



Nanchang University
ME235: Fluid Dynamics
(Last Updated in Jan. 2025)

Credit: 4

Contact Hours

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office contact hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length; There will be a Q-A review session (3 contact hours) and Final Exam (3 contact hours) at the end of this term. This course has 72 contact hours in total.

Course Description

Fluid mechanics is a fundamental topic in mechanical engineering and many related areas. This course provides students with an introduction to principal concepts and methods focusing on fluid dynamics. Topics covered in the course include pressure, control volume analysis; mass conservation and momentum conservation, viscous fluid flows, Navier-Stokes equation, flow through pipes; dimensional analysis; boundary layers, and lift and drag on objects.

By the end of this course, Students will be able to

- 1) Develop their understanding of the basic principles of fluid mechanics.
- 2) Demonstrate an ability to choose the appropriate fluid mechanical principles needed to analyze fluid-flow situations.
- 3) Develop a student's skills in analyzing fluid flows through the proper use of modeling and the application of basic fluid-flow principles.
- 4) Formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts.
- 5) Develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications.

Note: This Syllabus is subject to change based on the needs of the class.

Required Textbook

Textbook:

A Brief Introduction to Fluid Mechanics by Donald F. Young, Bruce R. Munson, Theodore H. Okiishi and Wade W. Huebsch. 5th edition. Wiley.

Fluid Mechanics by Frank M. White and Henry Xue. 9th edition. McGraw Hill.



Grading

- Attendance 5%
- Homework 20%
- Project 20%
- Midterm 25%
- Final Exam 30%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	

Course Schedule

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session(3 contact hours) and Final Exam (3 contact hours).

Note: the course outline and required readings are subject to change.

Class 1:

Course Overview

Class 2:

Characters and Properties of Fluid

Class 3:

Pressure

Class 4:

Hydrostatic Force, Homework 1

Class 5:

Surface Tension

Class 6:

Bernoulli Equation

Class 7:

Fluid Kinematics

Class 8:

Control Volume Analysis, Homework 2

Class 9:



Reynolds Transport Theorem

Class 10:
Conservation of Masses and Linear Momentum

Class 11:
Potential Flows

Class 12:
Midterm

Class 13:
Viscous Fluids

Class 14:
Navier-Stokes Equation

Class 15:
Navier-Stokes Examples

Class 16:
Dimensional Analysis, Homework 3

Class 17:
Buckingham Pi Theorem

Class 18:
Modeling and Similitude

Class 19:
Pipe Flow

Class 20:
Boundary Layer, Homework 4

Class 21:
Drag and Lift

Class 22:
Open-Channel Flow

Class 23:
Project Presentation



Class 24:

Review for Final

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

Policy on "Late Withdrawals"

In accordance with university policy, appeals for late withdrawal will be approved ONLY in case of medical emergency and similar crises.

Academic Honesty

Nanchang University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.