design	
10		10/6	Fuselage Design	
DIS 11		10/7	Quiz 1	
		10/8	Tail design	
	T	10/13	MONDAY SCHEDULE	
12	Th	10/15	Writing skills	
	F	10/16	<i>Project update due by 4 pm</i>	<i>Wing, Fuselage Design</i>
13	T	10/20	Guest speaker?	
14	Th	10/22	Engine Selection- Jets	
15	T	10/27	Engine Selection- Propeller	
16	Th	10/29	High Lift Devices	
	F	10/30	<i>Formal Deliverable due by 4 pm</i>	<i>Interim report</i>
17	T	11/3	Takeoff and Landing	
	W	11/4	Quiz 2	
18	Th	11/5	V-n diagram and gust loads	
	T	11/10	Weights & refined sizing	
19	Th	11/12	Weights & refined sizing	
20	T	11/17	Static stability	
	T	11/17	<i>Project update due by 4 PM</i>	<i>Refined weights & sizing</i>
DIS 21	W Th	11/18 11/19	Team meetings Presentation skills	
22	T	11/24	Static stability	
		11/26	HOLIDAY NO LECTURE	
23		12/1	<i>Group Presentations</i>	<i>System Design Review</i>
24		12/3	<i>Group Presentations</i>	<i>System Design Review</i>
25		12/8	Structures	
26		12/10	Safety	