

PMA TA Manual

Mathematics

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This manual is for all Mathematics TAs in the PMA Division at Caltech, especially those teaching for the first time. Its aim is to clarify expectations, offer concrete advice from experienced TAs and instructors, and direct you to the right people and offices when questions or issues arise. The document is organized by task and by stage of the term: Section 2 gives checklists for before and during the course; Sections 3 to 6 detail core TA duties; Section 8 is a guideline for using AI as TAs. The final section describe how to support students and where to find resources for your own teaching. You are not expected to read everything at once, but you are encouraged to skim the checklists and the sections most relevant to your current course and return to others as needed.

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1 Introduction and responsibilities

Welcome to the mathematics department! In this document, you will learn about your responsibilities and expectations as a TA. Your teaching role is called “Teaching Assistant”, or TA for short. This will be you! This document aims to provide guidance and recommendations for how you can carry out each task in your role as a TA.

1.1 Teaching in the mathematics department

Teaching in the math department is (with very few exceptions) a requirement. Generally, you will teach undergraduate courses in your first few years. Later in your degree, depending on scheduling and whether or not there is a professor who requests you as their TA, you may have the opportunity to teach graduate courses.

Each class has an identifier of the form Maxxxy, where xxx is a number and y is a letter indicating the term during which the class is offered (a for Fall, b for Winter, and c for Spring). You can find a list of classes in the official course catalogue: <https://www.catalog.caltech.edu/current/>.

Core classes. Core classes are courses that every incoming undergraduate student needs to complete, regardless of their major.

In mathematics, the core classes are:

- Ma1a – Calculus, intended as an introduction to proof-based calculus.
- Ma1b – Linear algebra (practical track or analytical track).
- Ma1c – Multivariable calculus (practical track or analytical track).

Ma1b and Ma1c have two tracks, taught by different instructors. The analytical track is intended for students majoring in math or a related field; it goes into more detail and is more abstract than the practical track. While Ma1a does not have tracks, there is a section taught by a different instructor for students who have less background when they enter Caltech.

Other classes that are required for many undergraduates include Ma2b – Differential Equations, and Ma3b – Introduction to Probability and Statistics. Ma1, Ma2 and Ma3 typically have a Head TA, whose role is to coordinate a team of TAs. The Head TA should be your main point of contact, and you should check in with them regularly. The typical duties and responsibilities are otherwise the same as for other undergraduate courses.

Undergraduate courses. Undergraduate classes have a course number under 100, *e.g.* Ma1, Ma2, etc. Some undergraduates also take advanced classes, which have numbers above 100.

In *undergraduate courses*:

- there is a group of TAs teaching (first-year classes can even have up to 10 TAs!),
- typical minimal TA job expectations include:
 - recitations (see section 3),
 - office hours (see section 4),
 - grading (see section 5),
 - answering student questions via email or online message boards (see section 6);
- typical additional tasks are (see section 6):
 - writing solution keys to problem sets and/or exams,
 - holding review sessions before the midterm and final weeks;
- the instructor may ask you to do other relevant tasks.

Graduate courses. Graduate courses have a number above 100 and are typically taken by undergraduates majoring in math or a related field, and by graduate students.

In *graduate courses*:

- there is generally only one TA,
- there may or may not be a recitation,
- typical minimal TA job expectations include:
 - office hours (see section 4),
 - grading (see section 5),
 - responding to student questions (see section 6),
- solution keys are sometimes not provided, and students are encouraged to come to office hours to ask for clarifications.

1.2 Responsibilities

- It is important to understand that this is a job. Unlike a course, you cannot simply “fail” or do poorly without consequences.
- TAing is part of the official Caltech requirements for math graduate students.
- The instructor makes the rules and sets expectations, so be aware of what the instructor expects – this may vary between courses.
- In general, when responding to students (particularly to questions about administrative aspects of your course), please consult with the instructor or Head TA of the course first.
- All TAs in a course are employed as a group to complete all tasks. DO NOT expect to necessarily do an exact fraction of the tasks – you may be asked to help cover for another TA who is struggling.

1.3 Class policies

You and your students are expected to follow the Caltech Honor Code: “No member of the Caltech community shall take unfair advantage of any other member of the Caltech community.”

