Fall 2020

ME 304-003: Fluid Mechanics

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Mechanical Engineering
New Jersey Institute of Technology

Course Syllabus and Guidelines
ME304: Fluid mechanics, section 003

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Office: Webex Fall 2020

(Updated: August 31, 2020)

It is the responsibility of the student to read and understand this course syllabus.

Class Times

Section	Lecture room
M 07:30-10:20am	Webex: `https://njit.webex.com/meet/smarrasnjit.edu`

Office Hours

By appointment only. Send an email with the subject: "Booking office hour".

Prerequisites

ME 236: Dynamics
ME 311: Thermodynamics I

Main topics

Introduction to the basic principles of conservation of mass, momentum, and energy as they apply to engineering systems which utilize fluids. Some of the topics are dimensional analysis, theoretical and empirical analysis of one-dimensional incompressible and compressible flows, empirical analysis of external and internal flows, elementary boundary layer theory, and fundamental theory of turbulence.

Course outcome

You will learn how to address a problem involving the motion of viscous newtonian fluids (gases and liquids) within and around solid bodies. In particular, you will learn how to calculate the forces that a fluid at rest or in motion generates on the solid walls of a body in contact with it. The course will cover the fundamental laws of fluid mechanics (including, but not limited to, the Bernoulli and Navier-Stokes equations), fundamentals of hydraulics, energy conservation and dissipation, boundary layer theory, fundamentals of turbulence and fundamentals of compressible flows. The course is taught at a junior and senior undergraduate level; the understanding of the concept of partial derivatives and differentials is expected because of the large amount of equations that will be either derived or provided during the course of the semester.

Suggested literature

Theory The theoretical part of this course relies on Open Affordable Textbook (OAT). About OpenTextbook: An "open" textbook means that its authors have made it free to own, share, and adapt for non-commercial purposes. Instead of having to buy it, you can just read it online, download it to an electronic device (like a computer or e-reader), or print out some or all of it. The book for this course is "Lecture notes in fluid mechanics: ME304", by Simone Marras.

REQUIRED AND/OR SUPPLEMENTAL READING MATERIALS Open textbook or Open Educational Resources (OER) will be used for this course. Electronic links to all OER are on the Moodle course page. There is no traditional textbook for this course. All course materials (readings, videos, podcasts, images, etc.) will be available via web link or by download from the course Moodle page. Open textbook or Open Educational Resources (OER) will be used for this course and are provided on the weekly assignments schedule. The theoretical foundations of the course will be presented in the "Lecture notes of fluid mechanics: ME304" provided weekly via

Practice problems Practice problems will be assigned from the 8th edition of "Munson, Young and Okiishi's Fundamentals of fluid mechanics" by Gerhart et al., any previous edition can be used. However, in the case of using a different edition, it is the student's responsibility to find the problems number equivalence to be in sync with the 8th edition.

Knowledge expectations

In addition to a sound knowledge and understanding of the material taught in the pre-requisites, to be proficient in this class the student is expected to have a solid background and sound understanding of calculus and vector calculus. If you are lacking in any of these subjects, please, review them throughly as most of the course will be based on concepts from both subjects

Repeating Students

Students repeating the course are required to repeat the entire course. Assignments and reports cannot be transferred from previous semesters.

Grading

There will be two (2) exams before the final exam. The first will be approximately in the middle of the semester, and the second at the very end, right before the final.

If the student obtains **at least a** *"D"* **in both of them, the student will not be required to take the final exam unless he/she decides to do so**. In the event that the student decides to take the final exam, the two intermediate exams will be bf nulled and only the grade of the final will be the final and definitive grade for the class.

The final exam will be mandatory if the student fails either one or both of the two previous exams.

The final and definitive grade for this class will be determined according to the following percentages:

Tests: 100%

	A	Superior: **only given if all of the exams average to an A**.
	B+	Excellent
	B	Very Good
Grade scale	C+	Good
	C	Acceptable
	D	Minimum required to pass.
	F	Inadequate

The following conditions will cause **loss of points** during any exams:

- Wrong units.
- Wrong numerical results.
- Lack of explicit formula and solution procedure (i.e. I will not give credits/points if you do not show what formula you are using.
- Ambiguous sentences and explanations.

Allowed and not allowed material during testing:

One US-letter sheet of paper written on one side only and containing only the formulas that you think are necessary to solve the problems. Programmable calculators are NOT allowed.
Cellular phones, computers of any type, tablet, etc. are NOT allowed during exams and class.

Personal matters and health issues

The instructor should not be exposed to family matters, health, hospitalization, or other serious personal matters. Should a serious event happen, please, communicate the issue directly and solely to the Dean of Students who will advise on how to proceed.

NJIT honor code

The NJIT honor code will be upheld and any violations will be brought to the attention of the dean of students. *Mobile phones and similar electronic devices are expected to remain silent and not in use — the sight of a mobile phone during an exam will result in a final grade of F for the class.*

Communication

This course will make use of Canvas and/or official NJIT e-mail for dissemination of various materials. You will be regularly contacted via email at your NJIT email address.
I will respond to questions sent by e-mail **if and only if** the answer cannot be found on this syllabus.
I do **not** communicate by telephone.

Problem Sets

Homework will be often assigned but will not be graded. It is the student's responsibility to come see me during office hours if having trouble with the solution of homework problems.
If you come requiring help, it is your responsibility to have solved the problem by yourself first because I will not solve it for you at office hours; I will explain how to do it to get you going.

Requirements for students

For best understanding of the material, the student is advised to attend all classes. As soon as possible after missing a lecture, it is the responsibility of the student to study the missed material from the book(s) or from the notes of a fellow student.

A personalized exam will **NOT** be granted at a different date unless the request comes directly from the Dean of Students.

Reports placed under doorways and not submitted during the class period are not the responsibility of the instructor if lost.
If you feel you are not going to pass this course, please reach out to your instructor with adequate time before the drop date.