

Math 0090 - Fall 2021 Syllabus

Contact Information:

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Canvas Website: <https://canvas.brown.edu/courses/1086211>

Office Hours: Mon: 2:00 PM - 4:00 PM (online) or by appointment

Course Description

Math 0900 is an introduction to calculus. We will largely be focusing on three main topics: limits, derivatives, and integrals. The course content will be aimed at understanding these topics both conceptually and practically with applications to the other fields, such as physics, business, and biology through basic mathematical models. Topics with the course schedule are listed towards the end of this document.

Calculus is a demanding subject, students should expect to spend, on average, about eight hours a week working outside of class through completing homework, reviewing notes, and preparing for exams. You may find yourself spending more or less time studying, but the goal is for you to have a reasonable understanding of the course concepts by the end of the semester with the ability to pursue higher levels of math if you so choose.

The subject material presupposes a background in precalculus, in particular, familiarity with algebraic, rational, exponential, logarithmic, and trigonometric functions. Ideally one will complete this course with a reinforced knowledge of the topics just mentioned, in addition to an understanding of limits, derivatives, and integrals as standalone concepts and to how use them with each such previous family of functions.

Lectures and Discussions

Lectures will be posted online through Canvas weekly. Discussion sections are taught by teaching assistants, and depending on which section you are enrolled in, this will either be online or in person. These sessions are intended for you to reinforce knowledge learned from the previous week, so you should come prepared with questions for the TA. The two best means of contacting either myself, or the TAs is through messaging them on Canvas, or email. Below is some relevant contact information.

<u>Name</u>	<u>Email</u>	<u>Office Hours</u>
Aidan Backus	aidan_backus@brown.edu	Wed: 11:00 AM - 1:00 PM (Room 011)
Charles Daly	charles_daly@brown.edu	Mon: 2:00 PM - 3:00 PM (online) Mon: 3:00 PM - 4:00 PM (online)
John Ahn	john_ahn@brown.edu	Fri: 2:30 PM - 4:30 PM (online)
Stephen Obinna	stephen_obinna@brown.edu	Mon: 1:00 PM - 2:00 PM (Room 013) Thu 1:00 PM - 2:00 PM (Room 013)
Trent Lucas	trent_lucas@brown.edu	Mon: 4:00 PM - 5:00 PM (Room 011) Tue: 2:30 PM - 3:30 PM (Room 011)
Troy Liu	yanze_liu@brown.edu	Wed: 2:00 PM - 3:00 PM (online) Wed: 3:00 PM - 4:00 PM (online)

Textbook

Thomas' Calculus: Early Transcendentals, Single Variable, 14th Edition by Thomas, Weir, Hass (ISBN: 978-0-13-443941-9). This is the paperback edition. If you get an online copy or hardback, make sure it says '14th edition' and 'Early Transcendentals' as your homework will be assigned from this text.

Homework

Homework is assigned every week and will be due every Wednesday at 11:59 PM (EST). The schedule of homework will consist of a mixture of *odd problems* and *even problems*. The odd problems will not be collected whereas the even problems will be. So for example if a particular week the following problems from Chapter 2 Section 5 are assigned:

Month - Date - Month Date

Odd Problems: 2.5: 1, 3, 5, 13

Even Problems: 2.5: 6, 10, 18, 20

you would only turn in problems 6, 10, 18, and 20 from 2.5 for grading. That said, quiz and exam problems will be inspired from the homework, both even and odd

problems, thus you should in fact complete all the assigned problems.

Problem sets will be submitted through **Gradescope**. Click [here](#) to see how to submit a .pdf file. It is important that you submit your homework file as a .pdf and not other file formats, for example .heic, as they may not necessarily render properly on Gradescope. You do *not* have to type up your work on a computer or use a tablet to write your homework (that said you are welcome to if this is your preferred means so long as you can export your work to a .pdf). Most people prefer to use their smart phones to take pictures of their written homework and turn it into a .pdf. A pretty thorough guide on this process can be found [here](#) but if you have any questions, please feel free to contact me.

