

Details about Grading

This document provides details about grading omitted from the main syllabus (consult the main syllabus for the overall grading scheme) and provides a “Frequently Asked Questions” section.

C- Guarantee

See main syllabus. The 10th percentile of exam scores is determined as follows:

- Students with an academic dishonesty case on the midterm or final and students that miss the regularly scheduled final exam are excluded.
- The midterm and final exam scores are added before computing the 10th percentile. This includes the imputed score for students that missed the midterm for a valid reason.
- The 10th percentile is computed by the PERCENTILE.INC function in Microsoft Excel.

Lecture Attendance

Attendance will be checked during 11 or more lectures. Checks may occur at any time during class, and each lecture is worth 2 points.¹ Your lowest 3 scores (4 if there are at least 14 lectures with quizzes) are dropped, so you can miss at least 3 lectures without affecting your grade. Your lecture attendance score is your percentage score (excluding dropped scores) times the number of points allocated to attendance this semester.

Problem Sets

Problem sets are graded for completeness only, each out of 4:

4	FULLY complete	3.5	ALMOST FULLY complete
3	MUCH MORE THAN HALF complete	2	ABOUT HALF complete (or a bit more)
1	LESS THAN HALF complete	0	NOT HANDED IN, or (ALMOST) ENTIRELY INCOMPLETE

There may be a 1-point penalty if pages are incorrectly oriented (*e.g.* rotated or upside down).

A question is considered answered if your solution shows that you made a good faith effort.

Explain what you're doing. Just writing the answer and/or gibberish doesn't count!

Problem set points are capped at 32, so you can lose up to 4 points without affecting your grade. This is more flexible than just dropping your lowest score, so your true problem set average may be higher than Canvas shows if your lowest score is not zero. NO additional exemptions can be granted UNLESS two or more problem sets were missed for valid reasons.

Essay

You will receive two scores, each out of 10, on your essay: a *content score* and a *language score*. By rewriting the essay, you can improve your scores up to the limits in the table below:

In-class scores	Max. final content score	Max. final language score
$C \geq 6$ and $L > 7$	$C + L - 7$ (up to 10)	10
$C \geq 6$ and $L \leq 7$	C (no improvement possible)	10
$C < 6$	C (no improvement possible)	10, but language score will still be capped at content score if latter remains below 6

See the writing exercise document for grading rubrics.

¹ If attendance is taken multiple times during a class, you will get 2/2 only if you successfully complete the attendance check all times, and 0/2 otherwise. Arrive on time and don't leave class early!

Exam (Midterm and Final) Question Types

You will encounter two types of questions on exams:

- *Regular* questions are similar to exercises from problem sets or lectures, apply major course ideas in a straightforward way and/or ask for explanations/definitions from class. **New since Spring 2023: $\geq 50\%$ of regular points are assigned to questions taken from problem sets, lectures (slides or quizzes) or basic/regular questions from designated exams given after 2017 (you will be told which ones to study), with numbers/variables/functions possibly changed.**
- *Challenge* questions are typically made from scratch, so they can be very different from exercises that you have seen. As a result, they can be difficult, and even top students miss a significant fraction of them. They give you a chance to show (and be rewarded for) particularly deep understanding of the material and/or outstanding problem-solving skills.

You may have heard about final exam averages being as low as 15% many years ago. **Such low averages are a thing of the past** due to challenge questions now being outside the denominator (and a smaller part of final exams) and to the bolded policy above.

To prepare for exams, practice using **past exams** (especially from recent semesters), available on Canvas, and review BOTH problem sets and **arguments presented in class**: while problem sets give you practice using results from class, exams can also ask where those results come from.

Bonus

For students earning more than 108 points on exams, the excess is converted to a bonus equal to the greater of: (i) the said excess, up to the number of attendance and problem set points missed, or (ii) half of the said excess, up to 5 points. That is, the bonus is $\max\{\min\{A-108, 48-P\}, \min\{0.5*(A-108), 5\}\}$, where A is the total exam score and P is the sum of the attendance and problem set scores (after applying the caps, *i.e.*, out of 48).

Explanation of Grading Scheme

Earning full credit on attendance and problem sets is very important: those components will pull student scores up significantly, so your rank (and thus letter grade) can fall by a lot if you lose many attendance or problem set points. To reiterate a warning from the main syllabus: **missing class or a problem set without a valid reason is at your own risk**, especially early during the semester, as you may find later on that you need them to deal with emergencies.

