

TA Training Manual

Department of Mathematics
The University of Arizona
Fall 2007

Preface

Welcome to the University of Arizona Department of Mathematics. Teaching is an important part of the mission of our department, and you are now an important part of that teaching mission. Your role as an instructor in this department is to do your best to help those students who are able to succeed do just that.

This manual, in conjunction with the Department of Mathematics Resource Book, is intended to assist you in your job as a first-time instructor in our department. It is mostly a collection of tips for teaching, with a few policies thrown in here and there.

You can help us in assisting future TA's by letting us know what's missing, and how the manual could be improved. Please direct comments to Tina Deemer at deemer@math.arizona.edu.

Enjoy your first semester of teaching at the U of A!

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You're Going to be Teaching – Now What?

What Can I Expect from My Students?

The Math Department requires students to take a Math Readiness Test (MRT) in order to place into lower division math classes, such as College Algebra and Trigonometry. High school grades and courses are not used to determine placement into our math classes. Most of the students in College Algebra, for example, have already encountered most of this content in some course(s) in high school. The material will seem familiar to them, and they may even say “I already know all of this stuff!”, or “This is so easy!”. While the students may be familiar with a large portion of the material, most of the students have not mastered the concepts, or they wouldn't have tested into the class. You will notice that some students will have negative attitudes about math, or about taking this class.

Most of the students in these classes are freshmen, and they come from all kinds of different backgrounds – different high schools, different types of teachers, different expectations. Whatever their experience in high school, they will be used to high school expectations, and you will need to “break them in” to the expectations of a college-level course.

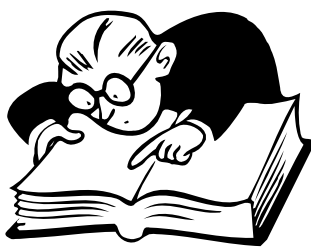
Some of the unrealistic expectations students may have:

- The teacher will grade on effort
- Homework is not supposed to be graded; it is only practice
- Extra credit will be available to bail out of a low grade
- Exams will be frequent and will cover few topics
- If you miss a test, you'll get a makeup
- The teacher will approach you about missed work if you are absent
- Being absent from class means that you are exempt from homework deadlines that day
- The correct answer is the only thing that matters, so intermediate steps or explanations are not important
- You don't need to read the book, because everything that will be tested will be covered thoroughly in class

Although most of your students will be courteous and respectful, you can expect that some students at this level will be somewhat immature. It is important to remember that if you treat them like mature, responsible adults, they will be much more likely to act that way.

The students in College Algebra will likely be majoring in business, agriculture, psychology, nursing, or health professions, or they are undecided majors. For many of these students, this will be the last math class that they take, or they may go on to take statistics or business math. The students in Trigonometry will have majors such as architecture, engineering, or science (physiological science, biology, computer science, etc.), and many of them will be going on to take calculus.

You will encounter very few math majors in these classes, and not a lot more science majors. Remember that your audience is more general, and therefore they will need more emphasis on concepts and examples, rather than theorems and proofs.



Preparing for Class

Preparation is critical in the success of any class. Preparation means more than just “knowing the material” – it involves thinking about what you want to happen in class, and specifically planning to make that happen.

The first step in preparing a lesson is to consult the Instructor’s Guide/Instructor’s Notes and the syllabus given to you by the course coordinator. These notes contain information about which material in the section is most important, what could be skipped, and suggested homework problems. Sometimes there may even be information about material that you should cover that is NOT found in the text. Neglecting to read this information could result in problems for you or for your students later in the semester. Try to stay “on” the syllabus. Getting too far ahead or too far behind the syllabus could turn into a fairly big problem.

Once you’ve read the course notes, you should read the section thoroughly and outline the main points. Write down what you think the students should already be familiar with and what you anticipate they will find difficult. What do you expect students to learn from this section? Read through the homework problems and think about what types of problems you expect students will be able to do after completing the lesson.

Now is the time to think about what class time will look like. Think about ways to get students actively involved in the learning process. In Math 110, you can check the workbook for possible class activities. Select suitable examples. Examples should cover a broad spectrum of difficulty, and each one should illustrate something at least slightly different. Remember that quality is more important than quantity.

Select homework problems carefully. Homework should reflect what you want the students to learn from the section. This means there should be a range of difficulty and types of problems. Make sure that you have an appropriate amount of material for an hour-long class. It never hurts to prepare more than you think you’ll need.

A Guide to Planning a Lesson

About one week before:

1. Read the Instructor’s Guide
2. Read the section thoroughly
 - Outline the main points.
 - What do you expect students to learn from this section?
 - Looking for examples
 - Find a paragraph or an example for students to read. Most students don’t read the book but assigning a particular item or example is a possibility. Talk about an example in the book especially if it is linked to a homework problem.
 - Make sure you use the words and terminology of the book.

3. Do the assignment, don't just look over the problems (or select problems and do them)
 - You won't be caught off guard in class or in your office.
 - Gives insight for the intermediate algebra that needs to be reviewed for them to do the assignment
 - Look for problems you want to grade
 - Problem 11 is assigned, problem 10 you can do in class.
4. Write notes

Full detail: everything is written out and problems included major steps
 Outline form: make sure examples with answers are in your notes.

 - What is the goal of this section?
 - Vocabulary for this section
 - In what ways can you get the students involved in the learning process? Check the workbook for possible class activities or other resources for worksheets.
 - Write down what you think the students should already be familiar with and what you anticipate they will find difficult.
 - Determine an overall plan for your lesson. What is going to happen in class?
 - Select suitable examples. Examples should cover a broad spectrum of difficulty, and each one should illustrate something at least a slightly different. *Remember that quality is more important than quantity.*
 - Make sure that you have an appropriate amount of material for an hour-long class.
 - Summarize the main points of the section. What do you expect students to learn from this section?
 - Include items that will be written on the board. (Section, topic, vocabulary, and important dates – exams, due date of assignment, etc)

Day before or on that Day:

5. Reread notes and make adjustments considering the class.
6. Make sure what you need to bring to class is listed on top of your notes and take to class

Being Prepared for Class and Office Hours - Organizational Tips

Being organized in and outside of class will help you keep up with the work involved in teaching a class, and ultimately will make your life much easier.

Items you may want to take to class with you

- Textbook, workbook
- Lecture notes with daily goals and materials listed, solutions to examples
- Student roster/attendance sheet
- Binder clips or folders for work that you collect, work that you are returning
- Calculator, calculator viewscreen panel if needed (put equations in calculator ahead of time)
- Auxiliary teaching materials, such as visual aids and worksheets
- Extra paper, pencils, pens, etc.
- Dry erase markers and or chalk and an eraser
- Transparencies and pens
- Homework assignment list with due dates, and homework solutions
- Printed grade sheet

Items to have available in your office during office hours:

- All materials that you take to class
- Extra dry erase markers or chalk, pens, and pencils for students
- Scratch paper – make sure that it is suitable for student use (no personal, private, or department information on it)
- Gradebook/printed grade spreadsheet
- Web page, if you have one

Most of the supplies listed above can be obtained from the math department office.

Sample Lesson Plans

Below are two sample lesson plans for the same section of material. As you can see, the samples are very different. There is no right or wrong kind of notes – you need to be prepared with notes that will be most useful to you in class.

SAMPLE #1

* Calculator Overhead

HWG due wed
Review due thurs

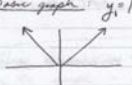
Section 1.6
8/7/00

Attendance Questions

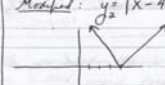
Last time, we looked at applications of functions (how they moved).
Now, we are going to experiment with some functions - we'll start by modifying the equation then looking at the effects on the graph. * Make sure you're familiar of basic graphs on p. 108.

Graphing calculator overhead

Basic graph: $y_1 = |x|$



Modified: $y_2 = |x-4|$



How would you describe this change? (Translated to the right 4 units)

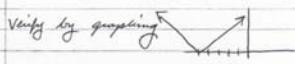
Let's look at a table:

x	y ₁	x	y ₂
-2	2	-2	$ -2-4 = -6 = 6$
-1	1	-1	$ -1-4 = -5 = 5$
0	0	0	$ 0-4 = -4 = 4$
1	1	1	$ 1-4 = -3 = 3$
2	2	2	$ 2-4 = -2 = 2$
		4	$ 4-4 = 0 = 0$

The vertex has moved to x=4
in fact, every point on original graph has shifted right 4 units

What do you suppose $y_3 = |x+5|$ will look like?

Verify by graphing



What we have just seen is a "horizontal translation" - this idea works for any function

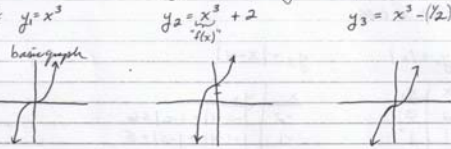
One example: $f(x) = |x|$ (basic graph), $f(x-4) = |x-4|$ (right 4), $f(x+5) = |x+5|$ (left 5)

In general: $y = f(x)$ (basic graph), $y = f(x-c)$ (right c units), $y = f(x+c)$ (left c units), $\leftarrow c$ is a positive constant

Notice that we have added or subtracted the constant directly to x

What will happen when we try $f(x) \pm c$? (Remember, $y = f(x)$, so this will be adding or subtracting directly to y)

Ex: $y_1 = x^3$ (basic graph), $y_2 = x^3 + 2$ (up 2), $y_3 = x^3 - 1/2$ (down 1/2)



These are "vertical translations"

One example: $f(x) = x^3$ (basic), $f(x)+2$ (up 2), $f(x)-1/2$ (down 1/2)

In general: $y = f(x)$ (basic), $y = f(x)+c$ (up c units), $y = f(x)-c$ (down c units), $\leftarrow c$ is a positive const.