Homework Policy

Late assignments will not be accepted for any reasons, including illness, absence, or adding the course late. As per consequence, it is well advised to submit your work early, so you do not run into technical difficulties that prohibit you from submitting your work. Occasionally, unavoidable issues arise, so each student's lowest homework grade will be dropped when calculating final grades, so you are able to miss a week without penalty. If you happen to miss two weeks for good reason, please contact me. Even if you happen to miss an assignment, you should still complete every assignment as they will help you prepare for exams and quizzes.

Important Note about Weeks 2-4: Any problems from a section before 3.3 that refer to slope, rate of change, or derivatives are intended to be solved *without* using derivative shortcuts such as the power rule, chain rule, etc. These tools will be developed later in the class and will not be recognized for any credit during weeks 2-4 if submitted with through homework.

Finally, it is your responsibility that each problem set is uploaded in a *readable* format, namely legible work that is properly oriented, not upside-down, reflected, blurry, etc. If your homework submission does not meet these requirements, you may not receive any credit for that particular assignment.

Helpful Resources

Here are some resources that may help you succeed in this class.

- **Office Hours:** Both me and the TAs will have office hours. This is a great opportunity to get your questions answered in real time and have a discussion about problems and concepts learned in class.
- **ED Discussions:** This is a good place to ask questions about problems and concepts. The idea is if you have a question, instead of sending it directly to me or the TAs, you post it here. Odds are extremely high that someone else has had the exact same question, and thus having a public posting answering your questions benefits not just you, but also your classmates.
- **Brown's Academic Tutoring Program:** Group tutoring sessions are available for various courses, including this one, but spots are limited so it would be wise to sign up in advance.
- **Study Groups:** You are encouraged to study with other students, it's a great way to learn. While you must each submit your own homework assignments, you can nevertheless work on the homework together.

Quizzes

Every week (except the first and exam weeks) on Friday there will be a short quiz based on the previous week's content. These will be available between 9:00 AM (EST) and 8:00 PM (EST) and are meant to be a low-stakes opportunity to practice for exams. Your lowest quiz grade will be dropped. The quizzes consist of fifteen minutes to complete your work on paper and ten minutes to scan your work upload it to Gradescope.

Exams

There will be three midterm exams and a cumulative final all of which are online. There are twenty hour windows for each midterm exam and scheduled to begin on the evenings of **October 6th, 2021**, **November 3rd, 2021**, and **November 23rd, 2021**. The twenty four hour final exam window is scheduled **December 15th, 2021**. Students unavailable during an entire exam window need to notify us at least a week in advance.

You will download the exam file and be able to scan and submit solutions written on blank paper. When writing your work, you *must* separate your problems per

page. For example Problem 1 goes on Page 1, Problem 2 goes on Page 2, Problem 3 on Page 3, etc. What you do *not* want to do is put more than one problem on a single page. For example, *do not put* Problem 1 *and* Problem 2 on the same page. If you don't adhere to this policy, this may result in your problems receiving no credit. If you require more than one page to do a Problem, that is fine so long as it is labeled clearly. Please see the Files section for an example of what to do and what not to do.

Rules for Exams and Quizzes

Exams and quizzes will be *partially open-book*. This means you are allowed to use *some* resources but not others.

You are **allowed** to use

- The textbook for this course
- Notes you have taken yourself during this course
- Solutions you have created yourself to problems *assigned* in this course

You are **not allowed** to use

- Calculators or other calculating devices
- Websites, apps, or other electronic/internet references
- Communication with other people
- Books or publications other than the course textbook
- Notes or solutions from other courses
- Notes or solutions created by other people

You are meant to submit your answer and your work that led to that answer. If you do not write down and submit all your reasoning for an answer, you are liable to lose points. In general if you simply put the answer to a problem, even if it is correct, you will receive no credit. If during your solution writing, you realize a previous line of reasoning was incorrect, simply erase or cross it out. Multiple answers to a solution will not be graded. If you forgot to submit part of your work, it cannot be used as justification after the fact. Finally if your work appears to come from a prohibited source, we will report it to Brown as a potential Academic Code violation.

SAS-Accommodations and Exam Conflicts

If you have an exam accommodation approved by Student Accessibility Accommodations (click [here](#)) or an exam conflict, you must let me know at least one week before the exam. Please contact me directly through email or ELMs.

Grading

Grades will be calculated according to the below list.

