AE 462
Applied CFD
Spring 2026

Course Information

Course Meeting: MWF 9-9:50am in 114 Transportation Building
Lab Section 1: 406B Engineering Hall (reserved MWF, 9-9:50am)
Lab Section 2: 110A Engineering Hall (reserved MW, 9-9:50am)

Instructor: Prof. Phil Ansell
302A Talbot Lab
ansell1@illinois.edu
217-300-0949
Office Hours: Mondays, 2-3pm, Thursdays 1-2pm

Teaching Assistants:
Prathamesh Sirmalla (Lab Section 1)
prs7@illinois.edu
Chaitanya Ongole (Lab Section 2)
congole2@illinois.edu

Prerequisites: AE 311, AE 312 and AE 370 (AE 410 is beneficial but not required)

Credit: 3 undergraduate hours or 4 graduate hours

Learning Goals:

- Understand how to use computation to understand flow phenomena
- Establish and utilize computational workflows for CFD problems
- Recognize and utilize best practices in computational aerodynamics
- Interpret flow solutions and aerodynamic performance results obtained through computation

Course Website: Integrated into Canvas (https://canvas.illinois.edu/courses/66737)

Laboratory Exercises:
Laboratory Exercises will be assigned approximately once every 1-2 weeks and will be due within one week of the start date, at the beginning of class. Submissions should be provided in PDF format.

While collaboration with classmates and colleagues on assignment is encouraged, all students are expected to turn in their own work. Submitting the work of another as one's own, or facilitating such a submission, is considered an infraction of academic integrity as outlined in the Student Code (https://studentcode.illinois.edu/). Submission of solutions, including hand/computer calculations or codes, that are perceptibly identical across multiple students is considered a cheating violation of the Student Code.

Term Project:

The final three weeks of class will center around a term project, where students will have an opportunity to demonstrate practices learned throughout the course of the semester on a project of their choosing. A brief project proposal will be due on March 13, 2026.

Grading:

Laboratory Exercises:	70%
Term Project:	30%

A+	100%-97%	A	96.9%-93%	A-	92.9%-90%
B+	89.9%-87%	B	86.9%-83%	B-	82.9%-80%
C+	79.9%-77%	C	76.9%-73%	C-	72.9%-70%
D+	69.9%-67%	D	66.9%-63%	D-	62.9%-60%

Course Outline:

1. Overview of CFD
2. Computational CFD workflow
3. Governing equations, meshing, and boundary conditions
4. Verification and validation
5. Inviscid flow
6. Viscous flow
7. Unsteady flow
8. Compressible flow
9. Three-dimensional flow
10. Aerodynamic shape optimization (tentative)

Belonging statement:

A feeling of belonging and inclusion is critical to the success and health of our community. The Aerospace Engineering department has a committee called Aero's Space to Belong. They offer office hours, one-on-one discussion, and a reporting process. If you experience conflict that undermines your or someone else's feelings of belonging, please consider using these resources: https://aerospace.illinois.edu/diversity/reporting

Absences:
If you are unable to participate in classroom activities or assessments, please obtain an absence letter (https://odos.illinois.edu/community-of-care/resources/students/absence-letters/), other documentation from a physician, or proof of outreach to dial-a-nurse. If you are unable to participate in classroom activities due to concerns of COVID-19 infection or exposure, please do not attend class in person. If necessary, submit documentation of a test taken within 24 hours of the missed activity, regardless of the result (positive or negative) for an excused absence.

Course Logistics and Policy Changes:
The instructor reserves the right to make any changes he considers academically advisable. Such changes, if any, will be announced in class. Please note that it is your responsibility to attend the class and keep track of the proceedings.

Academic Integrity:
The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Course Policy on Use of Generative AI:
Generative AI tools are recognized as being a useful tool for brainstorming, expanding, and outlining ideas. However, the limitations of these tools are also broadly recognized, including (i) reporting factually incorrect information, (ii) directly plagiarizing original sources of information, and (iii) providing perspectives that reflect a limited, or topical understanding of subject matters. Throughout this course, students are expected to submit original work reflective of thoughtful inquiry and well-supported by the scientific literature. The use of AI tools to assist in this pursuit is permitted, but students are cautioned that submission of work directly or heavily based on that generated by AI tools are incapable of meeting the course expectations and will be assessed accordingly.

Anti-Racism and Inclusivity Statement:
The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions

have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable. You can also report these behaviors to the Bias Assessment and Response Team (BART) (https://bart.illinois.edu/). Based on your report, BART members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Sexual Misconduct Reporting Obligation:
The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential. Other information about resources and reporting is available here: wecare.illinois.edu.

Religious Observances:
Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at https://odos.illinois.edu/community-of-care/resources/students/religious-observances/ to request appropriate accommodations. This should be done in the first two weeks of classes.

Disability-Related Accommodations:
To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-4603, e-mail disability@illinois.edu or go to https://www.disability.illinois.edu. If you

are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnosis a previously undiagnosed disability. You may access these by visiting the DRES website and selecting "Request an Academic Screening" at the bottom of the page.

Family Educational Rights and Privacy Act (FERPA):
Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See https://registrar.illinois.edu/academic-records/ferpa/ for more information on FERPA.