

## Fair Grading and Effective Feedback

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**Outcomes:** By the end of this session, participants will be able to...

- Communicate expectations to students
- Grade consistently and fairly
- Provide efficient and effective feedback for students

This resource is broken down into the following sections:

1. Communicating Expectations
2. Strategies for Fair Grading
3. Rubric Design
4. Considerations for Effective Feedback
5. Strategies for Efficient Grading and Feedback
6. Handling Complaints about Grades
7. Family Education Rights and Privacy Act (FERPA)
8. The Caltech Honor Code and Grading
9. Additional Contacts and Resources
10. References

- 1. Communicating Expectations:** A key component of fair grading is ensuring that your students understand *what* they are being graded on and *why*. If students understand how an assignment will be graded *before* the assignment is due, they will be able to produce better work and ultimately receive more relevant feedback—for instance, if a student does not know how to structure a lab report they turn in, comments from the TA will likely focus heavily on lab report structure, not on content or scientific understanding. Communicating expectations of lab report structure would help this student create a better report initially so feedback could focus on content. Consider the following communication strategies:
  - Communicate expectations between TAs: Before communicating with students, ensure all TAs and the professor agree on how an assignment should be graded, as well as who is grading it and when it should be returned to students. All TAs should know the expectations for how an assignment will be graded so they can give consistent and accurate information to students.
  - Communicate expectations to the students about: what kind and how much work should be shown in an assignment, how the assignment will be graded (ex. for structure, content, partial credit, etc). how much students can collaborate or use external resources, and what policies exist for late work or extensions. Presenting students with rubrics (see section 3) or model answers (see section 5) can be very helpful in communicating on what the students will be graded.

- Describe Assignments with Transparency: Transparent teaching, which is used to better communicate expectations and details of an assignment with students, has been shown to significantly improve student learning and grades (see link in references). To create a transparent assignment, you must express the following things to a student:
  - Purpose of the assignment - what skills should students practice? What knowledge will they gain? *For instance--explain to students how the assignment will benefit them and what skills they will develop by doing the assignment well. This may be particularly important for non-majors in the class who may not see value in understand the content, but who may see value in transferable skills like problem solving skills/report writing/etc.*
  - Task(s) at hand - What are the students actually doing? What steps should be followed? *For instance--if there is a specific format or workflow they should be employing, inform them of what it is or how to do it. This may be particularly important for students who do not have any experience with the type of assignment they are doing. A rubric can be a good tool for clarifying what the student should be focusing on.*
  - Criterion for success - What does excellence look like? *For instance--provide students with examples of "good" work, such as: a detailed answer key for a similar question type, a sample lab report (or journal article) that demonstrates the format you want your students to follow, or a sample presentation to prepare students to give their own presentations.*

2. **Strategies for Fair Grading:** As TAs, our goal when grading is to provide students with a fair assessment of their work. Consider the following tips for achieving this target:

- Be clear with your expectations. Communicate to the students the policies for the course (e.g. late work penalties and collaboration rules) and the expectations for submitted work. Make sure you talk with your professor before the term begins so that you can communicate these expectations accurately.
- Consider providing a version of the grading rubric or an example problem and solution to students to clarify expectations for written work. Use a rubric when grading (see below) and, if possible, publish it or a solution set when the graded assignment is handed back. Some professors may prefer to keep rubrics or detailed solution sets private, especially for lab reports or exams that are the same year after year, so check with them before giving these materials to students.
- Provide consistent answers to all questions about grading for all of your students. Also, ensure equal access to your answers. It may help to set limits such as “no clarification questions 24 hours before an assignment is due” or “no questions after the last office hours/recitation/class” so that everyone has the same information.
- When grading with multiple TAs, be sure to communicate with each other for consistent grading. If the assignment can easily be split up, have each TA grade a single question/section. If this is not possible, have all TAs use the same detailed rubric and grade together in the same place so issues can be discussed with the group as they arise. Although this could result in decreased consistency

in feedback, if the other two options are not feasible, consider splitting the class into marking sections and have each TA grade for each section. However, be sure to rotate sections between TAs evenly so that each student is graded by all TAs equally.