15% Homework	10% Quizzes
15% Exam One	20% Exam Two
20% Exam Three	20% Cumulative Final

When calculating homework and quiz averages, we drop your single lowest grade in each. This policy is to help intend to account for unforeseen life events, and even if your inability to take the quiz or complete the homework is excused, you will not receive an extra dropped grade.

If an illness or other *documented* issue causes you to miss more than one homework or quiz, please contact me as soon as possible and in this case we *may* drop additional grades to account for the absence.

Individual grades are not curved. Cutoffs for letter grades are not determined until the end of the semester. We choose these cutoffs based partially on the distribution of student grades this semester, and partially on typical percentage grades from previous semesters. If an exam has an unusually high or low average, we take that into account when choosing cutoffs.

This is not to present a ‘moving target.’ It gives us flexibility to lower *not raise* our thresholds and give higher letter grades to students who come close to the traditional cutoffs. In the case where we set concrete cutoffs at the beginning of the semester, we would likely only give passing grades to students who finish higher than 65%, but instead we have a floating cutoff so that we can also pass some students who come close 65% and how close depends on the factors above. Every cutoff has a maximum value; for example, any student finishing about 65% is guarantees (at least) an S, as we will never raise that cutoff above 65%.

- The cutoff between S and NC will be no higher than 65%, and will most likely fall somewhere between 55% and 65%.
- The cutoff between S_DIST (S with distinction) and S will be no higher than 90%, and it will most likely fall somewhere between 85% and 90%.

Note that Math 0900 has a mandatory S/NC grading. This does not mean every student automatically passes. You should take this course seriously if you want to succeed.

Below is the formula we use to calculate your score at the end of the semester. A reasonable way to estimate your performance in the class is to take your current grades and use reasonable estimates for future grades.

$$0.15(\text{Homework}) + 0.10(\text{Quizzes}) + 0.15(\text{Exam 1}) + 0.2(\text{Exam 2} + \text{Exam 3} + \text{Final})$$

So for example, let's say by the end of the second exam someone has an 90% in homework, 80% in quizzes, 85% on the first exam and 75% on the second exam, it would seem reasonable to plug in the average of the exams for Exam 3 and the Final which would be 80%. That said, the student can estimate they have approximately a 77.25%.

$$0.15(90\%) + 0.10(80\%) + 0.15(85\%) + 0.2(75\% + 70\% + 70\%) = 77.25\%$$

Academic Integrity

The instructors of this course take Brown's Academic Code, and academic integrity in general, very seriously. Submitting dishonest work, whether on homework or exams, makes it more difficult to effectively help you and your fellow students learn, and it dilutes the meaning of a Brown degree.

It is your responsibility to understand what actions are allowed in this course, and what actions are violations of the Academic Code. Further information is available here. Any incidents that appear to violate course rules will be presented to, and adjudicated by, the university's Academic Code committee.

Inclusivity and Equity

This course strives to be accessible and inclusive to all students, regardless of age, race, nationality, gender identity, sexual orientation, religion, economic background,

or any other difference that contributes to the vibrant and diverse Brown community. We are committed to conducting all interactions with students with a sense of respect and equity. We ask that students interact with other students and instructors in this same spirit. If something happens to make you feel unwelcome or discriminated against, please bring it to our attention so that we can try to make the situation right.

In addition, Brown is committed to providing support for students with learning differences, physical impairments, and other disabilities. If you think you may need accommodations due to one of these conditions, contact Student Accessibility Services for more information.

Schedule

Sept 5th - Sept 11th: 1.3, 1.5, 1.6, 2.1

Odd: See worksheet

Review, intro to limits

Even: See worksheet

Sept 12th - Sept 18th: 2.1, 2.2, 2.4

Limits

Odd Problems:

2.1: 1, 9, 15

2.2: 3, 5, 9, 15, 25, 39, 47, 61, 71, 79

2.4: 3, 9, 17, 21

Even Problems:

2.1: 16, 22, 26

2.2: 2, 38, 54, 64

2.4: 10, 20, 26

Sept 19th - Sept 25th: 2.5, 2.6, 3.1

Limits, Intro to derivatives

Odd Problems:

2.5: 1, 15, 37, 47, 57

2.6: 9, 17, 27, 33, 57, 61, 77

3.1: 7, 13, 19, 23, 25, 29

Even Problems:

