
Introduction to Numerical Analysis in Computational Fluid Dynamics

MAT 6932 Section: 2345 depx Class Periods: M,W, F, period 7, 1:55pm-2:45pm, LIT 207
Academic Term: Fall 2021

Instructor: Nan Jiang

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Office Hours: Wednesday, Period 8, 3pm-3:50pm, or by appointment

Course Description

This is a 3 credit course providing an introduction to numerical analysis in finite element Computational Fluid Dynamics (CFD).

Topics include

- (1) Mathematical preliminaries: energy and stress
- (2) Approximating scalars using the finite element method
- (3) Introduction to mixed methods for creeping flows
- (4) Introduction to the equations of fluid motion
- (5) The steady Navier-Stokes equations and approximating steady flows
- (6) The time-dependent Navier-Stokes equations and approximating time-dependent flows.

Course Prerequisites

Any Partial Differential Equations (PDE) course (undergraduate or graduate) with a minimum grade of C.

Required Textbook

Introduction to the Numerical Analysis of Incompressible Viscous Flows, by William Layton, Society for Industrial and Applied Mathematics (SIAM), Philadelphia, 2008.

Evaluation of Grades

The final grade will be determined by a final project (50%) and a class presentation (50%).

Grading Policy

Information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Attendance Policy

Requirements for class attendance and makeup exams, assignments, and other work in this course are consistent with university policies that can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Accommodations for Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Diversity, Equity and Inclusion Statement

The Mathematics Department is committed to diversity and inclusion of all students. We acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements. It is our intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.

Contact information for the Counseling and Wellness Center.

<https://counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

U Matter, We Care.

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392- 1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.