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SAMPLE #2

Math 110 Class 14 FDMOND

Check Test 1
Section 1.6

Graph on calculator

$y_1 = x^2$		(+ moves up) (- moves down)
$y_2 = x^2 - 2$		
$y_3 = x^2 + 3$		
$y_4 = x^2 - 1$		

Graph on calculator:

$y_1 = x^2$		(+ moves left) (- moves right)
$y_2 = (x+1)^2$		
$y_3 = (x-1)^2$		
$y_4 = (x+2)^2$		

Put calculator away

Graph: $y = \sqrt{x} + 1$

$y = \sqrt{x-1}$

$y = \sqrt{x+2} - 1$

$y = (x+1)^3 - 2$

Graph $y = f(x) + 2$
 $y = f(x+1)$
 $y = f(x-1) - 2$

Must do these

H.W Workbook 013/1-6 Text case 163/11-18 all

Summary of graphs on p 108 of text

? Q: I am flying through the material - they seem to be picking it up - so I am 3-4 days ahead of the syllabus. Is this okay?

A: This is probably NOT okay. Most often, when you think that the whole class is "getting it", you are mistaken. If you are 3-4 days ahead of the syllabus, you should first assess your students' knowledge by having them work on a somewhat challenging problem. If you find that the majority of students are really on top of the material, it is probably a good time to get them involved in some in-class problems or projects that will extend or enhance their understanding of material already learned. Perhaps having students present problems at the board would also give you more of an idea where your students stand. You can use other textbooks, experienced teachers, and supplemental material that you may have received from the course coordinator as sources. Ask around. People have a lot of resources that they are willing to share.

Classroom Dynamics

Who is your favorite teacher of all time? Why? What would you like to emulate about that person? Did you like things about his/her teaching style, the way the class was run, or the help that was offered outside the classroom? If these questions were asked of n distinct people, you would almost certainly get n very different responses. There is no one “correct” way to teach. The style of teaching that you adopt will be a combination of factors, including your personality and comfort level, the needs and personalities of your students, and the material to be taught. Whatever styles of teaching you choose to adopt, there will be some things that will be common to any style. The roles of the teacher in a classroom may include:

- To assist and guide students in learning process
- To provide examples
- To provide overviews and tie ideas together – “the big picture”
- To help students in becoming independent thinkers
- To provide feedback to students
- To help students if they need or want it outside of class time
- To interest students in the subject matter and motivate them to want to learn
- To make effective use of class time in order to facilitate these goals
- To establish the tone for the class, and maintain it throughout the semester

How does one learn?

In thinking about the answer to this, the following questions may be of use: How did you learn to ride a bicycle? In what ways do *you* learn? Do you learn best by being told something? Seeing it done? Practicing it on your own? Reading about it? Doing something slightly easier (like using training wheels) and working your way up to it?

There are many different types of learners and ways of learning (audio, visual, hands-on, etc.). Most people learn best with a variety of experiences. Keeping students interested, involved, and getting hands-on practice will enhance the learning process immensely.

How do you make the classroom a place where learning happens?

Focus on what it will take for the students to understand the material, rather than on how you will present it. Create opportunities for students to get actively involved and engaged in the class and to get some hands-on experience with the material. Think of different methods that you can use to help students learn. There are many types of methods that you can use, including examples, explanations, questioning, and in-class work of all kinds. You need to create an environment in your classroom in which you expect and encourage questions, and in which students feel comfortable responding to questions. Answering a question out loud in class involves a risk for certain types of people; it is your responsibility to make sure that students feel that they will not be ridiculed or humiliated if they respond incorrectly.

Create opportunities for thought and synthesis in your lesson plans.

You can think of teaching as a relationship, rather than as a one-way street. Connect with your students. Get to know your students by name. Look at faces and try to figure out what they are

thinking. Read body language and other non-verbal cues for insights into whether they understand the material.

Respond appropriately to their feedback, both verbal and non-verbal, and adjust if necessary. If they seem confused, back up and find out where things got fuzzy. Encourage them – it is okay not to understand everything fully the first time out. Build in time to stop and allow them to practice. Be flexible enough about your lesson plan to accommodate student misunderstanding. If something isn't working, fix it before it becomes a bigger problem.

Short Checklist for making the classroom an environment for learning:

- o Focus on what it will take for the students to understand the material, rather than on how you will present it.
- o Create opportunities for students to get actively involved and engaged in the class and to get some hands-on experience with the material.
- o Think of different methods that you can use to help students learn:
 - Examples and explanations
 - Questioning
 - In-class work
- o Create opportunities for thought and synthesis in your lesson plans
- o Make connections between new and old ideas
- o Connect with your students
 - Get to know your students by name
 - Look at faces and try to figure out what they are thinking
 - Read body language
- o Expect and encourage questions
 - Make questions specific and not rhetorical
 - Don't give the answers away – wait for responses
 - “Do you have any questions?” VS. “What questions do you have?”
 - Ask what part they don't understand
 - Have them support and explain their answers
 - Be positive and encouraging
- o Respond appropriately and adjust if necessary
 - If they seem confused, back up and find out where things got fuzzy
 - Encourage them – it is okay not to understand everything fully the first time out
 - Build in time to stop and allow them to practice
 - Be prepared, but be flexible

An Assortment of Teaching Options

In the classroom, you have many choices about how to present material. The key is to find a style of presentation that suits you and is effective for your students. Since students may have a variety of different learning styles, you will probably want to try different types of classroom interactions, depending on the topic, the students, and your comfort level.

Explanation & Justification

Think of your presentations in class as explanations, instead of lecturing. The goal is to help the students to better understand the material. Think about what it will take for the students to understand, rather than how you will present. Below are some ideas to use when explaining material in class.

- State the topic clearly
- Capture their attention immediately, by asking a question, telling a relevant story, or placing the material in some context that students can relate to
- Organize the flow of information
- Make the main idea clear
- Relate the material to things students already know
- Choose examples thoughtfully - think through what each one will demonstrate
- Do and have them do lots of progressive examples
- Build your explanations around your examples
- Try to vary pacing about every 10-15 minutes
- Provide a clear conclusion
- Use explanations to enhance what is in the book
- Tie concepts together to help them get the big picture
- Have students talk you through a problem
- Have students explain a concept to the class
- Avoid proofs - think of justifications that make sense on their level

Boardwork

Writing on a board is a skill that you will hone over time. It's a bit harder than it looks to get a very neat and organized looking board. Many of our classrooms have white boards, but there are still a lot of classrooms on campus that use chalk. You will want to check out your classroom ahead of time to determine which type of writing implement you will need.

When you look at a clean board, try to think of it as a blank canvas. You will be creating your "artwork" as you go through the class. You may want to divide up the board into sections – maybe 2, 3, or 4, depending on the size of the board. You can draw lines between the sections or just keep them in mind as you are writing. In each section, start writing in the upper left hand corner, and write as you would on a piece of paper, leaving the bottom $\frac{1}{4}$ of the board blank

(otherwise students in the back will have a difficult time reading). Then continue writing in the upper left hand corner of the next section. Erase only by section – that will keep you from writing something and then erasing it to quickly.

Be sure that your writing is big enough for everyone in the room to read. This might mean that you have to ask on occasion.

If you are in a classroom with a white board, use different colors to emphasize different things. For example, if you are drawing two graphs on a single set of axes, you should probably use 3 different colors: one for the axes and one for each graph.

If you are in a classroom with a blackboard, be forewarned that colored chalk doesn't always show up well, nor does it always erase really well. In any case, whenever you are using colored chalk, be sure to ask if there is anyone in the class who cannot read it.

In-class Student Work

In-class student work can take many forms - quick problems done by individuals, working on assignments in pairs or groups, having students do problems at the board, etc. Including time for in-class student work in your lesson plans is helpful to students because it allows them an opportunity to get some hands-on experience with the material.

Have students work on their own or get together in pairs/groups. Control the pairings/groupings from the beginning of the semester (Avoid making groups any larger than 4 people). Collect a group/pair activity for grading. Make everyone responsible for their work. Guide students through an exploration/discovery exercise. Have students draw their own conclusions and share them with the class. Review previously learned material, or give quick practice when learning something new. Break up the class time when students are looking bored or tired. Use in-class activities to check understanding when students seem confused.

Keeping students actively involved in class helps them to stay focused on the material and provides an opportunity for the instructor to check student understanding of concepts. While in-class student work may not require you to do a lot of talking in class, it does require thought and preparation beforehand.

Short Checklist for in-class work:

- Prepare material ahead of time
- Give clear, detailed instructions (write them down!)
- Give them enough, but not too much time
- Provide back-up material for early finishers
- Circulate to answer brief questions & check on progress
- Ask students to report answers to the whole class verbally or on the board
- Include a mechanism that ensures that everyone is responsible for their work



Questioning Techniques

There are lots of reasons to ask questions in class. Ask yourself what you are trying to accomplish by asking questions. Are you trying to get the students engaged in thinking about the material? Are you trying to keep them from daydreaming? Are you trying to keep them active so they won't get bored? Are you trying to find out what they do or don't understand and use that as a gauge for how you will continue the class? Are you trying to make them feel like an important part of what is going on in your classroom? By answering these questions, you can figure out what kinds of questions will best suit your purposes. But no matter what purpose they serve, questions are an effective way for you and your students to get information.

These tips about questioning are intended to help you become an effective question asker and answerer:

- Plan why, when, and what questions to ask
- Make questions specific and not rhetorical
- Ask questions which will require some thought
- Ask as if you expect an answer
- Give them time to think
- Ask them to think before answering
- Wait for an answer
- Call on students by name
- Rephrase the question if necessary
- Have them write down ideas or thoughts & share with a neighbor
- Have them support and explain their answers
- Ask them to construct an example, a counter-example, or a problem
- Plan why, when, and what questions to ask
- Answer a question with a question
- Throw questions back to the other students in the class
- Always ask WHY and HOW
- Ask them what they don't understand, press them to be specific
- Don't assume they understand if they don't ask anything
- Ask them "What questions do you have?", as if you actually expect them to have some! This is better than "Do you have any questions?" or "Does everyone understand?", both of which seem to single out those students who "don't get it".
- Be encouraging when a student answers, either correctly or incorrectly
- Control "over-anxious" students by directing questions to specific individuals
- Don't give the answers away – wait for responses

Wait Time – How Long is “Long Enough”?