More specifically, each class should have a clearly stated class policy in its syllabus. It includes guidelines related to homework submission deadlines, grading policies, collaboration policies, and more. As a TA, you are expected to respect those policies in conformity with the Honor Code.

1.4 Other notes

- You are paid for 20 hours of teaching work a week, which is a lot more than students typically expect.
- If you have concerns about your students, fellow TAs, your instructor, or your working conditions, please speak to the TA Fellow or to members of the PMA Student Programs Team. They are currently:
 - [Nam Ung](#), PMA Director of Student Programs,
 - [Belen Maria Hernandez](#), PMA Undergraduate Affairs & Course Coordinator,

- [Mika Walton](#), PMA Graduate Affairs Coordinator,
- PMA Student Programs Office website: <https://pma.caltech.edu/resources-programs/studentprograms>.
- Remember that you may inadvertently inspire students in their future study or career choices, so be aware that you are a potential role model.
- Teaching is never a solved problem – continue trying to improve every year. Your students will really appreciate this, as will your instructor.
- Teaching experience is valuable (and often necessary) for your future career:
 - for academia: essential, as you will need to submit teaching statements.
 - for industry: teaching skills are transferable – management, collaboration, mentorship, communication, etc.

2 Checklists for teaching a course

2.1 Before/beginning of the course

In general, at the beginning of the course (a week or two before it begins) your instructor or Head TA will contact all the TAs and organize a meeting to discuss their expectations for the course. Tasks for you to do:

- Find a copy (electronic or hard copy) of the textbook – often the department will have one for you.
- Read the syllabus and refamiliarize yourself with the topics that you will be teaching.
- Double-check when your recitation time is and think of a good time for your office hours (you will have some leeway to choose this).

2.2 Each week during your course

Throughout the course, you are expected to stay aware of what is taught in lectures. Attending the lectures is an option, although not mandatory. Before your recitation and office hours:

- read the relevant parts of the textbook or lecture notes,

- familiarize yourself with the problem set or exam (you may want to take some notes for office hours),
- prepare notes (for yourself) for your recitation,
- complete any expectations set by the Head TA or instructor – this may include grading, preparing solutions for the problem set, or preparing recitation notes for the TA group.

2.3 Head TA specific guidelines

In the math department, the following courses typically have a Head TA: the Ma1 sequence, Ma2, Ma3.

- As a Head TA, your role is to coordinate a team of TAs and to distribute tasks within a given class.
- You will be responsible for communication between the other TAs and the instructor/professor. This often means sending administrative emails and organizing TA group meetings. It is recommended that you meet with your TAs at least once every two weeks, including once before the term starts.
- You will often be the first point of contact for students (before the instructor/professor).
- You are expected to handle most of the administrative details of the course, including setting up grading spreadsheets, updating the course webpage if required by the instructor, and setting up the Gradescope assignments if needed.
- You are expected to schedule review sessions before midterms and final exams. While you do not need to lead those sessions yourself, you need to make sure they happen.
- You are responsible for dealing with conflicts within the course (between any combination of TAs, students, and/or instructor). If things get too complicated, however, you should pass the issue to the TA Fellow (who may in turn refer it higher up the administrative structure).
- You will attend Head TA meetings with the TA Fellow (a casual atmosphere to discuss with your peers how your course is going and to get advice on any aspect).

3 Recitations

3.1 Introduction

You are expected to prepare and run your recitations yourself. Often you will have some guidance from the instructor or Head TA, but just as often you will need to decide what to include based on what was covered in lectures or the content of the problem sets. There is no single “correct” style for recitations, and it is beneficial for students to experience different styles. A strong recommendation is that recitations should be somewhere between a formal lecture and a casual discussion. You should be comfortable leading a lecture-style explanation of concepts, but just as comfortable taking questions from students and focusing on topics that students are struggling with. You should aim to have enough time each week to explain course content in more detail than in lectures, solve problems, and take questions from students.