- Try to ensure you spend an equal amount of time grading each student. It's easy to spend a lot more time on the first few assignments. Budget your time and use a stopwatch if necessary.
- If possible, grade problems sets or lab reports one problem or section at a time instead of grading each student's entire assignment before moving onto the next student. This will help to ensure you more accurately and fairly assign points for a given problem.
- Take a break! When you are tired you are more likely to make mistakes.

### 3. Rubric Design Guidelines

Rubrics are scoring tools made by instructors and teaching assistants to standardize the evaluation of students' work. They take time to develop but are useful in speeding up the grading process and allow you to grade more fairly and consistently between students. Publishing the rubric before an assignment is due can assist students in meeting your requirements, but always check with the professor before publishing a detailed rubric. Publishing after the assignment is due can help students understand the grade they received and how to improve it.

When starting to design a rubric, consider which **criteria** you would like to grade. Criteria can include data interpretation in a lab report or teamwork in a group project. When picking criteria think about the course's overall teaching goals and the purpose of the assignment. When grading reports or presentations, it can also be helpful to include both *content* and *style* criteria. If you are unsure of what criteria to choose, you may want to look through a couple students' assignments before designing your rubric. If you are familiar with your students, you might want to choose an assignment from a thorough, average, and non-thorough student to get a better idea of the spread your rubric may have to accommodate.

Next, for each criterion develop a **scale** of student performance. Two common scales are as follows:

- 2-level scales can be used for quick *yes/no* or *absent/present* calls on a minor point. These scales can be less subjective than multi-level scales.
  - ex. *Student included chemical equation: yes/no*  
*Chemical equation is correctly balanced: yes/no*  
*Chemical equation is formatted correctly: yes/no*
- Multi-level scales can be used for grading more complex points within an assignment.
  - ex. *Student eye contact in an oral presentation:*  
*no eye contact, reading directly from slides*  
*minimal eye contact, mostly reading slides*  
*consistent eye contact, some reading slides*  
*eye contact throughout, seldom reading slides*

In general, pick the smallest number of levels that distinguishes between different qualities of student work.

Then, assign **points** to each level. At this time you can decide how much weight each criterion will have. Is data interpretation or teamwork more important?

- o ex. *Student included chemical equation: 1 / 0*
- o ex. *Student eye contact in an oral presentation*
  - 1pt - no eye contact, reading directly from slides*
  - 2pts - minimal eye contact, mostly reading slides*
  - 3pts - consistent eye contact, some reading slides*
  - 4pts - eye contact throughout, seldom reading slides*

Once your rubric is finished give it a **test run** and mock grade a few assignments. Does your rubric differentiate between different qualities of work? Are there additional criteria you would like to add? Can another grader understand your description of the levels? Reassess as needed.

#### 4. Considerations of Effective Feedback

When grading an assignment, it is extremely important to not only evaluate a student's work with a grade or score, but also give feedback to students so that they can improve bad habits and maintain good habits. **Effective feedback** is an important element of grading and a key responsibility of teaching assistants and graders. Effective feedback can be broken down into some of the following considerations.

- *Feedback is understandable and accessible* – in order for students to learn from feedback, they must first understand the feedback and why it was given. To make feedback accessible, be aware of the following potential pitfalls:
  - o *Not enough feedback*: if the only feedback on a lab report is a student's final grade or raw score, there is no way for the student to know what they did wrong or where they can improve. Similarly, feedback that consists *solely* of cryptic marks (such as ~~strikethrough~~, underline, circles, or generic comments like "awkward" or "fix this") can be difficult for students to interpret and fix. Please note that things like strikethrough, etc. can be very useful in grading, but should not be the only feedback given.
  - o *Too much feedback*: Too much feedback can also be an issue for students—a paper covered in corrections and markings can be overwhelming and even long comments can be too unfocused for students to meaningfully interpret.
  - o *Feedback doesn't address the root of the problem*: If the same error occurs repeatedly in a report or assignment, or recurs throughout the quarter despite feedback on past assignments, the student may not understand what they are doing wrong, and therefore may be unable to correct it. Additional comments or encouraging the student to attend office hours may help.
- *Feedback is constructive* – feedback given to students should be useful, intended to improve the student's work, and be generally supportive. A student's self-

efficacy (their belief in their ability to successfully perform a given task) has a strong correlation with motivation, good study habits, and general success. A TA's written and verbal feedback can positively or negatively affect self-efficacy, therefore the following points should be considered in grading.

