Computational Fluid Dynamics (ME/AE 339)

Fall 2004

T/Th. 9:30-10:45, Room, 208 ME Building

August 26, 2004

Instructor: K. M. Isaac

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Text: Computational Fluid Dynamics, John D. Anderson, Jr., McGraw-Hill
ISBN 0-07-001685-2

Required Reading: Will be announced in each class. This should be completed before coming to the next class.

Classroom Participation: You are encouraged to actively participate in classroom discussion.

Grading: Homework, projects, quizzes: 31%, tests: 23% each, final: 23%

Attendance: Required. Please let me know in advance if you have to miss class. Those who miss class without acceptable reason will be dropped.

Homework: Due on the announced dates, at the beginning of class. No late homework please. Not all homework will be graded. Should be neatly done and stapled together.

Office hours: MW: 2:30-3:30 (any changes will be announced. Make sure to check your email messages daily). You may also use email and/or phone for assistance.

Test dates: Thursday, September 30; Thursday, November 11.

Final exam: 1:30-3:30, Thursday, December 16, Room 208 ME Building.

Grading: **Undergraudate students**: A: 90% and above, B: 80-89%, C: 70-79%, D: 60-69%, F: Below 60%
Graduate students: A: 90% and above, B: 80-89%, C: 70-79%, F: Below 70%

AE/ME 339 Syllabus

Review of numerical methods for ordinary differential equations; engineering examples
Introduction to partial differential equations, classification
Basic finite difference forms for derivatives
Truncation error and round-off error
Explicit and implicit methods
Stability of numerical methods
Crank-Nicolson method, ADI method
Treatment of boundary conditions
Linear PDE examples from heat conduction
Navier-Stokes equations
Numerical solution of the flow over a heated wall
Representative methods of solution of Navier-Stokes equations
Relaxation techniques
Pressure correction method
Burgers equation
MacCormack's method
Beam and Warming method
Solution of the shock tube problem
Potential flow over a cylinder
Flow in a de-Laval nozzle
Grid generation