3.2 Recommended structure

While the structure is up to you, here is an example that is generally very successful and appreciated by students:

1. Opening comments (3 minutes):
 - feedback from previous problem sets,
 - recommendations from the instructor,
 - other important comments about previous weeks’ work.
2. Beginning of recitation (3 minutes):
 - reminder of the main topics from the previous week,
 - clear statement of the main topics of the current week.
3. Body of the recitation (45 minutes). Three topics, 15 minutes each, preferably as follows:
 - state relevant theory,
 - explain how to use the theory in a problem,
 - work through a problem.
4. End of recitation (5–10 minutes):

- point students to relevant theory for other topics,
- take questions.

As you get more comfortable, feel free to deviate from this structure, but many experienced TAs never do.

3.3 Advice for things to do

- Be enthusiastic. This is often cited as a major factor in students becoming interested in mathematics and in the course.
- Be encouraging. Students are often timid, uncomfortable, or unsure in their own ability; encouragement is important in these cases.
- Be flexible. Particularly if students are struggling with certain topics more than others, it may be helpful to spend more time on those topics.
- Speak clearly and slowly, and try to engage with the students rather than just staring at the board the whole time.
- Do not be afraid to simplify, especially in a practical class. For example, for concepts like open, closed, compact, or boundary, you can draw a bunch of sets and explain intuitively why one is closed, one is open, etc. Then draw more sets and ask the students to tell you if they are open, closed, etc. For the last few years, students have identified all the sets correctly. Not all math has to be written in Greek. English and pictures work too.

3.4 Advice for things to avoid

- DO NOT SCARE YOUR STUDENTS. Try to relate every new concept to one they already understand clearly, so that instead of feeling intimidated they feel more comfortable.

For example, almost everyone is comfortable writing the equation for a line as $y = mx + b$; they love this. When you explain the equation for a plane, emphasize how similar it is to the line. The normal vector is just like the slope m , and the constant is just like the intercept b .

Another example: when you explain Stokes' theorem, emphasize how similar it is to the regular Fundamental Theorem of Calculus. On one side of the equality is information on the boundary; on the other side is information in the interior; you move from one side to the other by applying a derivative-type operator.

This is MUCH better than telling your students how this relates to differential forms and vector bundles and all the cool math in your research. You will likely just scare them away. Leave these conversations for when your students ask you directly about your work and are clearly excited to hear about it.

- **DO NOT BE ANTAGONISTIC.** Assume students are being genuine if they are complaining about something, or if they say that they do not understand. It is NOT a judgment on your teaching or grading abilities. In cases like this, try to explain the concepts in a different way or explain in more detail why you graded the way you did.
- **DO NOT BE CONDESCENDING** to students – they are still learning and will often get things wrong.
- **DO NOT ASSUME ANYTHING ABOUT YOUR STUDENTS.** This includes how good they are, or their motivations. Students doing poorly on problem sets are not doing so to spite you!

4 Office hours

4.1 Overview

Generalities. Every TA will hold at least one office hour every week. This is a time for answering questions that students may have. These questions could be about the lectures, the problems from the current problem set, questions from previous problem sets, or clarifications about grading. Any question related to the course is possible. However, most questions will be about the current problem set, and you should have a precise idea of the various ways to solve the problems *before* your office hour.

Practical things. While you have some freedom in scheduling your office hours, some times should be avoided, such as the dinner and athletics block (6pm–8pm). Attendance at your office hours will be higher if you schedule them close to the problem set deadline for the class, as most Caltech undergraduates start their sets only a few days before they are due.

Make sure you communicate clearly to your students when and where your office hours are. Include this information in the syllabus and on Canvas. You might need to book a room for your office hours if attendance is high. If you have a Head TA, they might do this for you, but otherwise you should ask **Belen** to do it for you.

Structure of office hours. The style of office hours is usually quite casual and is driven by student questions, not by prepared material. It is strongly discouraged to teach in a lecture style, although if a student requests an explanation of a topic, you can take a few minutes to explain it in that format. Since the majority of questions will be about problems from problem sets, the most difficult thing is managing student expectations. It is unfair to other students to give solutions away, and doing so is a violation of the Caltech Honor Code. Students can be very insistent, but you should stay firm.

How to effectively help students? A good approach is to first insist that each student show you what they have already tried. If the course policy allows it, encourage students to discuss with each other. It has been demonstrated that discussing with their peers is a very effective way for students to consolidate new concepts. Often, students gain insight into a problem simply by talking about it out loud. Additionally, a student who is just there to get the solution will be quickly revealed if they have nothing to show. Of course, you should give them the benefit of the doubt in case they are genuinely struggling with the problem-solving aspect of the course. In such a case, encourage the student to try the problem again, explain relevant concepts, give them feedback on their attempts, and perhaps explain what kind of problem it is.