The C- guarantee ensures that if all students earn full marks on problem sets and attendance and 14/20 on the essay (vast majority of students get more if they do the rewrite), **then only ~10% of students** (with a valid total exam score) **or less will fail to achieve a C-, at the low end of the departmental guideline of 10-20%**. Also, I may be more generous and set the C- threshold lower than the guarantee if I feel that the performance on exams is strong.

For most students, challenge questions can be viewed as bonus questions: you do not need those points to get a good letter grade. That said, there is sometimes fairly easy partial credit on challenge questions, and you never know if you might personally find a challenge question straightforward. Therefore, while you could ignore challenge questions completely, you may want to at least read those questions.

On the other hand, students aiming for an A-range grade (especially A+) are expected to successfully answer some (but certainly not all) challenge questions. While it is possible to get an A+ by scoring 100% (or somewhat less, depending on exam difficulty) on regular questions and everything else, challenge points create some precious room for error. Note, though, that while exceptionally high exam achievement can make up for many lost problem set points, it cannot fully make up for a poor essay due to the cap in the bonus formula. Thus, even math geniuses need to write a fairly good essay to ensure a grade of 100%.

Frequently Asked Questions

I missed a course requirement. How can I avoid getting a “zero,” and how would my grade be calculated instead?

Please see the course policy on missing requirements.

The exams are difficult, and the average is low. Will this hurt my grade?

On average, **no**. Percentage scores for exams have no intrinsic meaning (unlike in departments or universities with a fixed scale). As stated on the syllabus, thresholds for letter grades are set so that the grade distribution follows departmental guidelines (or at least departs from them only under unusual circumstances), which are posted on the department’s website. The effect of difficult exams on an individual student is hard to predict. If difficult exams hurt your score less than most other students’, you actually *benefit* from them.

OK, so why do I hear that this course is bad for my GPA?

The origin of this common misconception is unclear, but here are a few potential explanations:

- The D range used in this course is narrow because the D/F distinction does not matter for the vast majority of students in this course. Giving more F’s and fewer D’s can reduce the average grade that appears on the transcript. This helps all passing students by making their grade look better in comparison, but may create the false impression that the course deviates from department guidelines, which do not distinguish between D’s and F’s.
- Students upset about a low letter grade complain and falsely attribute it to low numerical scores overall (as opposed to their own score being low relative to the class), while students that got a decent letter grade despite a low numerical score are less vocal.
- Because this course emphasizes understanding as opposed to rote learning, a small number of students that rely heavily on memorization may do much worse than usual in this course and voice their discontent, while most students don’t say much since their grade in this course is not unusual.
- Mistaken inference from the material/exams being difficult and/or the instructor being strict about course policies

I didn’t do well on the midterm or the essay. Can I pass this course by doing well on the final?

Yes, if you came to class* and did the problem sets. There are 68 regular points available on the final exam, so if you have near full marks on attendance* and problem sets, you can still get a decent grade. If, however, you lost many attendance* and problem set points, then scoring even 100% on the final’s regular questions may or may not suffice, and it is unlikely that a disengaged student would earn a significant number of challenge points.

*in semesters where this is required

What do I need on the final to get a grade of ___?

Because thresholds depend on exam difficulty, it is difficult to predict precisely what final exam score is needed. Provisional grade ranges will be provided before the final exam, so you can estimate what you need relative to the class (if its performance, adjusted for test difficulty, is similar on the final as on the midterm) by looking at how much pre-final total is above or below the threshold for your desired grade.

Why are you so stingy with partial credit on exams?

This is a fairness issue. Suppose the question asks you to prove the Pythagoras theorem. (Don't worry – this is just an example.) Would it be fair to give partial credit to a student that doesn't prove the theorem, but instead talks about why it makes sense (*e.g.* “ c depends positively on a and b ” or “if a becomes very big relative to b , then c is close to a ”)? You might think that the TA/professor would be mean to give zero to a student that demonstrates such related knowledge. However, you need to think about the student that has the same knowledge, but leaves the question blank because they realize that it doesn't answer the question. It would be unfair to put the latter student at a disadvantage by giving partial credit to the former student. This is why partial credit is reserved for solutions that contain steps or observations that are *directly* useful for answering the question (for example, the first few steps of a valid proof or stating the theorem if the question didn't do so), and not given for demonstrating related knowledge that does not directly help with answering the question.