- o *Include positive feedback in addition to constructive criticism:* In addition to correcting mistakes, it is also important to let students know when they have done something well. Students who receive positive feedback in addition to criticism tend to have better self-esteem and better attitudes towards their coursework. It is ok to include comments like "nice answer" or "great explanation" on an assignment. It can also be nice to write a general comment after grading an assignment, such as "you seem to really understand the material in part A! The material in part B seemed to be more challenging--Please see my comments and come to my office hour if you want to talk about them"
- o *Focus on the action, not the person:* unless there is a greater issue, feedback shouldn't seem too personal or make the student feel incapable of doing good work. For instance, a comment like "you aren't very good at writing" or "you should have learned this in high school" suggests there is some innate defect with the student's ability or knowledge base, as opposed to transient issues that can be fixed with practice and effort. Instead, directed feedback such as "past tense should be used in a lab report" or "this topic is covered in most general biology courses, I recommend this resource" can be more effective.
- *Give feedback can be usefully incorporated* – in addition to the student understanding feedback, they must also be able to incorporate it.
  - o *Timeliness:* feedback should be given in a timely manner so students are able to contextualize the feedback and act upon it. For instance, if a test is returned a month after it is taken, students may have little or no memory of what they did or why they did it. Similarly, if a lab report is returned a day before the next one is due, students might not have time to meaningfully understand and incorporate the feedback from the first report before the second one is turned in.
  - o *Feedback should direct future effort:* student work and writing can have different levels of issues that necessitate different levels of feedback. Surface-level feedback focuses on spelling, grammar, algebraic mistakes, etc. Content-level feedback focuses on content, organization, conceptual understanding, etc. Students often focus on surface-level feedback since it is easier to correct, so it may be useful to direct students' future efforts with additional commentary. You do not want your students to focus solely on correcting surface issues when there are major issues in conceptual understanding.
  - o *Different students may require different feedback:* While it is important to spend a similar amount of time on each student's work, it is ok to give students different feedback. Avoid the temptation to correct/point out every single mistake. While you should still assign points appropriately, you should prioritize your feedback to point out the *N* most important areas of

improvement.  $N$  may differ depending on the assignment and time restrictions, but a number around 5 might be a good starting point. This also helps students direct their efforts towards content issues over surface issues (see above point).

**5. Strategies for Efficient Grading and Feedback.** The biggest hurdle to effective feedback is time. Luckily, effective feedback can be delivered in several efficient ways, some of which are described below:

- **Rubrics** – print out rubrics ahead of time and mark off scores as you grade. You can also include common comments with associated checkboxes to save yourself from writing the same comment on each assignment. Staple the graded rubric directly to the students' assignments. This lets the student know where their grade comes from, what was expected from them, and what was missing.
- **Model Answers** – model answers are examples of responses/work that would earn full points on an assignment. These can be given before an assignment to show students the level of work that is expected, or after an assignment to guide students on what they should do in the future. Model answers are often provided in the form of a thorough answer key.
  - Example 1: Provide the answer key on the right to show students the work needed to get full credit.

**Answer Key:**

$$y = 2$$

**Better Answer Key:**

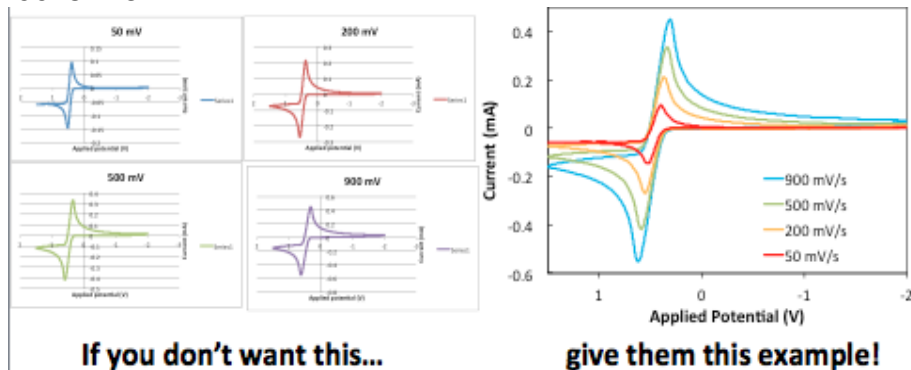
$$4y = 3(3)-1$$

$$4y = 9-1$$

$$4y = 8$$

$$y = 2$$

- Example 2: If you would like to see graphs, writing, etc. organized in a specific way, provide a template or example showing what a “good” work looks like.