Usually, problems will be one of the following types: easy – where you just apply a definition or theorem; medium – where you may need to combine a few definitions/theorems; and hard – where solving the problem may involve a creative trick in addition to what is expected from a medium problem.

4.2 To summarize

- Style: casual problem-solving session.
- Do not: give away solutions.
- Do: explain, help, go through student solutions, motivate, etc.
- Insist that students present what they have tried before giving hints.
- Problems will tend to be one of three types:
 - Easy: apply a definition or theorem.
 - Medium: combine a few definitions/theorems.
 - Hard: may involve a trick/creativity.

5 Grading

5.1 Overview

Grading deadlines. Grading is the most time-consuming of your tasks and is often described as boring. However, it is important not to take this task lightly or to be careless. In particular, this is the task most directly related to students' grades, and hence, to them, the most important.

Make sure that you allow yourself enough time to grade within the timeframe that has been set for the course. Generally, it is good to release graded homework about a week after the submission deadline. The feedback you provide is a key component of students' learning and will help them improve. The exact deadlines for grading are set by the Head TA or the instructor. It is your responsibility to know when your grading should be finished and to meet those grading deadlines.

There are two hard deadlines each term regarding grading:

- The midterm grade report deadline, which is usually a few days before Drop Day. This allows students who are at risk of failing a class to drop it, and is an effective way for the instructor to gauge how the class is going.
- The final grade report deadline, which is usually in the last week of the term. This is when the final grades are transmitted to the Registrar's Office.

For each of those deadlines, the grades are reported on REGIS. You should ask your instructor or Head TA whether they expect you to input those grades or if they will do it themselves. Usually, some combining and rescaling of the various grades (problem sets, exams) is required to compute the midterm or final grade. Hence, you should give yourself (or the instructor / Head TA) extra time between finishing your grading and the grade report deadlines.

Consistency is key. In order to be fair to all students, if you are grading a particular problem set you will be assigned one (or more) problems, and you will grade all students on those problems. Usually you will be the only grader for these problems. Therefore, it is important to be consistent when you grade.

The best way to ensure consistency is to create a rubric for each problem. This is usually done alongside writing solutions for the problems you are grading. This will be entirely your responsibility; instructors rarely include any guidance other than providing the total number of points available for each problem.

Expectations are course dependent. When writing rubrics, be aware of the expectations in the course – an analytical course may have higher standards for proof rigour, while a practical course may require just a brief justification or explanation. Ask your instructor, consult the syllabus, and confirm with your fellow TAs what the expectations are. I do not say this lightly – inconsistency here is what most student complaints are about. Your Head TA has hopefully discussed this with all the graders in the course to ensure consistency.

Grading is entirely course-specific. Graduate courses care less about students explaining fundamental concepts and focus more on the correctness of proof steps and on ensuring that students fundamentally understand what is required of them. Undergraduate courses (especially freshman/sophomore courses) generally require students to include more details and to cite all definitions/theorems they use. In return, I recommend including marks for attempting a solution, having a correct approach, and providing logically valid proof steps.

Individualized feedback. Last but not least, you should provide feedback (generally, short comments). If the solution is correct, simple check marks may suffice, but if there are mistakes, a brief indication of why it is wrong and what to do instead is recommended. Be succinct and encouraging; DO NOT use condescending or insulting language. In particular, avoid words like “trivial”, “easy”, “obvious”, “bad”, “ridiculous”, “ugh”, etc.

Regrade requests. Most classes allow for regrades. This allows students to ask for clarifications once they receive their graded homework back. Make sure to process those as they come, and avoid lengthy back-and-forth email exchanges with students. If necessary, you can always set up a meeting with the student to discuss their solutions in more detail. The regrade policy should be clearly stated in the syllabus, and it typically addresses how many regrades students are entitled to in the class, and within what timeframe they can be submitted.

