Mechanical Engineering Department
Introduction to Fluid Mechanics | MEC 364 | 3 Credits

Prerequisite: PHY 126 or PHY 131; MEC 262; MEC Major

Weekly Schedule:

Lecture: Mon, Fri: 1:00 - 2:20 PM
Location: Online
Recitation: Wed: 10:30 - 11:25 AM
Recitation R01 Location: Frey Hall 104
Recitation R02 Location: Online

Instructor: Wenhai Li
Email: wenhai.li@stonybrook.edu
Office Location: Light Engineering 139
Office Hours: Wed: 1:00 – 2:30 PM via Zoom

Teaching Assistant: Ian Bonnell
Email: ian.bonnell@stonybrook.edu
Office Hours: Wed: 3:00 – 4:00 PM via Zoom

Catalog Course Description:
Fundamental properties of fluids and their conservation laws with applications to the design and evaluation of flows of engineering interest. Topics include hydrostatics, surface tension, dimensional analysis and dynamic similitude, Euler's equation, rotating coordinate systems, boundary layers, lubrication, drag on immersed bodies, open channel and pipe flows, and turbomachinery.

Course Learning Objectives:

1 Understand basic concepts, laws, principles, and phenomena in fluid mechanics.
2 Understand the principle of manometer as a measuring instrument and determining the hydrostatic force on submerged surfaces.
3 Apply the basic equations in integral form for a control volume.
4 Understand the differential analysis of fluid motion.
5 Apply the dimensional analysis and similitude.
6 Understand the dynamics of perfect fluids.
7 Understand the fundamentals of internal and external incompressible viscous flow.

ABET Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Textbook:

Title: Introduction to Fluid Mechanics with WileyPLUS registration card for homework assignments, 10th edition (2020)
Authors: Robert W. Fox, Alan T. McDonald, John W. Mitchell
Publisher: John Wiley & Sons, Incorporated
ISBN: 9781119603764

Course Requirements:

Online / Live Lectures: The lecture is online and will be delivered live via Zoom (https://stonybrook.zoom.us/). Zoom provides video and voice communication, text chat, interactive whiteboard, screen sharing and annotation. Note that you must login with your SBU email address when using Zoom. Assignments, lecture notes, and other class materials will be uploaded to the Blackboard. You are required to check the Blackboard prior to each class for the

announcement of online lecture URL. The online class will be lecture-oriented while lecture notes will be displayed and discussed using an interactive whiteboard via screen sharing. The lecture will be video recorded. Lecture videos and class notes will both be posted on Blackboard after the lecture. If at any time you experience technical problems, please contact me or DoIT as soon as possible. DoIT can be reached by calling (631) 632-9800.

Attendance: Attendance will be randomly checked via in-class quizzes for both lecture and recitations.

Homework: Homework problems will be assigned every week or two. A WileyPLUS registration code is required for online homework assignments. Late homework will not be accepted, except under documented emergencies.

Exams: Two midterms and one final exam. All exams are closed book and subject to change. No makeup exam unless arranged prior to the exam. The exam grades will be posted on Blackboard.

Final Grade: Will grade on the curve and the grading scheme is given as follows:

Attendance	5%
Homework Assignments	15%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	40%
Total	**100%**

Course Grand Rules:

- Participation in the online live lectures is required.
- Participation in the online or in-person recitations is required.
- Learn how to use Blackboard / Zoom on DoIT's website: https://sites.google.com/stonybrook.edu/keeplearning
- Keep abreast of class announcements.
- Do not hesitate to contact me if you need further assistance.

Tentative Course Outline:

Date	Lectures (Monday and Friday)	Recitations (Wednesday)
Week 1 Aug. 24 – 28	Chapter 1: Introduction	No Recitation
Week 2 Aug. 31 – Sep. 04	Chapter 2: Fundamental Concepts	Idea Gas & Unit System Example
Week 3 Sep. 07 – 11	Mo (Sep. 07) No Class (Labor Day) …	Fluid Properties & Flow Regimes Example
Week 4 Sep. 14 – 18	Chapter 3: Fluid Statics	Force on Surfaces, Rigid-Body Motion, Velocity, and Acceleration Example
Week 5 Sep. 21 – 25	…	Stream / Streak / Pathline Example
Week 6 Sep. 28 – Oct. 02	Chapter 4: Basic Equations / Control Volume Analysis	Control Volume Analysis - Mass & Momentum Conservation Example
Week 7 Oct. 05 – 09	… Fr (Oct. 09) Midterm #1 (Chapters 1 to 3)	Review for Midterm #1
Week 8 Oct. 12 – 16	Chapter 5: Differential Analysis	Differential Analysis Example

Date	Lectures (Monday and Friday)	Recitations (Wednesday)
Week 9 Oct. 19 – 23	…	Bernoulli Equation Example
Week 10 Oct. 26 – 30	Chapter 7: Dimensional Analysis / Similitude	Dimensional / Similitude Analysis Example
Week 11 Nov. 02 – 06	… Fr (Nov. 06) Midterm #2 (Chapters 4, 5, 7)	Review for Midterm #2
Week 12 Nov. 09 – 13	Chapter 6: Perfect Fluids	Perfect Fluids Example
Week 13 Nov. 16 – 20	Chapter 8: Internal Incompressible Viscous Flow	Viscous Fluids Example
Week 14 Nov. 23 – 27	No Class (Thanksgiving)	No Recitation (Thanksgiving)
Week 15 Nov. 30 – Dec. 04	Chapter 9: External Incompressible Viscous Flow	Review for Final Exam R01 Session Becomes Online
Week 16 Dec. 07	… Mo (Dec. 07) Last Lecture	
Dec. 17 (Thu) 2:15-5:00pm	Final Exam (Comprehensive)	

Copyright Statement
Course material accessed from Blackboard or the Stony Brook website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder, is a violation of the Federal copyright law, as well as a violation of SUNY copyright policy.

Masks and Social Distancing
For in-person lectures/recitations, students are required to wear face masks at all times and maintain social distancing (6 feet between individuals in traditional classrooms, or, in instructional laboratories and similar settings, only a few minutes in closer proximity when absolutely necessary to achieve learning objectives). Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and should stay at home. Instructors have the right to ask those who are not complying with these requirements to leave class in the interest of everyone's health and safety. If a student refuses to comply with these requirements, the instructor has the right to cancel class.

Allowed Calculators
Following the Mechanical Engineering Department's mandatory calculator policy, **only** the following calculators will be allowed to be used on the midterm and final exams. There will be no exceptions. This list of calculators is identical to that allowed for the National Council for Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year, as well as the Professional Engineering (PE) exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better. If you have any questions on this policy, please feel free to contact me. The NCEES policy on calculators can be found here: http://www.ncees.org/exams/calculators/.

Casio:	All **fx-115** models. Any Casio calculator must contain fx-115 in its model name.
Hewlett Packard:	The **HP 33s** and **HP 35s** models, but no others.
Texas Instruments:	All **TI-30X** and **TI-36X** models. Any Texas Instruments calculator must contain either **TI-30X** or **TI-36X** in its model name.

Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu/programs/fire-safety/emergency-evacuation/evacuation-guide-people-physical-disabilities and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement:

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 is 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:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards 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. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.