Instructor: Antoine Cerfon, Associate Professor of Mathematics, CIMS  
Office: Warren Weaver Hall 1011  
Email address: acerfon@nyu.edu  
Office hours: Monday: 1:30PM – 2:30PM, Wednesday: 4:00PM – 5:00PM

Expected Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
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</thead>
</table>
| 1    | 1/29-31 | **Chapter 1**  
Introduction to continuum physics  
Review of classical mechanics and thermodynamics |
| 2    | 2/5-7 | **Chapters 2-3**  
Cartesian Tensor  
Eulerian and Lagrangian description, Streamlines and streamfunction |
| 3    | 2/12-14 | **Chapters 3-4**  
Rotation rate and vorticity, Reynolds transport theorem  
Equation of continuity, Conservation of momentum |
| 4    | 2/19-21 | **Chapter 4**  
Euler equations  
Bernoulli function |
| 5    | 2/26-2/28 | **Chapter 4**  
Stress tensor. The Navier-Stokes equations  
Energy conservation, Frictional dissipation |
| 6    | 3/5-7 | **Chapter 9**  
Laminar flow  
Reynolds number, flow transition and viscosity |
| 7    | 3/12-14 | **Chapter 5**  
Vorticity and circulation  
Review Chapters 1–5, 9 |
| 8    | 3/26-28 | **Chapter 5**: Helmholtz theorem, vorticity equation  
**Thursday, March 28**: Midterm exam |
| 9    | 4/2-4 | **Chapter 5**  
Vortex filament, interactions between vortices  
Fluid flow in a rotating frame |
| 10   | 4/9-11 | **Chapter 7**  
Potential flow and streamfunction  
Flow around a cylinder |
| 11   | 4/16-18 | **Chapter 7**  
Conformal mapping  
Kutta-Joukowski lift theorem |
| 12   | 4/23-25 | **Chapter 8**  
Linearization, gravity waves  
Shallow water waves |
| 13   | 4/30-5/2 | **Chapter 8**  
Dispersion and group velocity  
Internal waves and sound waves |
| 14   | 5/7-9 | **Chapter 8**  
Hydraulic jump and shocks  
Review |
| 15   | | **Final Exam Date and time TBA** |
Prerequisites
Students who wish to enroll in this course must meet one of the following prerequisites:

- Calculus III (MATH-UA 123)
- Mathematical Physics (PHYS-UA 016) is suggested to PHYS student.

Course Textbook

This is a nice and complete textbook, which you could find useful in your life as a student and later in industry or in academia. However, if you do not wish to invest in this somewhat expensive book, note that the electronic version of the Fifth edition of the book, which is excellent too, is available for free through NYU Bobcat. Feel free to choose this option! I will post self-sufficient lecture notes after every lecture, and the homework will not make reference to the textbook, so there is not much to lose in doing so.

NYU Classes
The chief means of communication for this course will be the course Classes site, accessed through home.nyu.edu. Students are expected to check this for assignments, lecture notes, and announcements.

Recitation
Recitations will take place every Friday from 11:00AM until 12:15PM in CIWW 201. A teaching assistant will lead class discussions on the course material and homework problems, and be there to answer your questions.

The teaching assistant will also hold office hours, on Fridays from 2:15PM until 3:15PM in CIWW 805.

Exams – Grades
Your course score will be determined as the following weighted average:

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>25%</td>
</tr>
<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Class participation</td>
<td>10%</td>
</tr>
<tr>
<td>Final</td>
<td>35%</td>
</tr>
</tbody>
</table>

Homework assignments

• Assigned weekly, due on Thursdays after class. 10 % penalty if assignment is submitted late on Thursday.

An assignment will not be graded if it is submitted after Thursday. An assignment that is not graded will be given a 0 score.

Your two lowest scores will be dropped in the calculation of your written homework grade.

Policy on out-of-sequence exams
We are only able to accommodate a limited number of out-of-sequence exams due to limited availability of rooms and proctors. For this reason, we may approve out-of-sequence exams in the following cases:

• A documented medical excuse.
• A University sponsored event such as an athletic tournament, a play, or a musical performance.

Athletic practices and rehearsals do not fall into this category. Please have your coach, conductor, or other faculty advisor contact your instructor.

• A religious holiday.
• Extreme hardship such as a family emergency.
We will not be able to accommodate out-of-sequence exams and finals for purposes of more convenient travel, including already purchased tickets. Please note again the date of the final and plan your summer travel accordingly.

Scheduled out-of-sequence exams (those not arising from emergencies) must be taken before the actual exam. Makeups must occur within one week of the regularly scheduled exam otherwise a zero score will be given.

If you require additional accommodations as determined by the Center for Student Disabilities, please let your instructor know as soon as possible.

**Academic Honesty**

Guidelines regarding cheating and plagiarism are laid out in the College of Arts and Sciences guidelines and will be adhered to strictly. Collaboration is permitted, in fact encouraged, for home and class assignments; however, all submitted assignments must be written up independently and represent the student’s own work and understanding. Furthermore, collaborations must be acknowledged at the top of the assignment, by naming the participants in it.