

ME 566 Viscous Flow

Description: Boundary layer theory and exact solutions, laminar and turbulent flows, boundary layer control, approximation methods, turbulence modeling. Three (3) Credits; course meets three times per week for 50 minutes each.

TEXTBOOK: *Boundary Layer Theory*, 8th Revised Edition by H. Schlichting and K. Gersten

GOALS: This course is designed to give graduate students more in-depth understanding and experience of the fundamentals and practical solutions of viscous dominated flows in general and boundary layer theory in particular. In addition, approximate solutions methods are explored along with introductions to turbulence and boundary layer control.

PREREQUISITE
BY TOPIC: 1. An intermediate course in fluid mechanics (ME560 if taken at OSU)
2. Some tensor and vector notation

TOPICS: 1. Boundary layer theory and its fundamentals
2. Mathematic development of boundary layer equations
3. Exact solutions for several flow situations
4. Approximation methods
5. Boundary layer control/drag reduction
6. Turbulence fundamentals and modeling
7. Examples of turbulence flow analysis

COMPUTER USE: Several assignments may require computer generated solutions using an optional language and/or application

LEARNING OBJECTIVES: Upon completion of this course students are expected to:

1. Formulate low Reynolds number flow approximation equations to a variety of flow geometries and conditions.
2. Solve for velocity and pressure fields within a viscous flow subjected to steady and transient conditions.
3. Formulate boundary layer approximations and understand the differential and integral solution methods for boundary layer analysis
4. Predict flow separation conditions in external flow environments and develop concepts for flow control.

COURSE EVALUATION:

Quizzes:	40%
Oral Presentation:	20%
Assignments:	40%

STATEMENT REGARDING STUDENTS WITH DISABILITIES:

"Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098

CHEATING:

There is a "zero tolerance" policy in effect for cheating. *Copying* of any material, or obtaining information from another student to be turned in for a grade is considered cheating. Cheating will result in a grade of zero on that piece of work. In addition, any instance in which a student is caught cheating will be handled in accordance to the policies mentioned in the Schedule of Classes and at the following web site:

<http://osu.orst.edu/admin/stucon/regs.htm>.