methods for mesh generation and analysis of boundary layers and incompressible viscous flows are studied. Application using a commercial CFD package is performed.

## Course Goals and Student Learning Objectives

By the end of this course, students should be able to

- Describe the governing equations of incompressible flows and their mathematical properties.
- Describe the setup of the finite volume and finite difference methods and their limitations.
- Formulate a mesh that results in accurate analysis of a thermal-fluid system and demonstrate its accuracy.
- Describe methods of modeling turbulence and choose an appropriate model for a given thermal-fluid system.
- Apply appropriate boundary conditions for a given thermal-fluid application.
- Demonstrate a systematic application of the principles and describe the limitations of techniques for the simulation of turbulent and transitional flows and thus be able to apply these in a critical manner to practical applications.
- Demonstrate their acquired skills in applying commercial CFD software packages to practical engineering applications.

## Required Texts/Readings

Textbook

"An Introduction to Computational Fluid Dynamics: The Finite Volume Method (2nd Edition)" by H.K. Versteeg and W. Malalasekera, Longman Scientific & Technical. (or similar)

## Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, pass/no pass, incomplete grades, etc. Refer to the current semester's Time Schedule for these policies and deadlines.

to compare homework answers or solution methods with your friends after you have completed your problems.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the Disability Resource Center (DRC) at http://www.drc.sjsu.edu/ to establish a record of their disability.

Student Technology Resources

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs are available in ENG 213/215. Computers are also available in the Martin Luther King Library. The software used in this class, FLUENT, is available in ENG 213/215. It is also available for download. Instructions will be provided in class.

# ME 297 Schedule Spring 2016, Section 1

| Date | Topic | 2nd ed. reading | HW due |
|---|---|---|---|
| 27-Jan | Introduction to CFD, Numerical Methods, Flow Regimes to be Considered, | Chp. 1 | |
| 1-Feb* | Conservation Equations and Introduction to ANSYS Fluent | Chp. 2 | |
| 3-Feb | Fluent Modeling 1, Introduction to Model Setup Requirements (Take Detailed Notes!) | | ¥ |
| 8-Feb** | Finite Volume/Difference (PDE Equation Types) and Analytic Flat Plate Flow Modelling | Chp. 2 | ¥ |
| 10-Feb | Fluent Modeling 2, Flat Plate Flow Analysis (Analytic, Fluent vs. Tutorial) | | |
| 15-Feb | Finite Volume/Difference (PDE Equations), Internal Flow Analysis & Analytic Equations | Chp. 2 | ¥ |
| 17-Feb | Fluent Modeling 3, Internal Flow Analysis | | ¥ |
| 22-Feb | Implementation of Boundary Conditions and Initial Conditions | Chp. 9 | ¥ |
| 24-Feb | Fluent Modeling 4, Natural Convection Problem, JEDEC Test Board | | |
| 29-Feb | Meshing, Cartesian, Hexa Unstructured, Hexa Dominant, Viscid and Inviscid Flows | Chp. 11 | ¥ |
| 2-Mar | Fluent Modeling 5, Cylindrical and Cuboids, Steady/Unsteady, Viscid/ Inviscid Flows | | |
| 7-Mar | Solver Settings (k - ε model and Upwind Model) and Post Processing in Detail | Chp. 3 | |
| 9-Mar | Fluent Modeling 6, Sudden Pipe Expansion | | |
| 14-Mar | Turbulence Modeling, LES | Chp. 3 | ¥ |
| 16-Mar | Fluent Modeling 7, Turbulent Pipe Flow vs. Jet Speed vs. Cooling (0 vs. 2 eqn models) | | |
| 21-Mar | Midterm Review and Fluent Best Practices for Minimizing Errors | | |
| 23-Mar | Midterm Exam 1 | | |
| 28-Mar | Spring Recess- No Class: | | |
| 30-Mar | Spring Recess- No Class: | | |
| 4-Apr | Moving B.C. Problems | | ¥ |
| 6-Apr | Fluent Modeling 8, 2-D Rotary Blade Analysis Problem | Chp. 4 | |
| 11-Apr | ANSYS Lecturer or Visiting Lecturer | | |
| 13-Apr | Fluent Modeling 8, 2-D Rotary Blade Analysis Problem Contd / Project Work Day | Chp. 3 | ¥ |
| 18-Apr | Multiphase Flow Analysis | Handouts | |
| 20-Apr | Fluent Modeling 9: Multiphase Flow Analysis, VOF Analysis, (Inkjets, Fuel Injectors) | | ¥ |
| 25-Apr | High P <</M(s)]TJ 10.414 0 Td09OF A5xF60.008 Tw [([(4.209)-2Co)]TJ p9 Contd nt- | | |