The next time you ask a question in class, count to 20 seconds. You may be surprised that this seems like an eternity to you! The silence can sometimes be difficult for both instructors and students. But think about it – 20 seconds is not a very long time to understand a question, think about it, and formulate an answer. Any question that can be answered very quickly (within 5-10 seconds) is probably not probing the students' comprehension.

? **Q: The class before the first test was a review. When I asked for questions there was only one. But later when I went over some of the topics that I found important, it became obvious that not everything was clear to them. Any suggestions for how to provoke questions from the class?**

A: This happens often with the first test. I always tell students that I am not preparing any review material, so if they don't have enough questions to fill up the hour, I will move on to new material. This usually works. And it puts the responsibility on the students' shoulders, instead of yours. You might also want to try asking general questions, like "What questions do you have about (fill in the blank)?" Sometimes students are so confused about something that they don't even know what to ask.

Active Learning – Summary

Type of Active Learning	When Useful	Advantages	Possible Disadvantages
Non-Directed Questions	<ul style="list-style-type: none"> explaining new material for student feedback 	<ul style="list-style-type: none"> quick encourages volunteering comfortable for students 	<ul style="list-style-type: none"> weak students don't tend to get involved may cause you to be misled about students' understanding of material
Questions Directed at Specific Students	<ul style="list-style-type: none"> explaining new material for student feedback when you want to hear from a wider variety of students 	<ul style="list-style-type: none"> quick allows you to involve more students helps some students overcome fear of participating in class keeps the students alert and paying attention 	<ul style="list-style-type: none"> can make some students uncomfortable puts students "on the spot"
Student Board Work	<ul style="list-style-type: none"> best with groups when many problems are being presented 	<ul style="list-style-type: none"> builds student confidence helps students to see what others are doing and thinking 	<ul style="list-style-type: none"> time-consuming can make some students uncomfortable
Individual Practice	<ul style="list-style-type: none"> as a break in lecture quick practice with something new review of previously learned material 	<ul style="list-style-type: none"> gives students hands-on experience instructor can quickly test understanding gives you a chance to circulate and make one-on-one contact 	<ul style="list-style-type: none"> takes a bit more time than lecture
Small Group Work	<ul style="list-style-type: none"> as a break in lecture practicing with something new exploring examples in order to discover a new concept 	<ul style="list-style-type: none"> encourages cooperation among students helps promote a better understanding of the material promotes a problem-solving environment allows instructor plenty of time to circulate to different groups 	<ul style="list-style-type: none"> time-consuming takes more effort to keep students on task

? Q: How do you break a full class into groups?

A: If the class is so full that it is hard to move seats around, having students work in pairs may be the solution. Usually, you can have students work with the person right next to them without any difficulty. You can also have each pair check answers or share with another pair nearby without moving chairs around.

On the other hand, if you have the room to maneuver around a bit, and you are wondering how to get them into groups, here are a few suggestions:

- Have students count off or give them cards as they enter class and have them get in a group with people who have the same number.
- Just walk around the room and say, "You three work together", etc.
- If you plan to use group activities or discussion frequently, you may want to assign the groups yourself. In that way, you can control who is working together, and you can reshuffle the groups when the need arises. Also, this is a good way to get people to sit in a certain part of the room, or to keep people from sitting near certain others.

? Q: How can I make the class participate and don't waste too much time?

A: This is a challenge. As an instructor, it is your job to make decisions about how to spend class time. There is a balance between student involvement and getting through material. The bottom line is that time spent on class participation will cut into time spent on covering material. The trade-off is that although you may not explain every last point, the points that you do explain will be absorbed rather than reflected.

Try to think of quick ways to getting students active and involved. For example, instead of working 3 examples on the board, you could work out just one, and have the students work out a second one. Depending on how well they seem to understand the material, you can probably do this in the same amount of time that you were originally planning to spend. Granted, this may mean that you can cover fewer examples, but perhaps they will get more out of this process than just watching you do it.

In addition to quick problems at their seats, you could also try directed questions, a brief pair problem, or some combination of these things (like doing problems individually and checking with a neighbor). You might also try putting a problem or two on the board at the beginning of class for students to work on while you pass back papers, making that time much more productive.

You also need to remember that you do NOT need to cover every tiny detail found in the text - you are allowed to expect that they will read their books. You just need to make that clear to the students.

? Q: Some of my students are bored, while others seem really lost. How do I handle that?

A: This is always difficult. There will always be students who are very familiar with the material, and those who are really struggling, especially at the beginning of the semester, when you may be covering material that is considered to be "review" for them. However, you shouldn't go really quickly just because a few people look bored, and you shouldn't slow way down because a few are lost. It is your job as an instructor to make decisions about the level of your presentation and the pacing of the material.

A few suggestions that might help: Ask students what they know about a topic. Build on that basis, and focus your discussion on the areas where you think they aren't as solid. For example, when discussing inverse functions, many students know to "switch x & y, then solve for y", but they don't know what that means graphically, or what happens to the domain and range of the inverse. Most likely, they also haven't seen the usefulness of inverse functions in any context. Going over all the basic stuff with an interesting, practical example will usually keep the more knowledgeable students interested, while keeping the discussion at the appropriate level for other students. Be careful of misinterpreting the boredom; often students are looking bored not because they are finding the material easy, but because they are lost and have stopped paying attention. One way to tell the difference is to give the students an in-class exercise and then walk around the room looking at their work; you'll be able to see who is really following and who isn't. It's good to keep in mind that beginning instructors tend to err more on the side of going too fast than too slow.

? Q: My class has broken into two groups - half know everything, half are clueless. Any suggestions on how to keep both parts of the class interested and learning?

A: This is an important and ongoing issue whenever you teach a class at this level. On the other hand, you should remember that just because students seem to know everything, that doesn't mean that they really do. Sometimes the students who seem bored are just tuning out because they DON'T know what's going on. You can find out by giving them a question to answer in class and then walking around looking over their shoulders to see how they are doing. You may be surprised to find that the students you thought were bored don't seem to be doing anything. One suggestion is to put students into groups where they can help each other with problems. Get weaker students together with stronger students, and have them help each other. An interesting (e.g. some kind of application) problem would be nice, as it might be a challenge to the stronger students to apply what they've learned to a new situation.

Attendance, or Not?

Taking attendance may seem like a "high schoolish" thing to do. After all, these are adults we're talking about here, and they can choose whether to attend class or not. Why should it matter to you?

Well, it might matter in certain circumstances. For instance, it is very important to take careful attendance for the first week of classes. The reason for this is that the department has a reasonably strict administrative drop policy that was implemented due to the limited number of available seats in classes at this level. (See administrative drop policy in Resource Book.) Also, if a student stops attending class sometime during the semester, you may want to do an

administrative drop. But, in order to take advantage of that, you will need to have accurate attendance records.

Is there some middle ground between taking careful attendance every day, and just allowing students to come and go as they please? Here are some options for taking attendance:

1. Send a sign-in sheet around the room at the beginning of class. Don't allow students to sign in for anyone else.
2. Use homework as your attendance check. If a student hasn't completed the homework, (s)he can turn in a blank piece of paper with their name on it.
3. Take careful attendance during the first two weeks, then stop taking attendance. If you notice that someone has been missing a lot of classes, start taking careful attendance again. If a student misses more than 3 classes (after you start keeping track), you may want to administratively drop the student, especially if (s)he missed an exam.

? **Q: I have a student who came to class the first week and I have not seen her since. I have tried to contact her, but have been unable to reach her.**

A: Wait to see if this student shows up to the first exam; if she doesn't, then you should go ahead and process an administrative drop. You can get the forms to do this from the Main Office. If, on the other hand, the student does take the exam and does terribly, you should try to get her to drop the class.

Setting the Tone for the Class: Professionalism

In order to create a positive classroom environment, it will be up to you to establish clear expectations for the class, both academically and behaviorally. Remember that you have back-up. Your supervisor, the course coordinator, and other administrators in the department are here to help you with any problems you might encounter. You also have the Code of Academic Integrity and the Student Code of Conduct to fall back on.

Professionalism is a key element of a positive classroom environment. It is important that you exercise professionalism in all your dealings with students.

1. Expect and give respect.
2. Remember that this is your job. Although you have other responsibilities, and this is a part-time job, it does require a commitment, just as any job does.
3. You should dress appropriately for class. While Arizona is a pretty laid-back place, there is a minimum standard of decorum to which you should adhere.
4. Be to class on time and start class on time. The students have signed up for a class that has pre-specified meeting days and times, and you are obligated to meet with the class on those days for that amount of time. You are required to hold class every day that it is scheduled, even if that is the day before Thanksgiving or Spring Break.
5. Stick to your policies throughout the semester. The course and homework policies constitute a contract that you make with the student. Failure to follow your policies can cause all kinds of problems down the road.

6. Stay on top of grading. If you find yourself falling behind, talk to your supervisor immediately to come up with a plan for getting back on track.
7. Keep accurate records. (Read more about this in the next section.)
8. Office hours are part of your commitment to your students. You will need to be available during office hours, at the specified location.
9. Respond to email and other communications from students in a timely manner.
10. Listen to your students. Be sensitive to their situation, while keeping a professional distance. Be knowledgeable of their options. If you find yourself dealing with an unusual student situation, contact your supervisor or course coordinator for advice or assistance.
11. Be encouraging, yet realistic. Let students know where they stand in the class, but realize that, ultimately, the student must make his/her own decisions about things such as dropping the class.
12. Keep in touch with your students. It is a good idea to get student email addresses and make a listserv or group name so that you can easily communicate important information. Use a web page or D2L to post important class information, such as test dates, homework policy, etc.

