ME408 – Aircraft Performance and Design

Fall 2019 Course Outline

1) Instructor Information

Jim Geiger (Adjunct Professor)
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I don't have any specific office hours. Occasionally, I can arrange to meet with student teams after class. I do make every effort to respond promptly to e-mail. You can e-mail me at any time.

2) Course Objectives

a) Expose students to the **key elements** of conceptual, fixed-wing aircraft design: Requirements, Sizing, Performance, Wing-Fuselage-Empennage Design, Enhanced Lift, Structural Design, Stability & Control and Cost Estimation.

b) Demonstrate the fundamental, **iterative nature** of design through complete aircraft design projects that run parallel to the course material.

c) Students learn to design **multiple types** of fixed wing aircraft and gain appreciation for what drives the three basic types: Commercial Transport, General Aviation and Military.

d) Establish a foundation for the **fundamental principles** of aircraft design, especially for Aero-Concentrators who, on successful completion of ME408, may select an aircraft design related project for ME461.

3) References

a) Required Texts:
Primary Text Book: "Design of Aircraft", Corke, Thomas C., Prentice Hall, 2003
Reference: "Theory of Wing Sections", Abbott, Ira Herbert and von Doenhoff, Albert Edward, Dover Publications, 1949
Reference: Jane's All the Worlds Aircraft in four (4) separate volumes published yearly. Note: The BU Library has begun to purchase new volumes. Here is the latest

Jane's All the Worlds Aircraft-Dev & Prod	2013/2014
Jane's All the Worlds Aircraft-In Service	2015/2016
Jane's All the Worlds Aircraft-Unmanned	2014/2015
Jane's All the Worlds Aircraft -Aero Engines	2015/2106

Also, the MIT Library has a good selection of Jane's volumes.

b) Other Texts
"Aircraft Design", Sadraey, Mohammad H., Wiley, 2013

4) Class Attendance

Class attendance is highly encouraged, but will not be tracked so technically it is optional. Often time's students will be asked to bring their laptops to class for hands-on exercises. Students are also encouraged to bring their texts to class.

5) Grades

The individual course grades for this course will be based on the BU point system.

Points	Letter Grade	Honor Points
95+	A	4.0
90-94	A-	3.7
85-89	B+	3.3
80-84	B	3.0
75-79	B-	2.7
70-74	C+	2.3
65-69	C	2.0
60-64	C-	1.7
55-59	D	1.0
<55	F	0.0

Points will be awarded on the following basis:

Course Item	Content	Max Points	Due
Presentation 1	Chapters 1-3	25	9/19/19
Presentation 2	Chapters 1-6	25	10/8/19
Presentation 3	Chapters 1-9	25	11/5/19
Presentation 4	Chapters 1-13	25	12/10/19
*Learn Questions	All	5	various
BONUS	Best Design in Class	5	
Total		**110**	

Note: I would like to introduce some Blackboard Learn multiple choice style questions during the semester. I need to learn how to do this in Learn. Each student can earn up to 5 additional points during the semester by successfully answering the questions.

6) Team Projects

a) Projects

Military
-Long Range Strike Bomber
-Multirole Fighter

Commercial
-Twin Jet Airliner
-New Midsize Airliner (NMA)

General Aviation
-Trans Oceanic Business Jet
-Civil Utility Aircraft Family
-Agricultural Sprayer / Aerial Firefighter
-US Light Sport Aircraft (LSA)
-Four Seat Lightplane
-Aerobatic Sport-plane

Other
-Single Seat Ultralight
-Class I Unmanned Aerial Vehicle

Each team will be expected to work the entire design project throughout the Semester.

b) Teams

Members
Each student will be placed on a team based on project selections made by the students. The first assignment is to review the design projects and submit to the Instructor (jgeiger@bu.edu) your top three or four choices. All efforts will be made to form teams with each student's top choices.

