

GRADUATE STUDENT TEACHING SEMINAR WRITING AND GRADING AN EXAM

WHAT KINDS OF PROBLEMS SHOULD BE ON THE EXAM?

- Determine the main ideas, skills, methods, etc., that you want to assess. *Only then* should you start to write/choose problems. You don't need to have problems on all of these topics, but you should try to cover most of them.
- Decide on policies for notes, calculators, etc., and make sure the students know them in advance. Take these policies into account in choosing the exam questions. If you're teaching your own course (e.g., in the summer), you also need to decide how long students will have for the exam.
- Don't give difficult problems on marginal topics or trick questions. These don't help you use the exam as an assessment instrument.
- You want a range of difficulties (but a problem that only one or two students can make any progress on doesn't help you determine what most students know and it discourages the students). You might, for instance, have 40% of the problems doable by almost anyone who paid any attention in class, another 20% by people who did all the routine the homework, 20% by people who did the more challenging homework problems, and 20% that require combining ideas in ways the students haven't seen before. You can certainly fiddle with these percentages (and it's probably hard to classify a given problem with complete accuracy anyway), but you don't want to make the exam *too* interesting or challenging.
- Multi-part problems can help you with grading (and uniformity of grading!) and can help the students put ideas together to do a more complex task. But be very careful about multi-part problems where the later parts depend on the results of the earlier ones. What will you do with the student who gets the earlier parts wrong in a way that makes the later parts much easier than they should be?
- Don't weight the problems entirely by difficulty. If you give substantially more points to the harder problems, the students who can only do the routine problems will get discouragingly low scores.
- It's a good idea to make the first problem relatively easy. It helps anxious students get started.
- Make sure the questions you ask elicit the information you're seeking. If your question on the chain rule drags the student down into a swamp of algebraic detail, it's not testing the students on the material of the course. (And it will be a real headache to grade.)

FINDING PROBLEMS

- Get old exams and see what types of questions are asked and the level of difficulty of the questions. Try to get exams that were written by a variety of instructors: the fact is the range of difficulty can vary greatly. Also try to get a feel for how much you can ask in the given time for the exam (but see below).
- Look carefully at the homework problems. Modified homework problems can make good exam questions. Also, try to give a question or two that is unlike something they have exactly seen.
- Other textbooks are good sources, but make sure the notation is consistent with what you've used in class and that the problems don't depend on some topic you haven't covered yet.

TUNING YOUR DRAFT EXAM

- Print out the exam and take it yourself, answering all the questions in exactly the same way you'd want the students to do it, filling in the details, etc. This lets you catch typos and other errors, make sure there's enough space for the answers, and will help you identify problems where, e.g., the computation is actually more difficult or tedious than you want on the test.
- Time yourself when you're taking the exam. Students will need *4-5 times* as much time as you do. If the exam takes you 30 minutes, it's way too long for a 60-minute exam period.
- Go back over the exam and make sure that it has the coverage and range of difficulties you intended. If you make major revisions, print it out and take it again. (And remember that writing out the problems you've actually done a little while ago will be a lot faster than doing them the first time, even for you. So if you're redoing the exam, you want to be closer to the factor of 5 for estimating how long it will take the students.)

LOGISTICS

- (1) Get your exams copied at least the day before. You don't want a last-minute problem with a machine causing chaos.
- (2) Have the students check that they have all the pages when you pass out the exam.
- (3) Make sure the students know how long they have to work on the exam and what the policies on notes, electronic devices, etc., are. It's usually a good idea to tell students that if they have questions they should come up and ask you, but you don't have to answer all the questions. ("Is this the way to do this problem?")
- (4) Stick with those policies, unless there's really some emergency. It's not fair to the students who prepared based on those policies to change them at the exam, or to announce at the end that people can have a significant amount of extra time.

GRADING THE EXAM

- Grade the exam problem-by-problem, or at least page-by-page. This really helps keep the scoring uniform.
- Construct a rubric for each problem *before* you start grading that problem. Think about what the problem is intended to assess and assign partial credit with that in mind. Try to identify the likely errors and decide how much credit you'll give.
- As you grade, you'll encounter answers that you hadn't anticipated in the rubric. Evaluate them carefully in terms of the intent of the problem and add notes to your rubric about what you decide to do. You'll need these when students ask questions about their scores. If you decide that you need to make some change in the way partial credit is assigned, you need to go back through the papers you've already graded and re-evaluate them.

One more word of advice: If you do have a review session for the exam, resist the temptation to teach to (what you know is on) the exam.