And some don'ts:

- DON'T take it personally when students complain.
- DON'T lose your composure. (It's better to walk away!)
- DON'T feel pressed to respond to every concern immediately.
- DON'T date your students, and don't flirt with them.
- DON'T try to be friends with your students.

? Q: What happens if I am really sick, and I can't get to class?

A: If you need to miss a class for a serious and unavoidable reason, you must arrange for a substitute, and notify the main office staff about who will be replacing you. Your replacement should be someone who works in the department, and who is teaching or has taught the class before. Your supervisor is a good choice for a substitute, because (s)he is probably free at your class time. Classes should not be cancelled. If you are unable to find a replacement or have an unexpected emergency, contact the course coordinator or the Main Office staff to assist you.

? Q: How do I learn all the students' names?

A: Probably the easiest way to learn students' names is to hand back papers individually. Try getting to class a little early and start handing back papers before the bell rings. Take those few extra minutes to really look at the students as you return their homework, and talk briefly to them. Another idea is to take a few minutes before class each day to call through the roster and study faces as you take attendance. After calling all the names, go back around the room and try to name each person. Just a couple of minutes of effort each day will help you learn names much more quickly. "Studying" names right after class each day will help as well.

Record Keeping

Having accurate records of student grades is absolutely essential. Even if you are generally not an organized person, it is important that you be organized in this aspect of your life.

The following are some suggestions for keeping track of grades.

1. Keep ALL of your grades, even homework and quiz grades, on a spreadsheet. This will make your job much easier at the end of the semester, and will help you avoid making arithmetic errors when calculating grades. This is especially true if you are going to adopt a homework policy whereby you drop a certain number of the lowest grades.
2. Identify all grades with a descriptive title in your grade book. You should be able to identify the corresponding assignment for each grade in your records.
3. When you teach Math 110 or 111, you will receive a grade disk from the office staff that you will use to record the test scores (and ultimately the final grades) for your class. Please make a back-up of this disk every time you edit it, and print out a copy. This disk will get turned in to the office staff after each test.
4. Make a copy of the spreadsheet in a different file to keep track of homework/quiz grades.
5. Alphabetize all papers before you record grades. This will help expedite the process of recording grades, and it will also make turning back papers easier. It will also minimize the number of errors made by putting the grade on the wrong line in the grade book.
6. Devise some way of indicating an assignment that was not turned in, rather than leaving a blank space in your grade book. For example, you may want to put an “x” when an assignment was not turned in, and reserve “0” for assignments that were graded and received a zero. This serves a couple of purposes. First, it forces you to record something for every assignment for each student – this will mean fewer oversights in the recording process. Second, it keeps a student who actually turned in an assignment and received a zero from coming back later and claiming that you didn’t grade the paper.
7. Always input grades immediately into the master grade spreadsheet. Do NOT keep grades written on a piece of scratch paper, with the thought of writing them in your grade book later.
8. Print out a hard copy of all grades after each test. Keep these in a safe place where you will be able to find them later.
9. If for some reason you lose some grades, avoid making the problem worse, and talk to your supervisor immediately. Do NOT make up grades, or otherwise try to “fudge” the records.

Communication Skills

Communication is critical in your success as a teacher. You can think of teaching as a two-way communication between you and the student. While you may be doing a lot of the talking in the classroom, the students are a big part of the communication equation – whether the communication is verbal or non-verbal. Strong communication skills will be very helpful in becoming an attentive and effective teacher.

Basic Communication Skills

- Speak loudly enough for students in the back of the room to hear you. This may mean projecting your voice more than you are used to doing.
- Speak slowly enough that students can follow what you are saying and take notes if needed. Don't be afraid to repeat things more than once for emphasis or clarity.
- Make eye contact with students, even those who are trying to avoid your gaze. Look directly at individuals, but don't direct your discussion towards a single person.
- Pay attention to body language. Students won't always tell you when they don't understand something, but they have a difficult time hiding it in their posture or the expressions on their faces. Non-verbal cues are a very important form of communication during lecture, and they give you the feedback you need about pacing, difficulty, etc.
- Hone your listening skills.
- Give your students positive reinforcement when they speak in class. Don't be overly critical if they answer something incorrectly. Instead, try to find something in the answer that you or another student can build on.

? **Q: I have a deaf student in my class. How do I communicate with him when he comes to my office?**

A: I have had a deaf student in my class once before, and I struggled greatly with this and several other issues. My first suggestion is that you call the student's specialist at DRC, and ask what they suggest. When I did this, I found out that there are interpreters available for students when they want to go to tutoring or office hours - they just need to plan in advance for such things. Also, it was helpful talking to the specialist about communication and classroom activities.

On the other hand, if the student just drops by, you probably need to write back and forth. It is time-consuming, but it seems like the only reasonable thing to do.

Email Communication

Students are given a University email account (login@email.arizona.edu), and are expected to use it. Email addresses will be available to you when you request a class list (see Resource Book). It is a good idea to establish a class listserv (<http://listserv.arizona.edu>) or at least have a distribution list with your class email addresses on it.

While you (and most of your students) may be accustomed to using email very informally, it is important to remember that any email that you write is a formal written communication to the student. As such, you should be very careful about the language that you use, and about the overall tone of the email. In the case of any sensitive issue, including any kind of disagreement that you may have with the student, it is always best to speak in person or by phone.

Working with Students Outside of Class: Office Hours & Tutoring

You are required to have regularly scheduled office hours, and to be available to students who cannot attend your office hours by a mutually convenient appointment. When you see students in your office hours or in the tutoring room,

- Let the student tell you what they need from you.
- Ask the student what section they've been working on in the text, and ask to see notes/what they've been doing in class.
- Ask questions like "What have you done on the problem so far? What do you know about this problem? What do you know about exponential functions that might be helpful in the problem?" Model the thinking process for the student.
- Avoid showing the student "shortcuts". (derivatives, limits, definite integrals)
- Focus on concepts, rather than templates.
- Resist the temptation to distill something down to an algorithm. Emphasize thinking through the question.
- If a student doesn't know one particular method of solving a problem, suggest other alternatives. E.g. If they don't know how to do the algebraic method, perhaps they know a numerical or graphical method.
- Does the student know a way to check solutions? (estimation, taking derivative, etc?)
- Use the same terminology as the textbooks. Rephrasing or rewording to give a more basic explanation may be helpful as well.
- Ask the student what he/she has already tried. Refer to class notes and the text.
- Sketch or chart the information if possible.
- Make up a similar problem that is easier and guide the student through it.
- Stay long enough to get the student started and check back for progress.
- Keep the student actively involved in the learning process.
- Use questions to check for understanding.
- Keep in mind that we are there to assist in the learning process, not to do the homework for the student!

? **Q: Do students start to "really" come to office hours around the first test, or am I just blowing it and they don't understand?**

A: Frequently, students DO start coming to office hours once the reality of the first test hits. It really depends on the individual personalities in the class, the availability of outside tutoring, the difficulty of the material you are covering, and the convenience of your office hours. There are several things you can do to encourage your students to come to office hours. First of all, tell them that office hours are for EVERYONE, not just students who are doing poorly. Second, consider having an office hour that will be very convenient for students, like right before or after class. Finally, remind students that you are there to help them - all they need to do is ask. And when they do come, and you are helpful, word will get around.

Creating and Grading Exams

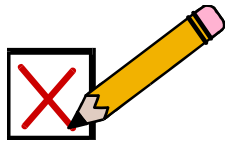
Guidelines for Constructing Exams

1. Begin by listing the main ideas and methods for which the student is held responsible, and try to cover most, if not all of them. You may want to keep a running list of possible test questions as you go through the material.
2. Try to maintain a reasonable balance between "plug and chug" problems and applications or reasoning problems. A good rule of thumb to use is 20% application/reasoning problems. Remember that "reasoning" doesn't necessarily mean "difficult". A good reasoning problem gets the student to stretch out of their usual way of thinking about a problem. This could be as simple as asking the student to give an example of an expression or equation with certain properties, instead of solving a given problem.
3. Determine what concept you are trying to test with each question. Make sure that the question accomplishes this. Try to avoid duplication of identical types of questions.
4. Making test questions significantly interdependent is a form of double jeopardy and should be avoided. If you ask questions with multiple parts, determine in advance how you will judge partial credit for students who miss the first part, and subsequently carry that mistake through to other parts of the question.
5. Try to represent a reasonable range of difficulty on the exam. You will want to use questions that separate "A" students from "B" students, "B" students from "C" students, and so on.
6. Include some multiple choice questions if your final exam will be multiple choice. It is a good idea to prepare students with a few questions of this type throughout the semester. Avoid using this format extensively, however.
7. Keep an eye on the length. Work out the test in detail, and write out the solutions. Time yourself. In general, it should take you about 15-20 minutes to do the test this way. For the first few times, it might be a good idea to look at old exams to get a feel for length.
8. Don't give students unnecessary difficulties. Be sure that the copy is readable and problems are clearly stated. Give explicit instructions. Work out the solutions to all problems thoroughly before giving the exam in class. Remember that if you have students who will be taking the test in the Testing Center, you will not have the opportunity to make corrections or clarifications for them during the test.
9. ALWAYS work out your exam before you submit it for copying. Use the following checklist to help you evaluate the appropriateness of the exam.

Short Checklist for reviewing your exam after creating it:

- Have you worked out every problem in detail?
- Write out complete solutions to the exam, as if you were the student. Multiply the time it takes you to do the exam by 4. Is this number within the 45-50 minute range? (This is a rough estimate.)
- Does the exam contain questions of varying levels of difficulty?
- Are the questions phrased clearly? Are there any vague directions/questions which might be misinterpreted?

- ❑ Does the exam include application/reasoning problems?
- ❑ Does the exam cover the basic concepts covered in the sections?
- ❑ Should a second version of the exam be made to avoid cheating?
- ❑ Have you used the terminology of the textbook?



Guidelines for Grading

The following is a set of suggestions for grading. You will undoubtedly think of many others as you grade this semester.

