AEM 2301: Mechanics of Flight

<u>Instructor:</u> Peter Seiler
Office: 224 Akerman Hall
Phone: 612-626-5289,
Email: `seile017@umn.edu`
Office Hours: W 1:10-2:00pm, F 10:00am-11:00am, or by appointment

<u>Course Information:</u>
Lectures: MWF 12:20 - 1:10pm in 231 Smith Hall (3 Credits)
Webpage: `https://www.aem.umn.edu/courses/aem2301/spring2015/`
University Policy Statements: `http://www.aem.umn.edu/teaching/syllabi.shtml`
Prerequisites: PHYS 1301W, concurrent MATH 2373 or equivalent

<u>Teaching Assistants and Graders:</u>

	Email	Office	Office Hours
Honest Frank Mrema	`mrema002@umn.edu`	123 Akerman	Tues 10-12, Thurs 1-2pm
Durgesh Chandel	`chand412@umn.edu`	123 Akerman	Tues 12-1, Thurs 11:30-12:30

<u>Textbook:</u>
N. Harris McClamroch, Steady Aircraft Flight and Performance, Princeton University Press, 2011.

<u>Course Description:</u>
This is an introductory class in flight mechanics. Topics covered in this course include: Standard atmospheric properties, basic aerodynamics, generation of lift/drag, airfoils and finite wings, elements of aircraft performance and atmospheric flight mechanics. The course will also introduce the use of Matlab and simulations for aircraft design.

<u>Homeworks:</u>
Problem sets are normally due two weeks after they are assigned. Problem sets solution submitted must follow the format described here: `http://www.aem.umn.edu/courses/required_homework_format.shtml`
Problem sets that are not in accordance with the required format will not be deducted 25%. No late assignments will be accepted without a valid excuse. Assignments must be turned on the due date by 4:00pm in the assignment collection box in Akerman 107.

<u>Exams:</u>
There will be three 50 minute in-class exams and one final exam. Exams cannot be made up without a valid, documented excuse (e.g. letter from doctor). **The last in-class exam will include a section of "go/no-go" questions.** These questions are meant to test your knowledge and understanding of the essential material of the course. You will be required to score 100% on these questions in order to get a passing grade in this course. Failure to score 100% will require that you take a follow-up oral exam to demonstrate your knowledge of this material. Examples of the "go/no-go" questions will be provided on the course web page. All exams will be closed note and closed book. You may have one 8.5 × 11 sheet (front and back) of notes for the first/second in-class exams and the final exam. A notesheet will not be allowed for the last in-class exam.

<u>Electronic Devices:</u>
During exams you may only use a simple calculator that does not communicate in any wireless manner. Pagers, cell phones, and all other communications devices must be turned off during quizzes/exams.

<u>Regrades:</u>
Your homeworks and exams will be graded and handed back as soon as possible. If you have any questions or comments on the grading please contact the TA who graded your paper. If you feel you deserve a higher grade, submit your request for a regrade in writing to the TA. Briefly explain why you feel you deserve a higher grade. If the TA does not accept your argument, you can request the TA to pass on your regrade request to Prof. Seiler. **You have one week to deal with grade disputes, after that the grade is final.** When disputing a grade, be aware that your work will be reexamined and as a result your grade can be reduced as well as increased.

Grading:
Letter grades for the course will be assigned using the following scale:

A,A-	90.0 - 100
B+,B,B-	80.0 - 89.9
C+,C,C-	70.0 - 79.9
D+,D,	60.0 - 69.9
F	below 60.0

This is only a rough scale. This scale may be adjusted depending on the performance of the class. Any adjustments to the scale will only lower the cut-offs to achieve a specified grade; cut-offs will not be raised beyond those listed here. **Grades will be weighted as follows: Homeworks 30%, Simulator Lab 5%, Design project 15%, In-class exams 30% (three exams worth 10% each), and Final Exam 20%.** Students can check their posted grades at: http://www.aem.umn.edu/srs. No extra credit opportunities to improve grades will be available either during or at the end of the semester.

Course Outline:
Below is an outline of the tentative course schedule. This outline may be modified slightly as the term progresses.

Week	Dates	Topic	Reading	HW/Exams
1	Jan. 21, 23	Aircraft Components Standard Atmosphere	1, 2.1-2.2	HW1 Out
2	Jan. 26, 28, 30	Basic Aerodynamics Matlab Intro	2.3-2.5 Notes	
3	Feb. 2, 4, 6	Kinematics, Forces/Moments	3	HW1 Due, HW2 Out
4	Feb. 9, 11, 13	Propulsion, Steady Flight	4, 5.1-5.5	
5	Feb. 16, 18, 20	Steady flight	5.6-5.9, 6.1-6.6	HW2 Due, HW3 Out
6	Feb. 23, 25, 27	Flight envelope	6.7-6.9	**Exam 1** on 2/27
7	Mar. 2, 4, 6	Steady level flight	7	HW3 Due, HW4 Out
8	Mar. 9, 11, 13	Steady climb/descent	8	
	Mar. 15-21	**Spring Break**		
9	Mar. 23, 25, 27	Turning flight (level)	9	HW4 Due, HW5 Out
10	Mar. 30, Apr. 1, 3	Turning flight (climb/descend)	10	**Exam 2** on 4/3
11	Apr. 6, 8, 10	Flight envelope	10	
12	Apr. 13, 15, 17	Range and endurance	11	
13	Apr. 20, 22, 23	Takeoff and landing	13	HW5 Due, Design Proj. Out
14	Apr. 27, 29, May 1	Aircraft static stability	Notes	**Exam 3** on 5/1
15	May 4, 6, 8	Longitudinal static stability	Notes	Design Proj. Due
				Final Exam on Tues. 5/12 1:30-3:30 p.m.

Disclosure Statement:
Prof. Peter Seiler is a consultant for MUSYN, a company that produces some of the design and analysis software for automatic control systems taught in this class.