Course Syllabus

Edit

Thermal Sciences

Monday, Wednesday, Friday, 2:00 pm – 2:55 pm

Location: Gates-Thomas Building, Room 135

Instructor: Prof. Xiaojing | Ruby Fu, Gates-Thomas Building, Room 366

Email: rubyfu@caltech.edu (mailto:rubyfu@caltech.edu)

Office hours: Wednesday 3-4pm

Admin: Michelle Markarian (mmarkari@caltech.edu (https://caltech.instructure.com/mailto:mmarkari@caltech.edu))

Teaching assistants:

Nathan Jones - ndjones@caltech.edu (mailto:ndjones@caltech.edu)

Aman Eujayl - aeujayl@caltech.edu (mailto:aeujayl@caltech.edu)

Kyla Cook - kcook2@caltech.edu (mailto:kcook2@caltech.edu)

Trey Scott - jascott@caltech.edu (mailto:jascott@caltech.edu)

Sara Razavi - srazavi@caltech.edu (mailto:srazavi@caltech.edu)

Brittany Wright - bmwright@caltech.edu (mailto:bmwright@caltech.edu)

TA Office Hours (Room: 320 GTL)

	Monday	Tuesday	Wednesday	Thursday	Friday
AM		**10–11am** Kyla Cook		**9–11am** Nathan Jones	

PM	**5–6pm** Sara Razavi	**3–5pm** Aman Eujayl			
Night Owl			**7–8pm** Brittany Wright	**7–8pm** Trey Scott	

Class Website: https://caltech.instructure.com/courses/8445 (https://caltech.instructure.com/courses/8445)

Reference Texts: The textbook for the course is Fluid Mechanics, by Frank M. White (7^{th} ed., McGraw Hill 2011). The various editions of this textbook differ little. There are many copies on reserve at SFL under ME11, ranging from the 4^{th} to 7^{th} ed. If I quote page numbers or problems, they will refer to the 7^{th} ed.

Exams: *Midterm*: May 5th 1pm-4pm **In-person (GT-135)**

Final: June 9^{th} 1pm-4pm **In-person (GT-135)**

Grades:

Problem Sets:	30 %
Midterm Exam:	30 %
Final Exam:	30 %
Class Engagement and Late Days:	10 %

A+: [96%,100%]; A: [92%, 96%); A-: [90%, 92%)

B+: [88%, 90%); B: [82%, 88%); B-: [80%, 82%)

C+: [78%, 80%); C: [72%, 78%); C-: [70%, 72%)

D: [65%, 70%)

F: [0, 65%)

Homework:

Given once a week and released on Canvas on Friday.

Due the following Friday at 11:59pm on Gradescope.

Deadline policy:

Homework should be submitted ***on time***. If the homework is late, there are two different processes by which it will be handled.

1) You have a very good reason. If you are sick, or have a family emergency, you will not be penalized. Typically, these situations involve the Dean's office and/or the Health Center. If possible, please let Prof. Fu know beforehand.

2) Your reasons do not warrant an extension – the most common situation. Students should do their homework, so hand in the work even if it is very late. With Canvas, work that is uploaded late will be marked as late*. If the number of late days throughout the term is less than 5 days, there will be no consequence. If you are beyond 5 days, you will lose points from the "class engagement and late days" part of the course. Every day past the 5^{th} day is 2% off from the participation category. An accumulation of 10 or more late days will result in 0% in the participation category.

**e.g., submission at 12:01am on Saturday will count as 1 late day.*

3) Please note that I will not accept any homework that is beyond 14-days late or after the last day of class (June 6^{th}).

4) Homework extensions are automatically granted and will be counted as late days according to our deadline policy 2. *Please do not email for extensions* unless the situation involves the Dean's office and/or the Health Center (see Deadline policy 1).

Exam policy:

The midterm and final exams will be in-person. *We will upload a separate front page of the exam with information on submission guidelines that you can view ahead of the exam.*

Class engagement:

Please plan on coming to class! "Class engagement" will be recorded at the beginning of each lecture via a sign-in sheet. This will count towards points in the homework.

Collaboration Policy:

Discussion of homework with other students is encouraged. However, each student is responsible for their own work. Each student should attempt the homework problems individually before consulting

other students or TAs. You may not use another student's homework to check your own work. Work with another student must be a collaborative effort. Do not seek homework advice from students who have previously taken this course. Do not look at homework sets (questions or solutions) from previous years.

Wellness Policy:

Please note that we want you to stay healthy throughout the academic year. If you are getting behind in your work, please talk with Professor Fu. Caltech has supportive resources through the Student Wellness Center.

Students with Documented Disabilities:

Students who may need an academic accommodation based on the impact of a disability must initiate the request with Caltech Accessibility Services for Students (CASS). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact CASS as soon as possible, since timely notice is needed to coordinate accommodations. For more information: **https://cass.caltech.edu/** (https://cass.caltech.edu/), **cass@caltech.edu** (mailto:cass@caltech.edu).

Honor Code:

All members of the Caltech community are expected to adhere to the Honor Code, which states "No member of the Caltech community shall take unfair advantage of any other member of the Caltech community." Honor Code violations will be reported to the appropriate governing body. Students are also reminded that "every member must share the responsibility of protecting the Caltech community and perpetuating the Honor System."

If there is an occasion when a case needs to be submitted to the Board of Control, Professor Fu will be engaged in the review process since she assigns grades and is responsible for the academic integrity of ME 11C. If the case is not resolved by the end of the quarter, a grade of E will be assigned.

The use of textbook solution manuals is strictly prohibited. Use of websites such as **Chegg.com** (http://Chegg.com) or **Bartleby.com** (http://Bartleby.com), and other similar (paid subscription) websites is strictly prohibited. Anyone who cheats on their problem sets will be immediately reported to the Board of Control (BOC).

Course Outline (subject to change):

WEEK	LECTURES	BOOK CHAPTERS

March 31	**Viscous flows**	**3.1–3.4, 4.1–4.4**
	Navier-Stokes equations	
	Viscosity, shear stress, & strain rate	
April 7	**Viscous flows — Pipe flows**	**4.10, 6.1–6.6, 6.9–6.10**
	Laminar vs. turbulent	
	Pipe networks	
April 14	**Viscous flows — Boundary layers**	**7**
	Steady-flow energy equation	
	Blasius solution	
	Scaling arguments	
April 21	**Boundary layers and Potential flow**	**4.7, 4.8, 8**
	Boundary layers	
	Laminar vs. turbulent	
	Potential flow	
April 28	**Potential flow + Midterm**	**8**
	Potential flow	
May 5	**Heat transfer -- Conduction**	**3.7, 4.5**
	Fourier's law	
	Heat equation	
May 12	**Heat transfer — Convection**	**9.8**
	Newton's law of cooling	
	Correlations	
May 19	**Compressibility**	**9.1–9.3**

	Isentropic flows	
May 26	**Compressibility — Nozzles**	**9.4, 9.6**
	Quasi 1D	
	Converging/diverging nozzles	
June 2	**Geophysical Flows & Review**	