1. Construct the point structure according to the difficulty of the question or the number of steps required to solve the problem. Make sure that the point structure will allow you to assign points in a systematic and consistent way.
2. Try to lay out the steps that students will earn points for (e.g. 1 point for grouping the first two terms together, 1 point for factoring out the leading coefficient correctly, etc.)
3. Use a well-refined scale. A problem that involves several steps should be worth several points.
4. Take off an appropriate percentage of points for small algebraic errors.
5. Give points, instead of taking them away. Think of this as the students earning points for various steps accomplished in the problem.
6. Grade the exam page by page, or even problem by problem, to ensure fairness in the distribution of partial credit. Do not attempt to grade one test at a time.
7. Write lots of constructive comments on exams/homework.
8. Mark up the paper enough so that you could recreate your thought process for the students, if it were necessary. Think of what you write on a student's paper as a sort of code, and use markings that are consistent from paper to paper. Some examples:
 - ♣ Circle or X out mistakes, put a check mark by steps done correctly.
 - ♣ If a problem is blank, put an X through the space. This prevents students from writing in answers after the fact and trying to get points for them.

? **Q: What should we be trying to accomplish in our tests? Are they just preparation for the final, or are they supposed to reflect what we emphasized in the course, etc.?**

A: Hopefully, you can do both things. A common final should and will emphasize what the course syllabus emphasizes. If you are not covering these topics, this can be a problem - not just with the test, but with the course as you are teaching it. You have a certain amount of leeway about what you emphasize in the course, but you must always cover the course content that is prescribed by the department.

On the other hand, final preparation is not really the goal at this point. You want to see what the students have learned, what they understand, and how they can apply the concepts presented.

You should focus on teaching and testing each section as important in its own right. If you are teaching the concepts put forth in the course syllabus, and your students understand them and can apply them to various types of problems, they should be able to be successful on a common final.

? Q: What if half my class fails the exam?

A: If your class does poorly on an exam, you first have to decide if the exam was reasonable or not. Look at the sorts of mistakes students made, and try to decide whether the mistakes are the result of flaws in the question, or flaws in the students' abilities. If there are any questions that almost everyone left blank, you should entertain a suspicion that the question was unreasonable. The best possible thing to do is to make sure that this doesn't happen. Your supervisor should be able to help you avoid giving an exam that is too hard or too long. The guidelines for constructing exams (above) should help guide you through the exam writing process, and ensure that your test is fair and doable. In the event that all of these systems fail, and your exam has a very low average, you should talk to your supervisor immediately, before returning exams. If you feel that the test was truly unfair or too long, you may want to rethink the distribution of partial credit, or the number of points allocated to a particular question. However, it is best to consult your supervisor before

Every once in a while the results on a test are extremely low or extremely high. We suggest that before giving the exam you do your best to assess the length, difficulty level, and fairness of the exam. You may want to ask an instructor who is experienced teaching the course for their opinion or look at sample tests on file with Brooke in the Math Office. If, in spite of these precautions, an exam average turns out to be very low or high, please hold onto the exams and talk to the course coordinator before making any adjustments.

? Q: Is it okay to give the same test that my office mate is giving?

A: It is permissible to use the same test if the classes are on the same day at the same time; otherwise, it is not appropriate. This policy prevents students from sharing information about the test with others who are taking it at a later time or on another day. If a test is needed for a make-up exam for one or two students, you may use another instructor's exam.

? Q: I gave a quiz that ran past the bell. At 10 till the hour, someone from the next class came in, and I asked him to leave. He left, but returned two minutes later, making lots of noise and pushing the students out although they still had a few minutes.

A: It is important to remember that your class ends at 10 till the hour (or whenever it says in the schedule of classes). The 10 minutes between classes is time for you to pack up your things AND for the next instructor to get set up. Although it is occasionally unavoidable, you should make every effort to be done with class on time. Try to plan quizzes and tests so that everyone has enough time to finish in the allotted time.

? Q: Can I give extra credit assignments?

A: Instructors with common course policies are expected to adhere to that policy. Some examples of things that are not appropriate:

- giving extra credit
- offering bonus points on quizzes or tests and incentives that enable a student to earn points that are not available to other students.
- points for attending class or office hours
- points for just handing in an assignment

In some multi-section courses, such as algebra, curving tests or dropping the lowest test score are also against course policy. Please check with the course coordinator of any course in which you are considering any such policy

Missed Exams

In Math 110 and Math 111, there is an established course policy for missed exams. You will need to follow this policy, and interpret it for each individual case as it comes up. Please remember that any student who has a legitimate reason for asking for a make-up exam will be willing to provide you with reasonable documentation, so don't be afraid to ask.

? Q: A student e-mailed me before the class after the first test saying she couldn't make it. How do I deal with this?

A: This depends greatly on your missed exam policy. If you say that the student must have a verifiable medical or other emergency excuse, then you should stick to that. Ask the student why (specifically) she can't make it to the test. If she has a legitimate excuse, then be sure to get the appropriate documentation. In any event, if you are unsure, you should talk to your supervisor.

? Q: One of my students said he had a Dean's excuse to miss the day of class when I am giving the exam. What is a Dean's excuse, and what do I do about him?

A: When a student will be unavailable to attend class due to a University-sponsored function (such as with a sports team or other legitimate club/academic activity), the student should get an excuse from the Dean of Students' Office, listing the dates that the student will need to miss class. In the case of students who play Division I team sports, they may get a list of these dates at the beginning of the semester; others will get them as the event approaches. When a student gives you such an excuse, the absence is considered an "excused" absence, meaning that the student should be allowed to make up any work that he or she misses during that time period. This may seem to be in contradiction with your homework policy or with the course policy, but it generally need not create a difficulty. In almost every instance, the student is well aware of University-sponsored events ahead of time, so you may request that the student turn in homework or take tests in advance of the date. Remember that the rule is that the student must be allowed to make up the work, but it doesn't say that you must allow that to happen AFTER the event. The student needs to notify you far enough in advance for the two of you to work out an arrangement that is fair to all the students in the class, without unduly penalizing the student.

Academic Dishonesty

Academic dishonesty is a fact of life for most college instructors. While we would just love to believe that “My students wouldn’t do that!”, the reality is that many students try, often successfully, to represent someone else’s work as their own.

The students at The University of Arizona are governed by the Code of Academic Integrity. The Code spells out the types of behavior that are classified as violations of the Code, and gives instructors direction about the proper procedures to follow when a violation is suspected.

Academic dishonesty can take many forms. Some examples of academic dishonesty include: copying from another student’s exam, bringing unauthorized notes into an exam (this may include unauthorized calculator programs), using a calculator that is not allowed on exams according to the course policy, communicating with another student during the exam (this may include sharing calculators), and changing answers on an exam that has already been graded. While this is not an exhaustive list, these are the things that we see most often in these courses in the math department.

Preventing Academic Dishonesty

The first step in preventing academic dishonesty is to notify students that you will uphold the Code of Academic Integrity in your class, and that any suspected violations will be dealt with in accordance with the Code. Emphasize students' ethical responsibilities. Believe it or not, some students coming directly out of high school do not take this issue seriously. If you tell them how serious this issue is to you, it will make an impact on some of the students.

1. During exams, proctor attentively; walk around the room during the exam, rather than sitting at the desk doing your own work. Keep an eye out for students watching you - students usually look to see if you are watching before trying to copy from someone else.
2. It is a good idea to create two versions of the exam. If you use multiple choice questions, rearrange the answers on different versions. For open-ended questions, you can either arrange the questions in a different order, or change the numbers slightly. (Note: If you make any changes in the problems, have your supervisor check the second version of the exam as well as the first.) In class, try to arrange students in columns to take the exam, skipping every other column if possible. You can alternate versions by column.
3. During the test, ask students put all books and other personal belongings under their seat. Provide adequate paper for students to use during the exam; don't allow students to use their own paper. Don't permit any communication between students during the exam, including sharing calculators.
4. Knowing all your students’ names before the first exam is extremely helpful. Bring a roster to check off the students taking the exam, and check them off a second time when they hand in the exam to you.
5. When grading exams, put an X through any problem left blank Circle mistakes on the exam. Include lots of comments and grading notation on the exam.

Handling an Academic Integrity Violation

Academic Integrity issues can be very sensitive, and it is extremely important that you handle them properly, according to University guidelines. Those guidelines are available online for both instructors and students.

If you suspect someone of an academic integrity violation, you should immediately contact your supervisor to discuss the matter. In the event that you witness something you feel is improper during a test, it is best to act immediately, but in a way that does NOT assume that the student has cheated. For example, if you think a student is copying from another student, you should move the student to another seat immediately, and take note of what work was already done on the test. As another example, if you see a student using an “illegal” program in their calculator, you should check the calculator to be sure that is the case, and if so, confiscate the calculator, but allow the student to finish the exam.

The Department has a very specific set of guidelines for dealing with an academic integrity violation. These guidelines can be found in the Resource Manual (look under Code of Academic Integrity – Department Policies).

Homework

Department policy requires that each instructor assign and grade homework on a regular basis. The exact statement of this policy can be found in the Instructor Resource Manual.

In addition to being required, there are many reasons to assign and grade homework. Among the many purposes of homework are:

- To practice and apply the concepts presented
- To provide continuous feedback of progress to students
- To provide continuous feedback of students' comprehension to instructor
- To practice for the exam
- To make sure that students are keeping up with the class
- To ensure attendance of students

Writing a Homework Policy

Policies are an important part of the student-teacher relationship. In essence, any policy that you give to students is like a contract for the class. You agree to abide by the policy as you have written it, while the student agrees to be subject to the terms of the policy.