5.2 Gradescope

Most grading is done online using Gradescope (<https://www.gradescope.com/>). If you do not have a Head TA, you might be in charge of linking Gradescope to the Canvas webpage of the course and creating the assignments. Make sure you set a submission deadline, and decide how late submissions will be handled. If you have any questions regarding Gradescope, feel free to ask the TA Fellow or the CTLO.

Features that make Gradescope especially useful include the ability to create rubrics that can be applied using keyboard shortcuts, detailed statistics about grades, the ability to handle regrade requests, and much more.

5.3 To summarize

- Grade within the timeframe agreed upon with your Head TA or instructor.
- You write your own rubrics – these can be very course-specific.
- Graduate courses can be more focused on correctness.
- Freshman/sophomore courses:
 - include marks for attempts,
 - include marks for a correct approach,
 - include marks for good logical steps and explanations of steps.
- Always include personalized feedback.

6 Other possible tasks

Every course is different, and you may be asked to perform tasks other than those mentioned here. The following is a brief summary of other possible responsibilities to keep in mind.

6.1 Responding to student questions

- Responding to student questions can occur in a variety of settings:
 - during recitations,
 - during office hours,
 - via email,
 - via online message boards, such as Piazza or Canvas.
- The guidance here is very similar to what was written about office hours (see [section 4](#)), but in short:
 - be respectful,

- do not give away solutions,
 - be encouraging,
 - feel free to give hints where appropriate,
 - if the questions are administrative, you may need to refer the student to the Head TA or instructor.
- Please keep correspondence course-content related. If personal problems are brought up or discussed, please follow the guidance of section 7.

6.2 Online duties

Certain duties are always online and reasonably self-explanatory. These include answering questions via email or message boards, recording grades on shared spreadsheets, and posting solutions on the course website. In unusual circumstances, the course may be moved online. In such a situation, you may be required to conduct recitations, office hours, and grading entirely online. In such a situation:

- You would teach using the Zoom software provided by Caltech.
- Generally this is paired with some sort of whiteboard software like miro.com, OneNote, or even the Zoom whiteboard. Tablets are ideal for this and can be borrowed from the library if needed.
- Some TAs prefer to prepare slides, but this is often a lot more work, and you will likely still be solving problems in real time, so the previous point is likely still relevant.
- Stay vigilant in case students are trying to ask questions via chat or by raising their virtual hand.
- Grading would be done exclusively with software such as Gradescope or Canvas (see section 5). It is important to grade just as thoroughly as if it were physical homework, and to always provide ample feedback.

7 Student support

7.1 Your role as a TA

Higher education, and Caltech in particular, can be a very stressful environment for students at all levels. Statistically, close to 50% of Caltech students use mental health

services at some point during their time here. Your students may be struggling, and it is important to know what you can do to help.

What you can do as a TA. It is important to remember that you are not a therapist or a doctor, so it is strongly encouraged that, when appropriate, you refer students to professional support. Equally, it is strongly discouraged that you should try to solve problems that are not strictly mathematical in nature. It may be very difficult to notice when a student is struggling. Signs of struggling often include the following behaviours:

- a marked drop in grades/participation – especially if it puts them at risk of failing,
- not submitting problem sets with no explanation,
- regularly late problem sets (even if the excuses seem reasonable on their own).

Of course, if you learn of any struggles via other means, be mindful that they may need help. However you come to suspect that a student may need support, please be encouraging and accommodating and let them know that you are concerned and that they may want to consider getting extra help. In such cases, you should feel comfortable granting short extensions, but such accommodations are only temporary.

One last piece of advice before we look at the resources available to you:

- DO NOT ASSUME students are trying to take advantage of the system: mental health issues are often invisible and present differently in different people.
- BE RESPECTFUL and understanding.
- Caltech is small, and so we expect TAs to follow up with students rather than just let them fail – this is very different from most universities.

7.2 Student resources

There are many resources available for students at Caltech; as a TA you can direct students toward these or report specific concerns to them. These include the PMA Student Programs Office, the CTLO, the Caltech Accessibility Services for Students (CASS), the Title IX Office, the Undergraduate Dean's Office, and the Caltech Health and Counseling Center. The details are below.

