

ME 410 Flight Vehicle Design II Spring 2011
Information Sheet

<u>INSTRUCTOR:</u>	<u>OFFICE:</u>	<u>OFFICE HRS:</u>	<u>PHONE</u>	<u>E-MAIL</u>
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TEXT: Recommended:

Aircraft Design: A Conceptual Approach, Daniel Raymer, AIAA, Washington, D.C., 2005.

COURSE GOALS:

The main activity in this class will be a preliminary design of an aircraft, to be accomplished in teams. The idea is to have each member of the group be responsible for one functional aspect of the design. The success of your final design will depend upon how well each individual successfully performs his/her task as well as the ability to work together and communicate so that the separate pieces can be integrated into a viable design. To that end, the specific objectives of the course are as follows:

- To provide an in-depth aerospace *system* design experience within the context of a team effort.
- To stress the importance of professional skills such as communication and teaming.

PROJECT MILESTONE/DELIVERABLES:

1. **Machine Shop Orientation:** Introduction and orientation to machine shop, including description of machines, safety and other policies, and expectations for drawings. All group members must attend.
2. **Conceptual Design Update:** Technical memorandum describing updates to conceptual design based on comments provided at the end of last semester. **E-ppendices.**
3. **Work Plan:** Short report outlining workplan, including Gantt chart and linear responsibility tables.
4. **Individual Progress Reports:** Formal presentations providing progress on preliminary design in the individual functional areas. These will NOT be team presentations, but individual presentations grouped by functional area. **E-ppendices**
5. **Mock-up:** This will involve three “deliverables:” a preliminary plan (including some preliminary drawings), a final plan submitted as part of the progress reports, and the mock-up and report. A single composite grade will be assigned.
6. **Design Review Presentation:** Formal presentations scheduled for approximately two weeks before the final presentation to present final design. Unlike the Final Design Presentation, which is a short presentation to a general audience, the design review should be oriented towards a technical audience. ALL members of the group are expected to present material and to evaluate the progress reports of the other groups. **E-ppendices.**
7. **Final Design Report:** Detailed written technical report, describing design and analyses each of the functional areas. This will be the primary archival record of your work. **E-ppendices.**
8. **Final Design Presentation:** Oral presentation to a general technical audience (other AM students, Professors, alumnae and guests). In general, this is expected to be a well-polished display with effective visual graphics that demonstrate both a high-level of technical expertise and communication skills. ALL members of the group are expected to present material.

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OTHER ASSIGNMENTS/TASKS:

1. **Team Meetings:**

- Weekly meetings with instructor to discuss progress and plans during the scheduled class period, on Thursdays of most weeks.
- Meetings will be 30-minutes long, and are meant as a means to inform the instructor regarding project progress and to seek advice regarding major design issues. Detailed technical questions that require more than the allotted time should be handled separately outside the team meetings.
- **These are not intended to replace regular team meetings: i.e., do not plan to carry out regular team business such as making assignments for deliverables, voting on design issues etc.** However, if conflicts among various team members are significantly impeding progress, then this issue should be included as part of the meeting agenda.
- For each meeting, a different team member will be designated as the *meeting leader* and another will be assigned as the *secretary*.
 - The responsibilities of the leader will include the following:
 - Preparing handout which includes an agenda, a summary of the group's activities since the last meeting, highlights of key findings, comparison of progress to the Gantt chart, outline of plans for the coming week, and a listing of any outstanding concerns or issues. This should be in the form of several PowerPoint slides.
 - Presenting a 5 minute summary of the items in the handout along with a clear statement of the key objectives of the meeting. This will be in the form of an oral report.
 - Chairing the meeting—i.e., making sure that the discussions stay on topic so that all agenda items can be addressed.
 - The responsibilities of the secretary will be to keep minutes of the meeting and to post those minutes to the Blackboard Group page.
- All team members are expected to attend all meetings and to bring their notebooks to the meetings. Exceptions for attendance will be made on a case by case basis, but generally will be granted only for the same types of emergencies that would merit a make-up exam. Students who need to miss a meeting with a valid excuse must inform the instructor and the meeting leader at least two days in advance. Meeting leaders or meeting secretaries who need to miss meetings must inform the instructor at least one week in advance and must also designate an alternate meeting leader or secretary.
- See syllabus and separate meeting schedule for time slots and meeting leader/secretary designation.
- Although each team will be meeting for only 30 minutes, the rest of the class period is NOT free time; it should be used for project work or other ME 410 assignments.

2. **Design Notebook:**

- Each student will maintain a Design Notebook, which documents work on his/her aspect of the design.
- Bring notebooks to all meetings. Students without notebooks will be asked to leave meetings.

3. **Ethics assignment:** This will be an individual written assignment, dealing with professional ethics, based on discussions in class. Details to be provided.

4. **Peer Assessment:** At the midpoint and end of the semester, you will be required to fill out peer evaluation forms, assessing other members of your team. The assessments will be used as part of the

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“team contribution” component of the grade. For situations in which an individual does not contribute significantly to the team’s design effort, the group component of the grade will be discounted for the non-productive team member. This is rare, but has been done 4 times over the past 10 years, and in all cases, the remaining team members were supportive of the action.

