Semester: Spring 2019
Course: MEC 393, Engineering Fluid Mechanics

Instructor:
   Professor Juldeh Sesay, 226 Heavy Engineering Bldg., (631)632-8493
   Email: Juldeh.sessay@stonybrook.edu
   Office hours: Tuesdays and Thursdays: 11:00 – 12:30 PM.

Teaching Assistants: None

Lectures: Tuesdays, Thursdays.01:00 – 02:20 PM,
         SocBehav Sci 5228

Credit: Three (3) credits

Prerequisite: Fluid Mechanics 1 MEC 364

Textbook: Introduction to Fluid Mechanics by Fox and McDonald's, John Wiley & Sons, 8th, ISBN-13 9780470547557, ISBN-10 0470547553

Course Description:
Flow around immersed bodies; drag and lift. Introduction to boundary layer theory. Compressible flow; one-dimensional isentropic flow, normal and oblique shocks; Prandtl-Meyer flow; Rayleigh and Fanno flow. Two lectures. Two credits. Prerequisite: MECH 318. (Cr.2)

Course Learning Objectives:
By the end of the course students will be able to:
- compute boundary layer thicknesses and associated properties using Blasius and momentum integral methods
- determine lift and drag of simple bodies
- analyze one-dimensional compressible fluid flow systems
analyze simple two-dimensional shock waves

Syllabus

Topics: (numbers of class lectures are approximates and might change as class progresses)
CHAPTER 8 INTERNAL INCOMPRESSIBLE VISCOUS FLOW

8.1 Introduction
- o Laminar versus Turbulent Flow
- o The Entrance Region

PART A. FULLY DEVELOPED LAMINAR FLOW
8.2 Fully Developed Laminar Flow between Infinite Parallel Plates
- o Both Plates Stationary
- o Upper Plate Moving with Constant Speed, U

8.3 Fully Developed Laminar Flow in a Pipe
PART B. FLOW IN PIPES AND DUCTS
8.4 Shear Stress Distribution in Fully Developed Pipe Flow
8.5 Turbulent Velocity Profiles in Fully Developed Pipe Flow
- o Energy Considerations in Pipe Flow
- o Kinetic Energy Coefficient
- o Head Loss

8.7 Calculation of Head Loss
- o Major Losses: Friction Factor
- o Minor Losses
- o Pumps, Fans, and Blowers in Fluid Systems
- o Noncircular Ducts

8.8 Solution of Pipe Flow Problems
- o Single-Path Systems
- o *Multiple-Path Systems

PART C. FLOW MEASUREMENT
8.9 Direct Methods
8.10 Restriction Flow Meters for Internal Flows
- o The Orifice Plate
- o The Flow Nozzle
- o The Venturi
- o The Laminar Flow Element

8.11 Linear Flow Meters
8.12 Traversing Methods

CHAPTER 9 EXTERNAL INCOMPRESSIBLE VISCOUS FLOW

PART A. BOUNDARY LAYERS
9.1 The Boundary-Layer Concept
9.2 Boundary-Layer Thicknesses

13.5 Flow in a Constant-Area Duct with Friction
- o Basic Equations for Adiabatic Flow
- o Adiabatic Flow: The Fanno Line
- o Fanno-Line Flow Functions for One-Dimensional Flow of an Ideal Gas
- o Isothermal Flow (on the Web)

13.6 Frictionless Flow in a Constant-Area Duct with Heat Exchange
- o Basic Equations for Flow with Heat Exchange
- o The Rayleigh Line
- o Rayleigh-Line Flow Functions for One-Dimensional Flow of an Ideal Gas

13.7 Oblique Shocks and Expansion Waves
- o Oblique Shocks
- o Isentropic Expansion Waves

Guidelines

Attendance Policy: Attendance is mandatory and highly recommended.

Announcements: Each student will be responsibled for knowledge of all scheduling and announcements with regards to this course. Each student is adviced to check course web pages regularly.

The homework should be viewed as a tool to help you understand the material. In that sense, your success in this course will depend highly upon your completing homework assignments. If you feel you need additional practice, you should try to solve additional problems in the textbook. Collaboration on homework is allowed. A lot of valuable insight can be gained from interaction with your classmates. However, blindly copying homework will be treated as academic dishonesty.

Please adhere to the following guidelines. They will be strictly enforced:

Typically six problems will be assigned every lecture and are due within one week of assignment.

Homework will be accepted only during class and at the beginning of the lecture and not immediately after the lecture.

Homework will be assigned approximately every Thursday during lectures.

No Late homework will be accepted.

Homework will be accepted on any form of a paper and pen

Staple neatly the top left corner

Write your name, ID, course and homework number on a cover page attached to your homework solutions
.
Make sure you numbered the question and show all your procedures

Graded homework should be collected from my office and not during lectures.

The solutions to the homework problems will be posted on the blackboard immediately after the homeworks have been collected in class.

There are two midterm exams and no final. All exams will be closed book and closed notes and the material needed to be covered for each exam will be posted on the web.

Make-up exams will be scheduled only in emergencies as per university guidelines. A written permission is required: for example, if you were ill, we will need a letter from a doctor attesting to this fact. The letter should have the doctor's phone number, and we will call the doctor's office for confirmation.

The **tentative dates** for the two midterms are as follows:
Exams schedule:
1. Thursday, March 07, 2019 (01:00 – 02:20 PM)
2. Thursday, May 09, 2019 (01:00 - 02:20 PM)

Grading :   Grades will be determined using :
Homework   16%
4/6 Quizzes   20%
Two exams   64% (32% each)

Instructor expectation:
- Be regular in class attendance
- Arrive on time
- Be attentive and participate in classroom discussions
- Come prepared to lectures/recitations
- Be up to date on previously cover material
- Allocate sufficient time every week to study for this course
- Be prepared to work hard and learn

Pet Peeves:
- Being distracted or distracting others in class
- Not willing to work hard or put an honest effort into learning
- Coming to me late in the semester for grade changes, extra credit, etc.
- Arguing over partial credit on homework/test grades
- Doing other tasks during lectures (including sleeping)
- Cellular phones ringing during lectures

DISABILITY SUPPORT SERVICES (DSS) STATEMENT (must be the following language)

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

[*In addition, this statement on emergency evacuation is often included, but not required:* Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.stonybrook.edu/ehs/fire/disabilities]

ACADEMIC INTEGRITY STATEMENT (must be the following language as approved by the undergrad council):

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

CRITICAL INCIDENT MANAGEMENT (must be the following language as approved by the undergrad council):

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.