- PMA Student Programs Office (<https://pma.caltech.edu/resources-programs/studentprograms>):
 - Nam Ung, PMA Director of Student Programs,
 - Belen Maria Hernandez, PMA Undergraduate Affairs & Course Coordinator,
 - Mika Walton, PMA Graduate Affairs Coordinator.
- Center for Teaching, Learning and Outreach (CTLO):
 - The CTLO supports Caltech’s multifaceted educational efforts, including undergraduate and graduate courses and curricula, formal and informal learning, and partnerships with PreK–12 teachers and students.
 - Specifically for graduate TAs, the CTLO has a large library of resources on teaching and teaching-adjacent skills, as well as experts who are always available for consultation and who also run a wide variety of workshops throughout the year. A more comprehensive list of the available help provided by the CTLO can be found on the CTLO website.
 - Website: <https://ctlo.caltech.edu/>.
- Caltech Accessibility Services for Students (CASS):
 - will contact TAs and instructors at the beginning of the term with guidelines for specific students (e.g. regarding course policy),
 - it is less common for TAs to directly reach out to CASS, but they can be a good resource if you have general questions,
 - website: <https://cass.caltech.edu/>.
- Title IX Office:
 - Handles sexual misconduct, harassment, and discrimination cases.
 - As a TA, you are required by law to report such situations to the Title IX Office.
 - Contact: equity@caltech.edu.
- CARE referral: if a student is really struggling, you can submit a CARE referral (either anonymously or not) at <https://caltechcares.caltech.edu/care-referrals>. This alerts the Undergraduate Dean’s Office, and professional support staff will check in with the student. They will then have access

to resources available through the Caltech Health and Counseling Center and the Undergraduate Dean's Office, such as:

- Caltech Health and Counseling Center: therapists, occupational therapists.
- Undergraduate Dean's Office:
 - * the Dean can approve extensions at the highest level,
 - * the Dean can approve exam extensions,
 - * the Dean can approve various forms of incomplete grades (allowing a student to take more time or retake the class later),
 - * the Dean's Office runs a tutoring program that can provide additional course help.

8 AI for TAs

AI tools are becoming part of teaching, and they can be genuinely useful. They can help you prepare examples, organize a recitation, think of common student mistakes, or explain an idea in a different way. At the same time, they raise real concerns about student privacy, grading fairness, mathematical correctness, and the Honor Code.

The basic principle is this: AI can support your work as a TA, but it does not take responsibility for you. You are still responsible for protecting student information, checking the mathematics, grading fairly, and following the instructor's course policy.

Caltech's AI policies may change as the technology changes. TAs should use AI consistently with Caltech's principles of disclosure, data protection, content responsibility, and the Honor Code. Useful starting points are:

- <https://www.imss.caltech.edu/services/ai>
- https://ctlo.caltech.edu/documents/31921/Teaching_with_AI.pdf

If you are unsure whether a use of AI is appropriate, ask the instructor or Head TA before using it. This is especially important if you want to use AI with course problem sets, official solutions, rubrics, grading-related work, or during recitation or office hours.

The most important rule is simple: do not upload student data to public or commercial AI tools. This includes student submissions, grades, names, emails, private student questions, accommodation information, identifiable office hour/Piazza/Canvas content, or anything covered by FERPA or other privacy obligations. If Caltech later

provides an approved enterprise or “walled-garden” AI tool for some of these uses, the instructor or department would give separate guidance.

8.1 AI for preparation

Using AI for preparation is often reasonable. You can think of it as a brainstorming tool or a search engine. It may help you:

- plan the structure of a recitation,
- generate examples or similar practice problems,
- suggest active learning activities,
- identify likely student confusions,
- find another way to explain the motivation or big picture,
- rewrite your own notes more clearly.

However, AI-generated mathematics must always be checked. AI can give confident but incorrect solutions, skip assumptions, misuse notation, or suggest examples that are not appropriate for the level of the course. Before using anything in front of students, check it yourself.

Be careful with course materials. If you want to upload problem set questions, official solutions, exam materials, lecture notes, or unpublished instructor notes to an AI tool, ask the instructor or Head TA first.

8.2 AI for grading

AI should not be used to grade student work or make grading decisions. Do not upload actual student submissions, grade spreadsheets, student-specific feedback, or identifiable records to public or commercial AI tools.