First and foremost, policies should insure CONSISTENCY and FAIRNESS. In particular, your homework policy should:

- Be thorough to cover all eventualities
- Be clear and concise
- Be fair and consistent to ALL students
- Be presented in written form
- Be created with the purpose of the policy in mind
- Be created to reflect your expectations of your students
- Be something you can live with for the entire semester
- Follow the departmental guidelines for homework as spelled out in the Resource Manual

Because the courses you will be teaching are primarily made up of freshmen, some of the students may expect a lot of forgiveness or leeway for not being responsible. Keep this in mind as you are writing your policy. Close the loopholes as much as possible, but build in some flexibility to allow for the unexpected.

Use the outline on the following page to rough out the elements of your homework policy.

Homework Policy Outline

1. Breakdown of points HW vs. quiz
2. When is homework due?
3. Late assignments
 - How late is late?
 - Will they be accepted?
 - Are they worth full credit?
4. Absences – how will HW and quizzes be handled?
5. Calculation of points
6. Grading of assignments
 - All problems or selected ones?
 - Allowance for effort?
 - When returned?
7. Building in some flexibility
 - No extra credit
 - Replacement assignments
 - Dropping a certain number of the lowest grades before averaging
8. Special Requirements (stapling, neatness, fringes, etc.)

Sample Homework Policies

The following are sample homework/quiz policies. Please note that not every policy contains all of the elements described in our session, as your policy should.

SAMPLE #1

Homework is assigned for each class period. It is due at the beginning of the class. Late homework will be graded but NOT counted. Actual homework points will be scaled to a total possible 100 points. If you have notified the instructor of an unavoidable absence, turn in the homework on the DATE DUE. This homework may be left at the Math Office (Room 108) before 4:30 P.M. Be sure to include your name, section, date and my name on the paper. It is your responsibility to get the information regarding the new homework due for the next class.

Homework is assigned daily to practice skills and applications, and also to give both the student and the instructor feedback information on the student's understanding of the material. Show your work for the problems, do the work in an organized manner and staple multiple pages. Label answers and use complete sentences where appropriate. Keep up with the pace and come in for extra help whenever needed. There are no opportunities for extra credit or to redo previous work, so please do not ask.

SAMPLE #2

Homework will be assigned regularly. Selected homework will be graded and a final score (out of 100 points possible) will be assigned. Homework will be due by 4pm on the due date, and *late homework will not be accepted for any reason*. Instead, several low/missing homework scores will be dropped at the end of the semester.

Homework is an essential component of the course as the best way to learn math is by DOING math. Before attempting the homework problems, students are expected to read the appropriate section (seriously! It helps!). Students' assignments are expected to be neat, and all work must be shown. Keep in mind that "solutions" will be worth more than "answers". Many homework problems will ask for a written explanation. In such cases, sentences (in English), which clearly and completely answer the question, are expected. Also keep in mind that homework will be not be graded on "effort" but on understanding and correctness.

Discussion of homework problems ("working together") is encouraged, but each student is expected to write up his/her own solutions (see academic integrity note below). Students are also encouraged to ask questions during office hours and to use the free tutoring available.

In addition to homework, quizzes may be given to assess student progress during the semester. Quizzes may be announced or unannounced, and make-up quizzes will only be given at the discretion of the instructor. Any quizzes given will be factored into the homework score.

SAMPLE #3

Homework Policies:

Textbook homework problems from each section are listed on the homework list (see web page) and will be due two class periods following the one in which the section covered by that assignment is finished. Selected problems from each assignment (usually even-numbered ones) will be graded. In addition to the problems from the text, there will be assignments from the workbook and in-class work that will count toward your homework grade.

Regular assignments will be worth 10 points. There will be a few longer assignments that will be worth more points. A few of the lowest scores from the regular homework assignments will be dropped, and the remaining scores will be averaged together to comprise your homework/quiz grade.

You are encouraged to discuss homework problems with me, with tutors, and especially with each other. However, you are expected to write up your own solutions. Most homework questions are to be handled in your instructor's office hours and in the tutoring room. On the day before the assignment is due, I will entertain questions for the first few minutes of class. I will discuss frequently missed questions in class when I hand back assignments.

Specific Homework Procedures:

- Homework is due at the beginning of the class period. No exceptions.
- Do your homework on regular 8.5 x 11" notebook paper. You may write on both sides of the paper. No fringes, please.
- Your name and the textbook section number should be written at the top of every page, with multiple pages should be stapled together.
- Each problem should be neatly written, with all intermediate steps included and the problem number clearly marked. Written explanations should be included whenever appropriate. Include units on answers. Graphs should be labeled, with the window clearly marked.
- You will not be given credit for problems that are not legible. If your handwriting is illegible, you will be given a warning, after which I will no longer accept your assignments unless they are legible.
- Because the few lowest homework scores will be dropped, late homework will not be accepted.

SAMPLE #4

Homework will be assigned regularly. Homework is an essential component of the course, and will help you prepare for the exams. Homework will be due at the beginning of class, usually on Monday morning and Wednesday morning. **No late homework will be accepted.** There will usually be a quiz at the beginning of class on Friday morning. The lowest 3 homework scores and the lowest 2 quiz scores for the semester will be dropped. Homework must be done in pencil (not pen). You may write on both sides of the paper, but multiple pages must be stapled. No fuzzy edges. Homework not complying with these policies may not be graded. Any solution or problem that is at all difficult to read may not receive any credit. Selected homework problems will be graded, and the total homework score will be scaled to be worth 75 points in the class. The total quiz score will be scaled to be worth 25 points in the class. Together, homework and quizzes will account for 100 points, which is one seventh of the total grade.

SAMPLE #5

The written homework and the in-class assignment/quizzes account for 100 points of your final grade.

Homework: You will usually have two homework assignments for each section we cover in the book. I will give you a list of homework problems and due dates at the beginning of the semester and after each test. This list will also be posted on the class web page. I expect homework to be handed in on its due date at the beginning of class. In case of an emergency, you may turn in your homework by 4:00pm on its due date to receive credit. (Bring it to the Math Bldg., Room 108).

I expect homework to be stapled (one staple per assignment, as needed) and readable. Right answers which are not accompanied by coherent back-up work will be worth 0 (zero) points in all cases. You may work together on homework, but you need to hand in your own write up of the problems.

Quizzes: Occasionally I will give in class assignments/quizzes. Assignment/quizzes may sometimes be open notes, but not always. They may cover both old and new material. Assignment/quizzes CANNOT be made up for credit.

? Q: Is there a common homework policy in Math 110 and 111?

A: The department has no pre-set standards for the distribution of grades in each section. Rather, there are sets of common standards for each course, in many cases including a common course policy, syllabus, and final exam. These standards have been established to help instructors and students understand what the goals and content of each course are, and to give guidelines for expected student outcomes. In Math 110 and Math 111, these standards are established in part through a course policy that is common to all students taking the course. However, you are responsible for making your own homework/quiz policy., with your supervisor's approval, of course.

? Q: Lots of students are asking if they can redo homework to improve their scores. Is this a usual thing?

A: It is usual in the sense that students will frequently ask for such favors, but it is not something that is normally done. When something like this happens to me, I usually tell them to put the actual score aside for the moment and consider WHY they got that score. I then try to get them to think about what they can do on future homework assignments to avoid such low scores. This usually serves to put the responsibility of the homework grade on the student's shoulders, which is where it belongs.

? Q: What do you suggest we do with students who forget to put their name on their homework assignment? Take points off? Throw it out?

A: Well, I definitely wouldn't throw it out. Perhaps taking off points (or not grading the homework) would be appropriate, or a warning might be in order. In general, when this happens to me, I grade the homework. Then, when I return those papers, I ask if there is anyone who did not get their homework back. Most of the time, the person will realize that they are missing a paper, and will claim it. And they don't usually do it again.

? **Q: My homework grades are low, and it is hurting students that are otherwise doing well. Should I try to grade the homework more leniently?**

A: Hmm. This is a tough one. It is important to set and maintain high standards for your class, if the expectations are reasonable for the level of the course. So, what is reasonable? Hmm.... an even tougher question. I would suggest asking your supervisor to look over a set of your graded homework, and give you feedback about your grading.

I would also question why the students seem to be doing well on exams, but not on the homework. Are they not taking the homework seriously enough? If you find that you have certain students whose homework grades don't seem to fit with their test grades, I would talk to those students. Find out what they have to say about their homework, and maybe you'll find that your strict homework standards are helping students to improve their exam scores!

? **Q: Do I need to grade every homework problem assigned?**

A: No. Not only is this not necessary, but you will probably drive yourself crazy trying to do this. You can select a certain number of problems from each assignment to grade. Just try to pick an assortment of problems that cover a cross-section of the material covered. Students don't really expect you to grade every single problem.

Classroom Issues and Sticky Situations

Scenarios

The following is a list of some situations that you might encounter during your teaching. How would you respond to each of these situations?



1. Several students continue to talk socially during class after you have asked them to stop.
2. The same few students in the front of the room answer your questions and seem to be driving the pace of the class.
3. After answering several questions, you find that you have gotten off track. There are 10 minutes left to cover your remaining 20 minutes of material.
4. Students are not responding to your questions. Some students look confused while others look bored.
5. You make a mistake at the beginning of a solution, but no one catches it. At the end, you notice that the answer does not match your notes.
6. A student with a lot of questions continues to demand your attention in class.
7. Students begin complaining amongst themselves. When you ask what is wrong, they reply “Nothing”.
8. You have just finished your lecture and there are 15 minutes left of class time.
9. A student compares you (unfavorably) to one of their previous math teachers.
10. A group of students are coming in late to class or are leaving early.
11. Students begin to “gang up” on you over an issue.
12. You have answered a lot of questions, but you feel you need to move on. The students are noticeably upset.