- **Shorthand feedback** – you can create a key of symbols that correspond to specific comments or errors (ex. SP=spelling, CN=citation needed, SW=show work, etc) and mark the assignment with the shorthand symbols to save time. When doing this, you should staple a copy of the key to each assignment.
  - Example: reduce the amount of time by writing things like “CN” and “SW” instead of “citation needed” or “show work.” Be sure to make the key to your shorthand easily available.

It is known that acids have a PKA because of the following equation:  

$$HA_{(aq)} + H_2O_{(l)} \leftrightarrow H_3O^+_{(aq)} + A^-_{(aq)}$$
 HA (aq) + H2O(l) <-> H3O+ (aq) + A-(aq)  
 I had an unknown acid and I figured out the PKA of the unknown acid by titrating a base into it. First, I made the sample in water, then I added the base a little bit at a time and measured the pH. More details can be found lab manual. In the end, I actually found out that the base had two PKAs so it must have two protons on it. Was also measured by weighing out the acid and adding it to a

### Comment Key

CN = Citation Needed

SP = Spelling error

SF = Sentence fragment

F = Formatting

V = voice issue

(3<sup>rd</sup> person past passive)

- **Focused Commentary** – in a given assignment, not all comments you make will be of equal importance (e.g. a grammar mistake is less problematic than a fundamental misunderstanding of the science). To help students focus on improving the most important problems, you can leave a short comment on the front of each assignment summarizing what the student did well and what the student should work on the most. If you do this, you can leave fewer comments within the assignment, which can save you time.
  - o Example: leave a short comment on the cover page of a lab report.

John Doe  
Lab Report #2

John -  
Overall, this was a good improvement from report #1! The main things for you to work on are formatting figures and working on voice/tense in writing. It looks like you have a good understanding of the science! Please see me in my office hours if you have questions!

In this lab experiment, I had an unknown acid and I figured out the PKA of the unknown

- **General Commentary** – if you notice many or all students making the same error, you can deliver general feedback to the entire class through email or a short discussion at the beginning/end of recitation or lecture. Summarize the common errors and their solutions. It can also be helpful to relay this information to the course professor, who might be willing to revisit the material.
  - o Example - email the entire class about common errors you saw while grading or expect to see while grading. This can be done before the assignment is due to help guide students OR it can be done after the assignment is due.

Hi everyone!

Here are some general comments to consider on your upcoming report!

When writing a lab report, it is correct to use a 3<sup>rd</sup> person voice:

1<sup>st</sup>: We dissolved 5.00g KMnO<sub>4</sub> in 20.00 mL water and stirred for 2 hours.

2<sup>nd</sup>: Dissolve 5.00g KMnO<sub>4</sub> in 20.00 mL water and stir for 2 hours.

3<sup>rd</sup>: 5.00g KMnO<sub>4</sub> was dissolved in 20.00 mL water and stirred for 2 hours.

- *Provide feedback only when it can be acted upon* – for terminal assignments, such as final exams, there is no need to give comments. You may choose to write a general comment on the assignment (1-2 sentences) in case the student does return the following quarter asking for feedback.

6. **Handling Complaints about Grades.** It is important that TAs address complaints about grades in a fair and transparent manner. These tips will help you address these concerns while maintaining fairness.

- Discuss ahead of time with the professor and other TAs any mechanism for students to earn back points on assignments and exams. Having such an option encourages the students to iterate on their work and confront their mistakes. This is essential for learning the course material.
- Having a clear, detailed rubric is essential for transparency and clarity. With the expectations clearly laid out, a rubric is a useful tool for explaining why a student earned a particular grade.
- Make an effort to ensure consistent and transparent treatment of complaints. Ensure any opportunities to earn back points are clearly communicated and made available to all students where appropriate.