2.5: 6, 30, 48

2.6: 20, 30, 40, 56

3.1: 8, 18, 34

Sept 26th - Oct 2nd: 3.2, 3.3, 3.4, 3.5

Derivatives and derivative rules

Odd Problems:

3.2: 9, 17, 55

3.3: 5, 21, 35, 57, 59, 71

3.4: 7, 11, 15, 21, 31

3.5: 9, 21, 29, 33, 57, 61

Even Problems:

3.2: 6, 32

3.3: 16ab, 50, 66

3.4: 18, 30

3.5: 16, 32, 54

Oct 3rd - Oct 9th: 3.6, 3.7

Chain Rule, Implicit Differentiation
(Exam 1, no quiz)

Odd Problems:

3.6: 11, 13, 39, 45, 51, 55, 75, 79, 87, 101, 109

3.7: 5, 15, 37, 39, 43

Even Problems:

3.6: 28, 38, 58, 80, 90cef, 92

3.7: 12, 16, 32, 40ab

Oct 10th - Oct 16th: 3.7, 3.8, 3.9

Implicit differentiation, Derivatives of inverses

Odd Problems:

3.7: 25, 29, 41ab, 47

3.8: 5, 21, 27, 33, 51, 59, 63, 93, 95

3.9: 5, 15, 21, 33, 47, 49, 59

Even Problems:

3.7: 24, 30

3.8: 22, 28, 30, 46, 94

3.9: 32, 40, 46

Oct 17th - Oct 23rd: 3.10, 4.1

Related Rates, Extreme Values

Odd Problems:

3.10: 11, 15, 23, 25, 29, 37, 43, 47

4.1: 5, 17, 23, 35, 41, 51, 59, 75, 77

Even Problems:

3.10: 22abc, 28, 32, 36, 40

4.1: 30, 50, 62, 70, 76

Oct 24th - Oct 30th: 4.2, 4.3, 4.4

Mean Value Theorem, Shape of a curve

Odd Problems:

4.2: 3, 7, 19, 21, 63

4.3: 7, 13, 17, 25, 39, 41, 49, 61, 63, 71

4.4: 1, 13, 17, 27

Even Problems:

4.2: 8, 56

4.3: 14, 38, 46, 66, 78

4.4: 4, 8, 18

Oct 31st - Nov 6th: 4.4, 4.5
(Exam 2, no quiz)
L'Hôpital's Rule, Curve sketching

Odd Problems:
4.4: 25, 33, 53, 85, 87, 93, 111, 113
4.5: 3, 15, 33, 45, 51, 57, 65

Even Problems:
4.4: 28, 34, 58, 94, 120
4.5: 16, 20, 48, 58, 64

Nov 7th - Nov 13th: 4.6, 4.8

Optimization, Antiderivatives

Odd Problems:
4.6: 7, 11, 29, 33, 39, 57, 63
4.8: 5, 27, 39, 41, 55, 83, 91, 95, 111, 127

Even Problems:
4.6: 6, 12, 20a, 24, 70
4.8: 10, 38, 42, 62, 102

Nov 14th - Nov 20th: 5.1, 5.2, 5.3

Intro to integrals

Odd Problems:
5.1: 3, 17, 19
5.2: 5, 17, 23, 27, 45
5.3: 9, 19, 27, 29, 45, 49, 61, 75, 81

Even Problems:
5.1: 2, 12, 16
5.2: 28, 32abc, 46
5.3: 12, 22, 40, 58

Nov 21st - Nov 27th: 5.4, 5.5
(Exam 3, no quiz)
(Break Nov 24th - Nov 28th)
Fundamental Theorem of Calculus, substitution

Odd Problems:
5.4: 5, 7, 21, 23, 31, 41, 47ab, 61, 73, 75
5.5: 5, 17, 21, 25, 43, 51, 65, 73

Even Problems:
5.4: 18, 24, 44ab, 50, 64
5.5: 20, 24, 52, 60, 78

Nov 28th - Dec 4th: 5.6, 6.1
(Final Exam, Dec 15th)
Applications of Integrals

Odd Problems:
5.6: 7, 15, 19, 25, 31, 51, 57
6.1: 17, 19, 23, 27, 31, 37, 53bc, 59ab