13. You make a mistake on the board. A student catches it and says “How do you expect us to be able to do this when you cannot even do it?”
14. In the middle of your lengthy (but appropriate) explanation, you hear “Just tell us how to get the answer.”
15. You are two days ahead of the syllabus prior to the first exam. The students have not been responding when you ask “Are there any questions?”
16. A student compares you to another instructor. “My roommate’s instructor curves tests, answers more homework questions, drops the lowest test score, etc.”
17. As you are trying to answer a question, you get cut off by the student who asked the question. The student says “Oh forget it”.
18. Several students in the back of the room are reading the newspaper after class has begun.
19. A student who has been struggling tells you “I will be gone for a week in October. Will I miss anything?”
20. You ask the students to hand in their homework and someone says “How can you collect our homework when you haven’t answered all of our questions?”
21. A student asks a very basic question and you hear another student say “That’s a stupid question.”
22. You have made a decision not to give a formal explanation (or proof), but a student asks “Why?” or “How do you know that is always true?”
23. Students ask “Why do you assign even problems? We do not have the answers and that is not fair.”
24. In the middle of a difficult or lengthy example, a student asks “Will this be on the test?”
25. Your students are working in groups and you notice that very little discussion about mathematics is taking place.

26. A student asks about a homework problem, but you answered that question on the previous day.
27. A student comes to your office hours asking for help on homework. It seems he/she is not attempting the problems before coming in.
28. A student says "I do not come to class because all you ever do is go over the examples in the book."
29. A student says "No one asks questions in class because we never understand your explanations."
30. "I never have problems with my homework, but your tests are impossible. Your tests are nothing like the homework."
31. A student comes to you a few minutes before an exam and says "Can I take the exam some other time? I couldn't study last night because I had to finish a term paper."
32. Half way into an exam you discover that some of the exams are missing a page.
33. A student says "My roommate is taking this class from another instructor and I looked at their exams and they are much easier than yours."
34. "I do not know why you took point off this question. I got the correct answer."
35. "I think you took too many points off for this mistake."
36. A student comes up to you after you have handed back the exam and says "you took points off for this question and I got the right answer." You suspect that they wrote this answer in after you handed back the test.
37. "Your test was too long. I know I would have gotten an A if I had more time."
38. "You are too picky when you grade. That is not fair when we do not have a lot of time to check our answers."

39. "I did not do well on this exam because I was sick when I took it."
40. Half way into the exam you discover a typing mistake. The mistake makes the problem extremely difficult or impossible to solve.
41. "I have no idea what to do. I study all the time and still cannot pass your tests."
42. "I have always been a poor test taker. I know this material. I deserve a much better grade."
43. "I have to get a B in this class to keep my scholarship." "If I do not pass this class, the university will not let me stay."
44. "I know I have not been turning in homework. Can I do extra credit instead?"
45. "You did not give our homework back in time to study for the test."
46. Your average on the first exam is an 85.
47. Your average on the first exam is a 52.
48. "I have never gotten a C in a math test in my life. There is something wrong with this exam."
49. "If I get an A on the final, can you drop my lowest test score."
50. "I have not handed in a lot of the homework. Can I do them and hand it in now?" (This is the end of the semester.)
51. You make a mistake on the board. A student catches it and says, "How do you expect us to be able to do this when you can't even do it? This won't be on the test, will it?"
52. Several students in the back of the room are reading the newspaper after class has begun. At the end of class, these same students start packing up 5 minutes before the bell rings.

53. A student says “My roommate is taking this class from another instructor, and I looked at her exams and they are much easier than yours. I would be getting an A if I were in her section.”
54. A student comes to your office hours after the test. “I have no idea what to do. I study all the time and I still can’t pass your tests. You said the average on the exam was 63%. Doesn’t that tell you something?”
55. One of the students in your class comes to office hours every time you have them. Lately, the student has been asking fewer questions and talking about more personal issues. It has become obvious to you that this student is flirting with you.
56. A student offers you a pair of basketball tickets “just because you’ve been so nice and helpful to me”.
57. You notice a student’s eyes wandering during an exam, and you think (s)he is copying from another student.
58. You find a student with a note tucked inside his/her calculator case, and you don’t know what’s on it.
59. You gave a test on Thursday. A student shows up to class on Monday with a Dean’s excuse and wants to know when (s)he can make up the exam.

? **Q: What will happen if a student complains to the department about me?**

A: Students who are complaining about their course/instructor are generally sent to the Math Center. After talking to the student, the Math Center Coordinator determines a course of action. In the case of a TA, that will usually mean discussing the situation with the TA’s supervisor or the course coordinator. In most situations, the supervisor/coordinator will meet with the student to discuss his/her concerns. After this has happened, if there is any merit to the student’s complaints, the supervisor/coordinator will talk to the TA to try to address any problems. Having a student complain about you is something that happens on occasion, and you shouldn’t panic about it. However, you should be aware that if you do anything out of line with University or Department policy, the department is likely to hear about it.

Disruptive Student Behavior & The Student Code of Conduct

As the scenarios above may indicate, there will be times when you have to think about how to handle disruptive student behavior. The best time to think about such issues is **BEFORE THE SEMESTER BEGINS**. You should establish expectations for classroom behavior in your course policy, and talk to students about these expectations. Some of the issues that you may want to address include: prohibitions on cell phone use, talking during lectures, sleeping in class, reading the newspaper in class, entering late or leaving early from class, the time and manner of student questions, etc.

In the case of a minor infraction of the rules, the best thing to do is to talk to the student outside of class to discuss the inappropriate behavior and the type of behavior that is expected in the future. In most cases, this will be sufficient to get your point across. If you feel like you need more “fire power”, feel free to discuss the situation with your supervisor, and ask him/her to be at the meeting with the student.

However, regardless of the rules you establish and in spite of talking to disruptive students, you may encounter individuals who do not comply with your expectations. In this case, you may need to invoke the Student Code of Conduct. In this case, it is important to follow the procedures set forth by the Dean of Students Office. You can find information about the Student Code of Conduct, policies, and procedures at <http://math.arizona.edu/~deemer/scoc.html>

? Q: My students are packing up their bags every day a few minutes before the bell rings. How do I get them to stop doing that?

A: Sometimes students do this because the instructor is slowing things down for the last few minutes of class. They figure that they won't miss anything if they stop paying attention. Sometimes students do this because they think they can dictate when the class will end. If they start packing up, you'll give up and stop. Generally, behaviors like this, once established, are difficult to change. Let students know that you are not finished, and you expect their attention until the end of the class. Make sure that you have enough material to carry you through to the bell, and don't slow down. Avoid looking at the clock yourself, if possible. Resist the temptation to give in to them, or 1 minute will turn into 2, 3, 5, etc.

? Q: What's the best way to deal with disruptive students immediately? Can I ask them to leave? (I know the best solution is to talk to them one-on-one, but what if they're really disrupting the class?)

A: Yes, you can ask a student to leave the classroom if they are being very disruptive, but only for the remainder of that class period. You may want to try to diffuse the situation by giving the class something to do (like a problem or two), and ask the student to step into the hallway to talk to you. I have done this before, and it worked okay. In general, it is best to avoid confrontational situations with students in front of the whole class. On the other hand, it is completely appropriate to let them know what the expectations for behavior are, and to control what is happening in the best way you can.

Using Graphing Calculators in the Classroom

There are lots of ways that graphing calculators can be used in the classroom to help students learning. The important thing to remember is that the calculator is just another tool that students should use to help them understand the material better.

For example, you can use graphing calculators in the classroom...

- To help support algebraic conclusions. This helps build student confidence that they have worked a problem correctly. In the students' eyes, this also adds to the credibility of a solution.
- To explore concepts through examples which lead to generalizations. This is a particularly effective use of the calculator, because it allows students to "discover" the mathematics on their own.
- To help minimize tedious "plug and chug" type of algebraic work. Some algebraic manipulation is necessary and useful, but sometimes it is extremely tedious. When the graph can help reduce guess and check type of work, this is especially convenient.
- To establish relationships between functions. The calculator can establish certain graphical relationships easily and convincingly. A good example is the relationship between the graph of a function and its inverse.
- To show the "big picture". Explore basic characteristics, including limiting behavior, range, continuity, etc.
- To demonstrate general behavior or trends. The calculator is a great way to establish patterns. You can graph a relatively large "family" of functions quickly, and pick out the similarities and differences. For example, you can graph even power functions, polynomials of degree 3, exponential functions with base greater than 1, etc.
- To get a good look at the "details". Zoom in on zeros or local extrema, examine issues of differentiability, local linearity, etc.

Tips for Using Calculators Wisely:

1. Use technology hand-in-hand with algebraic techniques. Demonstrate the two techniques at the same time. Use the graph to back up the algebraic conclusion or vice-versa. Emphasize the importance of algebra.
2. Demonstrate the limitations of the calculator. There are many ways in which the calculator is at a disadvantage to a person. Remind students that these calculators are relatively crude in that they are only plotting and connecting points, NOT analyzing the function for "unusual" behavior. The calculator isn't always able to handle asymptotes, holes in graphs, domain restrictions, and so on correctly. The calculator is also limited by the user's ability to find a proper viewing window.
3. Choose examples that highlight the need to know the mathematics behind the graph. The standard viewing window will not always give students the "right" picture. Emphasize the need to be able to anticipate the general shape of graphs, long-term behavior, asymptotic behavior, and other basic characteristics of functions.

4. Encourage students to analyze functions before graphing. Many students are easily misled by their calculator, and all too often become too dependent on it to second-guess what they see. A little analysis before graphing can help to build students' confidence in their own thought processes, and can help students understand the graph that they see, even if it is misleading. Encourage students to trust themselves over the machine.
5. Avoid "gimmicks" which bog down students but do NOT advance understanding. There are a lot of "interesting" things that the calculator can do, but not all of these things are worthy of class time. You should always weigh the potential benefit of any in-class activity with the amount of time it will take. Using matrices to solve systems of equations and having the calculator evaluate sums of sequences are two examples of things which would require a fair amount of class time, but do not necessarily enhance the learning process.
6. Emphasize that values obtained from graphs are only approximate. Although approximations are valuable, there are times when exact values or solutions are desirable or even necessary. Students should be encouraged to find algebraic solutions whenever possible, even when the answer is relatively clear from the graph. Of course it then makes sense for instructors to give examples that require algebra techniques to find the exact solutions.
7. Ask students to analyze what the calculator is doing. Sometimes, when the calculator is doing something "wrong", there is something to be learned from asking why it is behaving that way. This can help students to further clarify their own thinking about a concept.