Trades
Each team will have the option of one (1) "trade" during the semester. The trade option is voluntary, not required and intended to give teams the option of improving upon team chemistry, in the event that personalities are getting in the way of team progress and morale. The trade must be one-for-one and both teams involved in the trade must be in full concurrence that the trade is approved. If a trade cannot be worked out to the satisfaction of all concerned, then the team seeking a trade must find a way to "soldier on". Once the details of the trade have been determined, all parties should consult with the Instructor to finalize the trade.

c) Team Presentations

Each Team will present the status of their designs to the class on four (4) occasions during the semester, tentatively on the following dates;

Thursday, 9/19/10	Chapters 1-3
Tuesday, 10/8/19	Chapters 1-6
Tuesday, 11/5/19	Chapters 1-9
Tuesday, 12/12/19	Final Project Presentation, Chapters 1-13

Each presentation will be graded. Each member of the team will receive the same grade for a given presentation.

Details of the expected content for each presentation will be given during the semester prior to each presentation. Templates to use for the presentations will be supplied.

d) Mid-Term Peer Evaluations

Each team member will have a chance to anonymously rate his or her team mates on overall contribution to the team. If the evaluations show clear evidence that a team member is not contributing to the team in a fair and equitable way, based on the other team members input, then a meeting with the Instructor will be arranged and a plan outlined to improve performance. If the behavior persists throughout the semester, then the final grade of the underperforming student(s) will be adjusted.

7) ME408 Class Calendar, Fall 2019

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ME408 - Aircraft Performance and Design

Fall 2019 Class Schedule

Week	Class	Date	Day	Lecture Topic
1	1	9/3/2019	Tu	Intro, Syllabus, Class Projects, Chapter 1 - Introduction
1	2	9/5/2019	Thu	Chapter 2 - Preliminary Estimate of Takeoff Weight
2	3	9/10/2019	Tu	Chapter 2 - Preliminary Estimate of Takeoff Weight
2	4	9/12/2019	Thu	Chapter 3 - Wing Loading Selection
3	5	9/17/2019	Tu	Chapter 3 - Wing Loading Selection
3	6	9/19/2019	Thu	Team Presentations - Chapters 1-3
4	7	9/24/2019	Tu	Chapter 4 - Main Wing Design
4	8	9/26/2019	Thu	Chapter 5 - Fuselage Design
5	9	10/1/2019	Tu	Chapter 6 - Horizontal and Vertical Tail Design
5	10	10/3/2019	Thu	Chapter 4-6 Review
6	11	10/8/2019	Tu	Team Presentations - Chapters 1-6
6	12	10/10/2019	Thu	Chapter 7 - Engine Selection
7		10/15/2019	Tu	NO CLASS (Holiday, Substitute Monday Schedule)
7	13	10/17/2019	Thu	Chapter 7 - Engine Selection
8	14	10/22/2019	Tu	Chapter 8 - Take-Off and Landing
8	15	10/24/2019	Thu	Chapter 8 - Take-Off and Landing
9	16	10/29/2019	Tu	Chapter 9 - Enhanced Lift Design
9	17	10/31/2019	Thu	Chapter 9 - Enhanced Lift Design
10	18	11/5/2019	Tu	Team Presentations - Chapters 1-9
10	19	11/7/2019	Thu	Chapter 10 - Structural Design and Material Selection
11	20	11/12/2019	Tu	Chapter 10 - Structural Design and Material Selection
11	21	11/14/2019	Thu	Chapter 11 - Static Stability and Control
12	22	11/19/2019	Tu	Chapter 11 - Static Stability and Control
12	23	11/21/2019	Thu	Chapter 12 - Cost Estimate
13	24	11/26/2019	Tu	Chapter 13 - Design Summary and Trade Study
13		11/28/2019	Thu	NO CLASS (Holiday)
14	25	12/3/2019	Tu	Prep for Final Project Presentations
14	26	12/5/2019	Thu	Prep for Final Project Presentations
15	27	12/10/2019	Tu	Team Presentations - FINAL
15		12/12/2019	Thu	NO CLASS (No Final Exam)