GRADING

The final course grade will be a combination of a *Team grade*-- same grade for all team members-- and an *individual grade*-- different grade for each student. The specific breakdown is shown in Table 1.

Table 1: ME 410 Grade Breakdown

	<u>Team Grade</u>	<u>Individual Grade</u>
Conceptual Design Update Report	5 %	
Work Plan	5 %	
Progress report:		10 %
Mock-up	15 %	
Overall Team Design ¹	20 %	
Overall Individual Design ²		20 %
Communication Skills ³		10 %
Team Contribution⁴		5 %
Participation ⁵		5 %
<u>Ethics Assignment</u>		5 %
Total	45%	55%

NOTES:

See Table 2 for a summary of which deliverables/activities will contribute to the various overall grades.

1. The **Overall Team Design** grade will be determined based on the following criteria:
 - a. Success at achieving mission objectives
 - b. Level of effort throughout semester.
 - c. Use of analysis for making design choices, in particular, the use of trade studies to optimize the design.
 - d. Level of difficulty of mission/project
 - e. Creativity in both design choices and approach to analysis.
 - f. Teamwork (Level of interaction of team members in working toward common goal)The two teams scoring the highest on these metrics will be finalists for the Outstanding Aerospace Design Project Award, with the final choice based on consultation with other AE faculty members. The award will be presented at the Department’s award ceremony (date and time TBA) and will be recognized at the College of Engineering Commencement Ceremony.
2. The **Overall Individual Design** grade will be based on the following criteria
 - a. Level of effort throughout the semester and completeness
 - b. Use of analysis for making design choices, including the extent of optimization
 - c. Level of difficulty of functional area, including availability of tools and information.
 - d. Creativity in both design choices and approach to analysis.
3. The **Individual Communications Skills** grade will be based on evaluation of presentation skills for the oral reports and evaluation of the format and quality of writing for written assignments. 80% of the grade will be for the individual scores and 20% for the team scores.

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4. The **Team Contribution** grade will be based on the following:
 - a. Performance at team meetings as meeting leader and secretary, and level of engagement when not leader of secretary.
 - b. Peer evaluations. This will include how your teammates assess you as well as the extent to which you realistically assess the team's performance and the lessons you learn from the experience.
5. The **Participation** grade will be based on the following: (1) Attendance at shop introduction, (2) attendance at meetings, (3) participation in class activities, and (4) participation in peer evaluations and presentation evaluations.

Once the overall numerical grades have been compiled and final letter grades assigned, a special adjustment may be applied under the following condition: if one team member far outperforms the rest of the team, based on the relative values of the overall individual and team grades, his/her grade will be increased by ½ letter grade. This adjustment is meant to reward individuals whose excellent work would be penalized by a particularly poor team effort, and will only be awarded in cases for which the discrepancy in the grades is dramatic. Only one student per team can receive this adjustment.

Table 2: Summary of deliverables/activities that contribute to various grades

Grade→ Deliverable/Activity ↓	Overall Team Design	Overall Individ. Design	Individual Comm. Skills	Team	Partici- pation
Individual Progress Report		√	√		
Design Review	√	√	√		
Final Report	√	√	√		
Final Presentation			√		
Team Meetings				√	√
Peer Evaluations				√	√
Class Activities					√
Shop Introduction					√

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Wk	Dates	In-class activities	Milestones (W=Written, P=Presentation)
1	1/18 1/20	Lecture: Intro/ General Expectations Team Meetings Shop Intro: Arrange with Joe Estano	<i>Shop Introduction</i>
2	1/25 1/27	Lecture: Functional area expectations Team Meetings:	
3	1/31 2/1 2/3	Report due on Monday at 9 AM Lecture: Work plan Functional Area Meetings:	Updated Conceptual Design (W)
4	2/7 2/8 2/10	Report due on Monday at 9 AM Lecture: Mock-up Team Meetings:	Preliminary Design Work Plan (W)
	2/14 2/15 2/17	Report due on Monday at 9 AM Lecture: Operating costs Team Meetings:	Preliminary Mock-Up Plan (W)
6	2/22 2/24	MONDAY SCHEDULE Team Meetings:	
7	3/1 3/3	Individual Presentations: Individual Presentation:	Individual Progress Reports (P) Individual Progress Reports (P)
8	3/8 3/10	Lecture: Ethics No Lecture: Project Work	
9	SPRING BREAK		
10	3/22 3/24 3/25	No Lecture: Project Work Team Meetings: Ethics assignment due by 4 PM	Ethics Assignment (W)
11	3/29 3/31	Lecture: History of Airline Industry Team Meetings:	
12	4/5 4/7	Lecture: TBA Team Meetings:	
13	4/11 4/12 4/14	Mock-up due on Monday at 4 PM Lecture: Technical Writing Team Meetings:	Mock-up
14	4/19 4/21	Team Presentation: Team Presentation: **	Preliminary Design Review (P) Preliminary Design Review (P)
15	4/26 4/28	NO LECTURE: ** Team Meetings:	
16	5/2 5/3 5/5 5/6	Final Report due at 4 PM Lecture: Final Presentation Tips and Hints No Lecture: Practice time for presentations Group Presentation 1- 6 PM PHO 210	Final Design Report (W) Final Presentation (P)