

# Aerodynamics I (AerE 310)

## COURSE POLICY

- Instructor:** Dr. Hui Hu and Dr. Abdallah Samad (backup)  
Department of Aerospace Engineering  
Iowa State University  
Office: Room 2249, Howe Hall  
Tel: 515-204-0094 (office) / Email: [huhui@iastate.edu](mailto:huhui@iastate.edu)
- Teaching Assistant:** Mr. Anvesh Dhulipalla  
Office: Room 2242- Howe Hall  
Tel: 515-294-0089  
Email: [adhulipa@iastate.edu](mailto:adhulipa@iastate.edu)
- Office Hours:**
- |           |                  |
|-----------|------------------|
| Monday    | 4:10pm – 5:10 pm |
| Wednesday | 4:10pm – 5:10 pm |
| Friday    | 4:10pm – 5:10 pm |
- Course Objectives:** Introduction to fluid mechanics and aerodynamics. Fluid properties and kinematics. Conservation equations in differential and integral form. Bernoulli's equation. Basic potential flow concepts and solutions. Boundary layer concept. Incompressible flow over airfoils and wings. Examples of numerical methods. Applications of multi-variable calculus to fluid mechanics and aerodynamics.
- Reference books:** 1). John Anderson, "Fundamentals of Aerodynamics" 4th Edition, McGraw-Hill  
2). John Bertin, "Aerodynamics for Engineers", 5<sup>th</sup> Edition, Prentice Hall.
- Homework:** Available at the course website at <https://www.aere.iastate.edu/~huhui/teaching/2024-01S/AerE310/AerE310.html>

## **Free Expression**

Iowa State University supports and upholds the First Amendment protection of [freedom of speech](#) and the principle of academic freedom in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

## **Academic Dishonesty**

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the [Dean of Students Office](#).

## **Discrimination and Harassment**

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email [eooffice@iastate.edu](mailto:eooffice@iastate.edu)

## **Prep Week**

This class follows the Iowa State University Prep Week policy as noted in section 10.6.4 of the [Faculty Handbook](#).

## **Religious Accommodation**

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office at 515-294-1020 or the Office of Equal Opportunity at 515-294-7612.

## **Contact Information for Academic Issues**

If you are experiencing, or have experienced, a problem with any of the above statements, email [academicissues@iastate.edu](mailto:academicissues@iastate.edu)

**Grading policy:**

In-class assignments and 5-minute quizzes	10 %
Homework	20 %
1 <sup>st</sup> Midterm exam	20 %
2 <sup>nd</sup> Midterm exam	20 %
Final exam	30 %
<b>Total</b>	<b>100 %</b>

**Late Homework submission:**

Due dates for mandatory graded submissions of any kind that fall within Prep week are listed below: ***Please make sure to turn in your homework on time (i.e., before 5:00pm on Fridays)***. If homework solutions are turned in after 5:00pm on the due date, the score will be reduced by 25%. If work is turned in 2 days after the due date, scores will be reduced by 50%. No credit will be given for reports turned in more than 2 days after the due date. To be granted an extension on a missed homework assignment requires a written signed memo delivered to the course instructor in advance of the due dates explaining in detail the reason for the request.

**Letter Grades defined:**

100 – 90	A
89 – 87	A-
86 – 83	B+
82 – 80	B
79 – 77	B-
76 – 73	C+
72 – 70	C
69 – 68	C-
67 – 64	D+
63- -64	D
62 – 60	D-
59 – 0	F