? **Q: How often should I be doing calculator demonstrations in class, and how much should I emphasize "by-hand" calculations versus using the calculator?**

A: Balancing basic manipulative skills with graphing calculators can be tricky. Because graphing calculators are required for these courses, it is important to utilize them as another "tool" in the learning "toolbox". Your use of graphing calculators doesn't need to be constant. Think of ways to use calculators to enhance the students' understanding of concepts like the slope of a curve, or transformations of trig functions. Give the students ways to visualize what they are doing analytically. If you feel that a basic skill is very important for them to learn to do "by-hand", then by all means, tell the students your expectations, and find ways to make sure they are meeting them.

A good way to get a feel for what is reasonable and unreasonable to do on a calculator is to play around with the calculator yourself. This may also lead you to discover some good new demonstrations. Demonstrations where the calculator is a mere echo of the algebra are less useful than ones which require the students to make connections between the mathematics and what they see on the screen.



Some Specific Suggestions for Using Graphing Calculators

Topic	Some Ideas for Using Graphing Calculators
Graphing equations, finding intercepts	Graph equations by hand, then on calculator; find intercepts algebraically and verify on graph; discuss long-term behavior as seen on calculator – why does this make sense algebraically?; find a good viewing window for a graph, using basic characteristics
Lines, linear functions	Explore the idea of slope through graphs and using TABLE; graph families of lines to find similarities/differences; use TABLE to emphasize the defining properties of lines; linear regression; graph perpendicular lines and discuss why they don't look perpendicular on the screen
Functions	Explore domain graphically – use examples that are not easily seen in standard window; find domain by hand – use graph to verify. Use examples that underscore the value of finding domain when choosing a proper window. (e.g. square root of $(15 - x)$)
Even/Odd, Increasing/Decreasing, Transformations	Use TABLE to explain even/odd functions; determine if functions are even/odd algebraically and check by graphing; use view screen panel to demonstrate symmetry (turn it over, rotate it, etc.). Investigate where functions are increasing /decreasing /constant and turning points using TRACE and TABLE
Transformations	Investigate families of functions (what happens when you add a constant, multiply by a constant, etc.) and have students generalize the results; have students fit data to a curve using transformations, graph their curve, and make alterations when necessary (e.g. does the graph need to be horizontally compressed? vertically shifted?)
Operations with functions	Demonstrate sum/difference of functions graphically – have students explain what is happening; investigate the effect of $ f(x) $ and $f(x)$ graphically
Inverse functions	Graph functions and their inverse functions in the same window and ask what their relationship is (if students can't express it in words, you may want to have them graph $y = x$ in the same window)

Topic	Some Ideas for Using Graphing Calculators
Quadratic functions	Explore symmetry of quadratic functions through TABLE; use examples where vertex is outside the standard window or has non-integer coordinates; solve applications to finding max/min values graphically
Polynomials	Explore the general characteristics of polynomials by looking at several graphs; find zeros algebraically and check by graphing; show graph on overhead projector and have students discuss the characteristics and possible equation
Rational Zero Test	Graph polynomial first, make a guess at a zero or two, then use synthetic division find exact values of all real zeros
Rational functions	Explore long-term behavior (horizontal/slant asymptote) and behavior near vertical asymptote(s) by using graphs & TRACE, or using TABLE; zoom out on a rational function and find the equation of the "line" you see; ask students to explain what the calculator is doing where there is supposed to be a vertical asymptote
Exponential functions	Use graphs to explore the general characteristics of exponential functions; use TABLE to analyze horizontal asymptote; use TABLE to introduce the irrational number e as a limit
Logarithmic functions	Use graphs to emphasize the inverse relationship of exponential and log functions; use TABLE to analyze long-term behavior of log functions, emphasizing slow growth (compare to exponential, polynomials)
Limits	Use TABLE and/or EVALUATE program to investigate limits numerically; use TRACE to estimate limits graphically
Derivatives	To approximate the derivative at a point, ZOOM in around the point until the graph looks almost linear, TRACE to find the coordinates of two points on the "line", and find the slope between those 2 points; Use the DIFFERENCE QUOTIENT program to estimate the value of the derivative at a point; Use the NDERIV function to get the graph of a derivative function
Definite Integral	Use the RECTANGLES program to demonstrate Riemann sums; Use the LRSUMS program to approximate the value of a definite integral using a given number of subdivisions

Assessing your Teaching

There will be many opportunities for you to assess and revise your teaching throughout the semester. Your teaching supervisor will visit your class at least twice during the semester, and (s)he will meet with you afterward to give you feedback about what is going well and what needs improvement. Remember that these sessions are intended to be helpful, not to criticize, so take any suggestions as an opportunity to improve.

In addition to your supervisor visits, your class will be videotaped at some time during the semester. You should view the tape by yourself and make notes about your observations. Then you will want to share your tape with your supervisor, and get his/her feedback. Watching yourself teach can be a very effective way to see yourself from the students' perspective.

Your students will have an opportunity to assess your teaching and the class via an evaluation questionnaire at the end of the semester. These evaluations can be a great learning tool. Unfortunately, you won't be able to see them until after you've finished teaching the class! For that reason, you may want to give students a mid-semester evaluation that you can use to help you evaluate your strengths and weaknesses. The evaluation can be very simple. For example, you may want to ask just two questions: "What do you like about the course so far?" and "What could be done to improve the course?". Or you may want to give them something a little more elaborate, such as the example shown below:

A Mid-semester Survey

Please answer each of the following questions briefly but candidly. If you need more space, feel free to continue your comments on the other side of the paper. Your responses are confidential, and your participation is optional. I appreciate your input!

1. What do you like about the class/instructor so far?
2. What suggestions do you have for improving the class?
3. How many times have you been to office hours this semester? If you have **not** been to office hours, why not?
4. Have you been to tutoring this semester for this class? What tutoring service(s) have you used? If you have **not** been to tutoring, why not?

In any case, be sure to frame your questions in a way that you are soliciting constructive feedback, rather than negativity. For example, think of the difference between these two questions: "What suggestions do you have to improve the class?" versus "What do you dislike about the course?"

A Final Word about Evaluations

Don't be too hard on yourself when you get a negative evaluation. Try to glean whatever information you can from the comment and move on. You will want to look for patterns that emerge from the entire set of evaluations, rather than focusing on a few negative comments.

Advice From Former First Year TA's

As a part of their training, we asked some TA's at the end of their first year of teaching to write down some advice for new TA's. A summary of their responses is below. (Most responses are verbatim, with the exception of comments that came up in more than one response, which have been condensed for the purpose of brevity.) Learn what you can from their experiences.

- Keep up with the syllabus. Ask if you have any questions.
- Prepare ahead of time, and review as the topic approaches. Learn new technology to help with teaching.
- Set up clear policies and stick to them. If you're homework policy says no late homework, then NO LATE Homework! Once you give in on something, you pretty much have to let them do it the rest of the semester so stick to your guns! Along the same lines, bending the rules in favor of the students can come back and bite you!
- Stick to the textbook
- Be organized.
- Be firm, but give them the impression that you want to help them. Never accept late homework.
- Don't be excessively generous in grading homework or tests, since students need to know when they don't know what they are doing, and, if they get a good grade, they think things are fine.
- Make sure to stay on schedule and keep the class moving! Remember, your supervisor is a great resource.
- Freshmen have a very short attention span, so keep your class active.
- Have confidence in yourself.
- Be patient with students' questions, no matter how silly they sound. It's just great when they ask them.
- Don't let silence in the class after you ask a question bother you. Let them think.
- Grade homework and tests promptly.
- Expect to make mistakes on the board occasionally. It's not a big deal. Your students will appreciate you being human.
- When in doubt, talk to an experienced instructor. Talk with other TA's, share test questions, etc.
- Students will understand the information you present, but their algebra skills are very weak. So when they do the homework they are lost. Students will think they know the material already, although many really don't.
- Make sure you let students know exactly what you expect from them, like when homework is due and how it should be written and turned in. Be very firm with this.

- Do something at the very beginning of class that is worthwhile so that students will be there on time, especially if you have a morning class. (Quiz, quick problem to clarify a homework problem, etc.).
- Get students' email addresses so you can reach them when you need to. Keep track of attendance, just in case students complain.
- Save emails from students.
- Get students to come to your office hours in the first week. They will come in to see you more when they realize you want them there. Have homework due everyday for Math 110. Go to your supervisor to get ideas on how to present a section and to get ideas on what students know or do not know on a subject coming into this course.
- Always be on time.
- Learn their names, and use them.
- Don't get frustrated with your students when they don't seem to care. Use that as motivation to motivate them.
- Pay attention to suggestions about grading and detecting cheating. Most students are trustworthy; some are not.
- Tests don't seem to motivate students very well. Look for other sources of motivation.
- Teaching is more work than you think. It is also more rewarding than you think.
- Always have a good attitude. Never give up on your students.
- Have fun in class with students.

More Advice From TA's:

If I had this year to do over again, I would definitely...

- Do the same way, however more organized and objective.
- I would definitely use review sheets and write up sample problem solutions. You may think you've been overly generous with hints for the test, but if you don't give them a review sheet to actually work out, you'll be surprised how much they missed. The review sheet gives them a chance to see if they're ready for the test.
- I'd like to give them a sort of project.
- I would definitely try to get more class participation because only a few students actively participate.
- Use calculator and projector in class more.
- I would also put aside more time for my TA duties. It's very hard as a grad student, but if you're too rushed you can't enjoy it and it really can be very rewarding if you have the time to devote to it.

If I had this year to do over again I would definitely not...

- Give exhaustive (checking every concept & type) exams.
- Tell my students that this was my first time teaching and act like it too.
- Assume students remember material.
- Assume the students understand a particular concept when they really don't.