Syllabus

ENME 3720 --Introduction to Aerospace Engineering
Autumn 2015

University of Denver
Mechanical and Materials Engineering Department

Meets: 207 CMK, 4:00-5:50 MW,
(4.0 Credit hours), Satisfies Undergraduate Technical Level/Graduate Course

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Course Description:
This course provides an introduction to aerospace engineering analysis and design. In the atmospheric domain, the basics of aerodynamics are covered, followed by flight mechanics. The approach is from a practical perspective in which analysis and design are intertwined.

Prerequisites: ENME 2710, Engineering Thermodynamics I, ENME 2510, Engineering Dynamics I

Co-requisites: ENME 2651, Fluids I, ENME 2520, Engineering Dynamics II

Textbooks:
Brandt, S.A., Stiles, R.J., Bertin, J.J., Whitford, R., Introduction to Aeronautics: A Design Perspective, 3rd Edition (AIAA Education Series), 2015. ISBN#: 978-1-62410-327-8

Course Learning Objectives: The student should be able to

- Apply basic/constitutive principles fluids mechanics such as the Bernoulli and Euler equations for Aeronautics applications
- Explain flow regimes (viscous/non-viscous; compressible/incompressible aerodynamics) and to estimate viscous and thermal effects for Aeronautics applications
- Compute lift/drag of simple configurations
- Derive and apply general equations of motion for flight to determine aircraft performance in steady gliding, horizontal and climbing flight
- Derive aircraft performance diagram and flight envelope, in relation to aircraft morphology, lift-drag polar and engine performance

Approximate Course Topics:

Topics	Approximate Topics Covered and Sequence
1	Fundamentals: Ideal Gases, Continuity, Bernoulli, Euler Equations
2	Compressible Flow I
3	Compressible Flow II
4	Laminar and Turbulent Flow I in Aerodynamics
5	Laminar and Turbulent Flow II in Aerodynamics
6	Airfoils and Pressure Distribution Theory
7	Airfoils and Finite Wing Theory
10	Introduction to Flight Mechanics I
11	Introduction to Flight Mechanics II
12	Horizontal Flight Performance I
13	Horizontal Flight Performance II
14	Climbing and Descending Flight
15	Flight Envelope

Grading

Homework 25%
Projects 25%
Midterm 20%
Final Exam: 30%

***Homework*:** 4-5 problems will be assigned from the required textbooks and or given out in a handout and will be due at the beginning of class on the due date--these will be assigned approximately weekly. The homework should be done in the required format which was shown on the first day of class. These problems are meant for you to hone your analytical skills and broaden your conceptual knowledge of Aerospace Engineering topics. On every homework assignment there will be problems that are marked as "G" for graduate students. These homework problems are only required for graduate students, but undergraduate students may do them for extra credit.

In-Class "Homework": There will be some in-class participatory exercises that will count towards your homework grade. These types of exercises might include watching videos on a topic and filling out a viewing guide as well completing analytical problems relevant to the most recent material. These will be typically graded such that legitimate attempts and participation will give you most of the credit. These exercise will help me gage your progress and understanding of the topics along with encouraging you to attend and participate in class.

Projects: Two projects will be assigned to help you synthesize your understanding of Aerospace Engineering topics and its practical applications to everyday engineering practice. The projects will have some additional requirements for graduate students. These projects will require a level of analysis beyond what is required in the homework, and will likely involve using a computational tool such as Fluent, Matlab, MS Excel, or similar.

***Late Policy on Projects and Homework*:** 10% penalty if not turned in during class period, 25% one calendar day late, 50% two calendar days late, no late work after three calendar days.

Exams: There will be one Midterm to help chart your progress in being able to solve Aerospace Engineering problems. These types of exams will test your analytical and your conceptual knowledge. The exams will be in-class and the problem types will resemble in-class examples and assigned homework. The exams are open book, open notes, and calculator. On every exam there will be problems that are marked as "**G**" for graduate

students. These exam problems are only required for graduate students, but undergraduate students may do them for extra credit.

Final: The final exam is scheduled for November 18th at 4:00 to 5:50 pm in 207 CMK. The final exam will cover 30% Aerodynamics, and 70% Flight Mechanics. Same rules as for the Midterm apply to the Final Exam.