**Course Outline:** See course syllabus attached.

## COURSE SYLLABUS

Date	Period	Topic/Text	Homework problems
<b>Week 1</b>			
15 Jan.	0 M	<b>University Holiday (no class)</b>	
17 Jan.	1 W	<b>Course Syllabus and policies</b>	
19 Jan	2 F	<b>Review of calculus and vectors</b>	
<b>Week 2</b>			
22 Jan.	3 M	<b>Relations between different coordinate systems</b>	
24 Jan.	4 W	<b>Directional derivatives -1</b>	
26 Jan.	5 F	<b>Directional derivatives -2</b>	
<b>Week 3</b>			
29 Jan.	6 M	<b>Review of fluid mechanics</b>	
31 Jan.	7 W	<b>Relations between different coordinate systems</b>	
02 Feb.	8 F	<b>Reynolds transport theorem</b>	<b>Homework Set #1 Due.</b>
<b>Week 4</b>			
05 Feb.	9 M	<b>Conservation of Mass 1</b>	
07 Feb.	10 W	<b>Conservation of Mass 2</b>	
09 Feb.	11 F	<b>Conservation of Momentum 1</b>	
<b>Week 5</b>			
12 Feb.	12 M	<b>Conservation of Momentum 2</b>	
14 Feb.	13 W	<b>Conservation of Momentum 3</b>	
16 Feb.	14 F	<b>N-S equations in different systems</b>	<b>Homework Set #2 Due.</b>
<b>Week 6</b>			
19 Feb.	15 M	<b>Circulations and Stokes theorem</b>	
21 Feb.	16 W	<b>Bernoulli's equation</b>	
23 Feb.	17 F	<b>First hourly Exam #1</b>	
<b>Week 7</b>			
26 Feb.	18 M	<b>Streamlines and Stream functions</b>	
28 Feb.	19 W	<b>Potential flows and potential function</b>	
01 Mar.	20 F	<b>Basic Flows 1</b>	<b>Homework Set #3 Due.</b>
<b>Week 8</b>			
04 Mar.	21 M	<b>Basic Flows 2</b>	
06 Mar.	22 W	<b>Basic Flows 3</b>	
08 Mar.	23 F	<b>Basic Flows 4</b>	
<b>Week 9</b>			
11 Mar.	M	<b>SPRING BREAK</b>	
13 Mar.	W	<b>SPRING BREAK</b>	
15 Mar.	F	<b>SPRING BREAK</b>	

<b>Week 10</b>	.....		
18 Mar.	24 M	Basic Flows 5	
20 Mar.	25 W	2D airfoil theory -01	
22 Mar.	26 F	2D airfoil theory -02	Homework Set #4 Due.
<b>Week 11</b>	.....		
25 Mar.	27 M	2D airfoil theory -03	
27 Mar.	28 W	2D airfoil theory -04	
29 Mar.	29 F	2D airfoil theory -05	
<b>Week 12</b>	.....		
01 Apr.	30 M	2D airfoil theory -06	
03 Apr.	31 W	2D airfoil theory -07	
05 Apr.	32 F	Second hourly Exam #2	Homework set #5 Due.
<b>Week 13</b>	.....		
08 Apr.	33 M	3D-Wing-Aerodynamics - 01	
10 Apr.	34 W	3D-Wing-Aerodynamics - 02	
12 Apr.	35 F	3D-Wing-Aerodynamics - 03	
<b>Week 14</b>	.....		
15 Apr.	36 M	3D-Wing-Aerodynamics - 04	
17 Apr.	37 W	3D-Wing-Aerodynamics - 05	
19 Apr.	38 F	3D-Wing-Aerodynamics - 06	Homework set #6 Due.
<b>Week 15</b>	.....		
22 Apr.	39 M	Introduction to Viscous Flows	
24 Apr.	40 W	Laminar and Turbulence Flows - 01	
26 Apr.	41 F	Laminar and Turbulence Flows - 02	
<b>Week 16</b>	.....		
29 Apr.	42 M	Boundary layer flow concept & theory - 01	
01 May	43 W	Boundary layer flow concept & theory - 02	
03 May	44 F	Review for the Final Exam	Homework set #7 Due.
<b>Week 17</b>	.....		

### Final exam for AerE310

- According to <https://www.registrar.iastate.edu/students/exams/fallexams>, AerE310 final exam will be held at **2:15pm ~ 4:15pm on Monday, May 06, 2024**