Below are some common complaints you will see and how fair grading techniques (like communication and rubrics) and effective feedback techniques can help you prevent or handle those situations.

1. *How will this be graded?*

You can provide rubrics to clarify the material that will be graded within the assignment (this can be more important for lab reports and presentations, which are generally large assignments with few guidelines) or model answers to clarify how work should be shown (this can be more important for problem sets and exams).

2. *My answer is correct--why didn't I get full points? (they didn't show work)*

It can be useful to show students the rubric you used to grade that question. You can also show the student an answer key showing how the answer would need to look to get full credit. In both cases, explain why it is important for work to be shown in that question.

3. *I think I should have gotten points for this! (partially correct answer)*

Show the students the rubric you used to grade the assignment. A good rubric will generally break a question down into several points, so you can explain what partial credit they did and didn't receive and why.

4. *My friend didn't lose points for this! OR I didn't lose points last time!*

Most of the time this comment comes when a student doesn't understand subtle differences between their friend's response and their response. You can show the student your rubric to explain that you used consistent criteria to grade all of the assignments, and you can even walk through and "re-grade" that question with the student using your rubric.

5. *Am I allowed to use the Internet (or other resources) on this assignment?*

Clear communication when the assignment is assigned can help prevent possible breaches of the Caltech Honor Code by letting students know what they can and cannot use for a given assignment. Remember--if you aren't sure what is allowed, your students won't be either!



6. *I don't understand what I was supposed to do.*

Rubrics, model answers, or detailed answer keys can help address this. If you are not allowed to give students a rubric before the assignment is due, you can walk through the rubric with them after it is due and explain why those points were included--teach them how to think about the assignment so they can apply the same logic to the next assignment.

7. *I'm so bad at this class... should I even be here?*

Use positive feedback here! Most of the time, the student is not doing that poorly, and even if they are doing poorly in the class, it shouldn't make them feel like they don't belong. If they aren't doing that poorly, reassure them that they are doing fine (especially if they have had fewer related classes, they are a non-major, etc.) and tell them anecdotes about how you struggled with similar topics. If they are doing poorly, focus on strategies they could use to do better, like improving study habits or attending office hours regularly. Additionally, put the class in perspective for them--many students at Caltech are used to being the best in the class at everything, so doing poorly in one class can be a major blow to their self-esteem. Let them know that, all things considered, a poor grade in one class is not going to dramatically affect their future.

8. *How should I study differently?*

Here, you can insert your own advice on this to try and recommend students attend office hours. You may also ask them if they ever look at the rubrics or answer keys provided (you often find that students don't use all the resources you provide!) and explain how they can use those resources to help them study.

9. *Can I still get an A in the class? How bad will this hurt me in the class?*

If you get this question, it is often best to refer them to the class professor or head TA. Regardless of what you do, it is important to focus on the students' behaviors (like studying, completing assignments in a timely manner, etc.), not their abilities or personality, when discussing this challenging situation.

**7. Family Education Rights and Privacy Act (FERPA)** protects the privacy of students and prescribes the release of and access to these documents. It is relevant to TAs when returning assignments, maintaining grades and student information, and communicating with students (emails, feedback, etc.). Some key guidelines are as follows:

- Hand work back directly to students during recitation sections or after lecture sections.
- Seal work (staple a blank cover sheet to the front, folding the work in half so only a name is visible at the top of the page, etc) so that grades/comments are not visible to others if work cannot be handed back individually.
- Use private online communication (through moodle or Caltech email) to return assignments, comments, or grades.

Practice your understanding of FERPA with the following scenarios:

- *Q1: Can a TA return graded problem sets by leaving them at the front of the room or in a box outside their office?*

