MAE104
AERODYNAMICS (http://bit.ly/1mRuLFT)
FALL 2012
UCSD

Prof. Juan Carlos del Álamo
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Course description:

We will introduce basic relations describing flow field around wings and bodies at subsonic and supersonic speed. In particular, we will study thin airfoil and wing theories. We will also study internal aerodynamics of jet engine inlets and nozzles. We will then apply these principles to the design of high-speed airplanes.

Prerequisites:

Open to MC 25, MC 27, MC 28 and SE 27 only and grade of C– or better in MAE 101A-B, or consent of the instructor.

Lectures:

Tuesday, Thursday 8:00 AM - 9:20AM @ CNTR 216 (Theory).
Fridays, 2:00 PM – 2:50 PM @ CENTR 113 (Problems).

The Friday hour will be used mainly as a problem session, although it will also be occasionally used as a lecture period.

TA: Lorenzo Rossini <lrossini@eng.ucsd.edu>

Professor office hours:
Monday, 4:30 PM – 5:30 PM.
Wednesday, 4:30PM – 5:30 PM.
Flexible office hours by previous appointment.
SME 344J

TA office hours:

Tuesday, 11 AM – 12 PM, **TBD**
Thursday, 11 AM – 12 PM, **TBD**

Textbook:
“Fundamentals Of Aerodynamics” by John D. Anderson, 5th Edition (Previous Editions OK).

Additional Textbooks (advanced):
"Flight Vehicle Aerodynamics" by Mark Drela, MIT Press
"Theoretical Aerodynamics" by L. M. Milne-Thomson, Dover.

Course Topics:

1. Fundamental principles: aerodynamic variables, aerodynamic forces and, flow similarities, conservation of mass, momentum and energy in fluid flow, vorticity and circulation (review of MAE101A and MAE101B). Chapters 1 and 2 in book.

2. Fundamental of inviscid incompressible flow: stream function and velocity potential. Governing equation for irrotational, incompressible flows. Elementary solutions (point sources/sinks, point vortices, doublets, etc.). Chapter 3 in book.

3. Incompressible flows over airfoils: The Kutta-Joukowski theorem and the generation of lift. Kelvin circulation theorem. Classical thin airfoil theory, symmetric airfoil, cambered airfoil. Lifting flow over arbitrary shape bodies, the vortex panel method. Chapter 4 in book.

4. Incompressible flows over finite span wings: downwash and induced drag, Prandtl's classical lifting-line theory. Lifting-surface theory. Chapter 5 in book.

5. Compressible aerodynamics. Compressible flows over airfoils: Linearized potential. Internal aerodynamics: nozzle flows. Chapter 11 in book.

Homework:

Homeworks will be worth 20% of the final grade. Assignments will be posted online and will be collected **in class on Fridays**. NO partial credit for late submissions. There will be no exceptions. There will be no exceptions to the no-exception rule, etc.

Exams:

Two midterms will account for 40% of the grade and the final will account for 40% of the grade.
Midterm 1 on October 28, 8:00 AM – 8:50 AM CNTR216.
Midterm 2 on November 21, 2:00 PM – 2:50 PM CNTR113.
Final on December 16, 8:00 AM - 11:00 AM, **Location TBA.**
Equation sheets will be provided for the exams. Closed-book exams. Non-programmable calculators are allowed.

Grading Policy:

HWs must be your OWN work. Do not copy of OTHER (friends, solution manuals, books, and an all-inclusive etc.) sources. Ditto for exams. Any copying as defined above will be grounds for a F grade. See http://www-senate.ucsd.edu/manual/Appendices/app2.htm

Notes on Course Schedule

The lectures on Tuesday November 25 and Friday November 28 will be cancelled.