With the instructor’s approval, AI may be useful before grading begins. For example, it may help brainstorm the structure of a rubric, draft generic feedback language, identify common types of mistakes from non-identifiable summaries, or generate similar practice problems. Even then, the final rubric and grading standards should be reviewed by the instructor or Head TA.

A useful distinction is:

- It may be okay to use AI to help think about a general rubric.

- It is not okay to upload student work and ask AI to assign scores.
- It is not okay to ask AI to write individualized feedback from student submissions.

If you are not sure whether a grading-related use is allowed, do not do it until you have asked.

8.3 AI during recitation and office hours

AI should not be a substitute for preparation.

Before recitation or office hours, you should review the relevant lecture material, problem set, solutions, and course policy. Most student questions will be about the course or the homework, and students can reasonably expect the TA to have prepared for those questions.

Sometimes a student will ask something unexpected, especially a broader or more exploratory question. If you have prepared and still do not know the answer, it is fine to say so and work through it with the student. In that situation, AI can be used like a search engine or another reference, but it should not be treated as an authority. If AI is used live with students, be transparent that it is being used as an exploratory tool, not as the final answer.

It is expected that you should understand the lecture notes, problem sets and other course materials without the aid of AI.

8.4 Examples

Here are some examples to help draw the line.

Usually OK

“Give me three interesting examples of applications of Markov chains for me to understand this and prepare my recitation.”

“I want to cover the following topics. Suggest a recitation outline for conditional probability and I will decide later.”

“Draft a practice problem similar in style to this public textbook topic and I will review and be responsible for lecturing this question myself.”

Not OK

“Grade this student’s submission.”

“Summarize these students’ common mistakes from their submitted homework.”

“Here is a student’s email/question/accommodation; draft a response.”

In short, AI is a tool that can help you gather information and prepare more efficiently, but you remain responsible for your teaching. Be careful with student and university data.

9 Resources to help you as a TA

If your questions are about course content, please consult your Head TA or instructor. If your questions are about TA expectations, teaching advice, or interpersonal problems, you have many other resources.

9.1 People and offices

Your Head TA or Instructor. You should definitely talk with one of them before the term starts, and understand their expectations throughout the term. You can always ask the TA Fellow if you do not know which classes you are TAing.

TA Fellow. The TA Fellow is a first point of contact among your peers. You can reach out to them for anything related to teaching, and they will be able to point you in the right direction. You can find their contact here: <https://pmatas.caltech.edu/contact-us>. TA Fellows also organize workshops throughout the academic year on various aspects of teaching.

Hearst Postdoctoral Scholar Fellow. A postdoc in the math department who is an expert on teaching.

Student Programs Office. They can help you with matters related to your graduate studies and undergraduate classes. Here are the contacts:

- **Nam Ung**, PMA Director of Student Programs,
- **Belen Maria Hernandez**, PMA Undergraduate Affairs & Course Coordinator,
- **Mika Walton**, PMA Graduate Affairs Coordinator,
- PMA Student Programs Office website: <https://pma.caltech.edu/resources-programs/studentprograms>.

CTLO. The Center for Teaching, Learning and Outreach has many resources that can help you improve your teaching skills. They run workshops throughout the academic year and offer multiple classes on university teaching. By attending these, and fulfilling additional requirements, you may obtain the Certificate of Interest or the Certificate of Practice in University Teaching. Website: <https://ctlo.caltech.edu/>.

CPET. A program piloted by the CTLO, but run by graduate students. They run workshops every term aimed at graduate students. Website: <https://ctlo.caltech.edu/universityteaching/programs/cpet>.

In particular, CPET runs a series of workshops every term to help you succeed as a TA. Each workshop addresses a specific aspect of TAing: recitation planning, holding effective office hours, feedback through grading, etc. These workshops will be advertised by email, both by the CTLO and your TA Fellow – so keep an eye out for them!

9.2 Digital resources

PMA TA Website. <https://pmatlas.caltech.edu/>. This is where you can access many resources specific to TAing in the PMA Division.

TA Archive. This is a Box folder that you are added to by the TA Fellow each term you are TAing. It contains material from previous years, so you do not have to reinvent the wheel.

TA Manual. You are reading it!

CTLO Website. <https://ctlo.caltech.edu/universityteaching/resources>.
You can find many resources there.

Good luck, and have fun TAing!