- a. No, this will allow students to view other students' graded assignments. Instead, some alternative options are:
  - i. Fold assignments in half and staple them. Write the students' names on the front so the name is the only writing visible.
  - ii. Place graded assignments in a sealed envelope (envelopes can be reused by asking students to hand in the next homework set in the same envelope).
  - iii. Assign codenames or a number to each student. Ask students to use this codename/number instead of their real name on homework they hand in. Be sure to not use a system that is easy to figure out (e.g. do not assign numbers on alphabetical order).
- *Q2: A student comes to a TA's office to pick their exam and also asks for their friend's exam, because their friend is too sick to pick up their own exam. Can the TA help the sick student out?*
  - a. No, the sick student must make their own arrangements with the TA to pick up their exam at a later time. (Also see the next question!)
- *Q3: Midterm exams were returned today but a student was too sick to pick up their exam. They email the TA to ask for their grade. Can the TA send the grade via email?*
  - a. The TA can send grades via email only if the TA can verify the student's identity. The Caltech FERPA office suggests that you:
    - i. Send the email to their caltech.edu email address only (the student must use their access.caltech credentials to access this email).
    - ii. Put the grade in the body of the email, not in the subject line.
    - iii. If sending grades to more than one student, send each student a separate email.
- *Q4: After an exam, some students ask the TA for statistics on the grades, for example, the mean and standard deviation. Can the TA provide this information?*
  - a. Yes, this is okay to provide as long as individual grades cannot be identified. The Caltech FERPA office suggests that you only do this when the class size is greater than 10 students.

## 8. The Honor Code and Grading

- The Caltech Honor Code states: "*No member of the Caltech community shall take unfair advantage of any other member of the Caltech community*"
- *How do breaches of the honor code generally show up in grading?*
  - Students have identical lengthy responses on homework or test
  - Students make the same atypical mistake or wording on a problem set, report, or exam
  - Student answers are identical to the answer key from a past year
- *What to do if you expect a violation:*
  - DO consult the professor if you are unsure if the honor code or collaboration policy has been violated. If yes...
  - DO report to the Board of Control (BOC) for undergraduate students or Graduate Honor Council (GHC) for graduate students. (see resources below)

- o DO grade and return the work-in-question as if everything were normal, but remember to make a photocopy to give to the BOC or GHC
- o DO NOT inform the student that the process has been initiated.
- *How to prevent honor code issues:*
  - o Be clear about the collaboration and homework policies. If you aren't sure what the students are allowed to do, your students won't know either! Be clear about whether or not the following sources are allowed or prohibited:
    - Other students, faculty, or other people
    - The internet
    - Former year problem set and answer keys
    - The course textbook
    - Other text resources, solutions manuals, or instructor editions
    - Computer programs (matlab, mathematica, etc)
  - o Remember that different assignments, exams, and even questions can have different policies. It can be helpful to clarify this at the beginning of each assignment.

## 9. **Contacts and Resources**

- FERPA: Mary Morley, [mmorley@caltech.edu](mailto:mmorley@caltech.edu)
- Undergraduate honor code violations: Board of Control, [boc@ucgs.caltech.edu](mailto:boc@ucgs.caltech.edu)
- Graduate honor code violations: Graduate Honor Council, [GHC@caltech.edu](mailto:GHC@caltech.edu)
- Teaching questions and advice: Center for Teaching, Learning and Outreach, [ctlo@caltech.edu](mailto:ctlo@caltech.edu)
- General concerns:
  - o Graduate Dean's office: [gradofc@caltech.edu](mailto:gradofc@caltech.edu)
  - o Undergraduate Dean's office: 626-395-6351
- Other resources to talk to:
  - o Head TA, Professor, Other TAs, previous TAs!

## 10. **References**

- Walvoord B.E. and Anderson V.J. Effective grading: A tool for learning and assessment.
- Center for Teaching Vanderbilt University: Grading Student Work [cft.vanderbilt.edu/teaching-guides/assessment/grading-student-work/](http://cft.vanderbilt.edu/teaching-guides/assessment/grading-student-work/)
- Underwood, J. S. and Tregidgo, A. P. Improving Student Writing Through Effective Feedback: Best Practices and Recommendations
- Wiggins, G. Seven Keys to Effective Feedback <http://www.ascd.org/publications/educational-leadership/sept12/vol70/num01/Seven-Keys-to-Effective-Feedback.aspx>
- Centre for Teaching Excellence, University of Waterloo: Receiving and giving effective feedback. <https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/assessing-student-work/grading-and-feedback/receiving-and-giving-effective-feedback>
- Winkelmes, M.- A. Transparency in Teaching: Faculty Share Data and Improve Student Learning. <https://www.aacu.org/publications-research/periodicals/transparency-teaching-faculty-share-data-and-improve-students>