

AEROSP-325 Aerodynamics

4 Credits, Winter 2014, MWF 11:30-1:00pm, FXB 1109

Instructor:

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Office hours: Mon 2:30-4pm, Thu 1:30-3pm

Other hours: By appointment.

GSI:

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Office hours: Tu 1:30-3pm, Wed 2:30-4pm, Aero Learning Center

Other hours: By appointment.

Course goals:

1. Basic understanding of the kinematics and dynamics of fluid flow.
2. Basics of potential flow and the construction of elementary potential flow solutions.
3. Thin airfoil theory, its applications, assumptions and limitations.
4. Influence of Reynolds number and the concept of boundary layers.
5. Characteristics of Turbulence and transition to turbulence.
6. Impact of turbulence/transition on aerodynamic quantities.
7. Lifting line theory and mechanisms of lift and drag in three dimensions.
8. Basics of subsonic/transonic/supersonic flow and their manifestations on aerodynamic quantities of interest.
9. Introductory computational aerodynamics, assessment of various techniques to solve practical aerodynamic problems.

Resources:

Lecture notes/Homeworks available through CTools

Fundamentals of Aerodynamics, Anderson, McGraw Hill (Suggested)

CTools forums would be a great place to interact with the class and instructors.

In most lectures, concept questions will be posed. Participation using iClicker may get you an addition of up to 3 % to the final grade. There will be no penalty for answering questions wrongly.

Pre-requisites:

Calculus, complex numbers, differential equations (at MATH 216 level), Basic knowledge of Thermodynamics, compressible flow (at AEROSP 225 level).

Grading:

Homeworks : 30 %

Mid Term 1: 20 %

Mid Term 2: 20 %

Final : 30 %

Maximum bonus for iClicker participation : 3 %

Lecture Plan¹:

1. Introduction/Review of concepts: 2 lectures
2. Kinematics: 3 lectures
3. Dynamics: 3 lectures
4. Potential Flow : 5 lectures
— Mid Term 1 (Feb 10) —
5. Thin Airfoil Theory: 5 lectures
6. Viscous Flow: 3 lectures
— Spring Break —
7. Turbulent Flow: 3 lectures
— Mid Term 2 (Mar 17) —
8. Finite Wings: 5 lectures
9. High Speed Aerodynamics: 5 lectures
10. Computational Aerodynamics: 3 lectures
— Review (Apr 18 & Apr 21) —

Homework Policy:

1. Allowable collaboration for homework is restricted to discussion of relevant concepts.
 2. Make sure submitted work is tidy.
 3. If the question is a numerical problem, box up the final answer. If answer has units and units are not specified, you will lose all credit for the problem.
 4. Late homework will not be accepted unless there is a clear extenuating circumstance.
 5. All homework will be due on a specific day in class, unless an exception is discussed earlier.
- Please do not slip homework under the door, etc.

¹Rough.. all dates including exams may vary by ± 2 lectures.