

Teaching Credit Courses to Adults

Opinions and Notes with an Emphasis on Computer Science

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The purpose of these notes is to stimulate thinking about the task of teaching adults – especially teaching them computer science.

The writer has spent years making teaching mistakes, but also discovering techniques that he has found to be beneficial. He is recording them here. Hopefully, the reader will accept some of these techniques: As for the rest, the writer expects that his ideas will stimulate the reader to think seriously about how to accomplish the same goals.

It is the writer's ultimate intention to gather the practices of good teaching in computer science from many sources: To do that, however, he thought it best to start by gathering his own thoughts. He is distributing this material and so to stimulate others to contribute their thoughts. The writer invites additions, alternatives, and comments. Please send these to ebraude@bu.edu. The writer is grateful to all contributors.

Except where explicitly stated, this work represents the writer's own techniques and opinions.

1 Introduction

There may be teachers for whom teaching very well is an effortless activity: For the rest of us, however, teaching well is a transitory occurrence, the result of much preparation and occasional inspiration. Experience helps, but so do exuberance and an excitement about our subject.

The requirements for effective learning by our students are as follows.

1. Know your subject matter well from a technical perspective
2. Communicate what you know in a clear and caring manner.
3. Set the bar high and do all that you can to help students get over it.

2 Interacting with Students

This section discusses interactions between students and the instructor.

Almost every professor who has taught continuing education students extols the benefits of teaching them. For one thing, continuing students are almost all motivated. They are also mature and, in many cases, experienced.

Tom VanCourt makes this additional observation: “In continuing education classes, especially in classes oriented to new technologies, there is a good chance that some students will know the material (or parts of it) better than the instructor. Those students can be valuable resources.”

2.1 Instructor Attitude

A principal reward of teaching is its unambiguous role as a service. Students perceive the role of instructors in the same way. For this reason, the writer believes that most students are favorably predisposed towards teachers because they expect dedication and a caring attitude. No subject is too technical or esoteric to obscure this.

2.2 Grades and the Student

Grades are a means to an end. They motivate students to work hard and learn the subject.

The means by which students are to be evaluated should be discussed openly with them in advance. These should be as fair, objective and transparent as possible. Objective standards can be very hard to establish in some areas: For example, how does one evaluate a student's software design? One should try to list the attributes that will be the basis for evaluation. In the case of software design, these could be *flexibility*, *maintainability*, *simplicity* etc. Such a list of criteria helps to make the evaluation process more objective.

The writer tries to remind students that grades are a means of motivation and measurement: They are not labels.

Grading techniques are covered later in this pamphlet.

2.3 Homework and the Student

Assigning graded homework is a principal way of getting students to exert effort. When he first began teaching continuing education students, the writer thought that adult students might not need the seemingly artificial motivation of graded homework, but for the vast majority of students this is not so at all.

“Homework also provides knowledge of a different kind than most people can get from books or lectures. One example, for beginning programmers, is updating a doubly linked list. It is easy to describe on the blackboard. The effort of implementing it, especially of debugging it, however, is an experience that the student has to have first-hand. It is typically much harder than the student would have thought. Well-designed assignments create the opportunity for the student to have educational experiences that can not be created any other way.” [TV]

Homework and test creation are covered later in this pamphlet.

2.4 Availability of the Instructor

Your students should feel that they can see you when they need to. Set aside times when you are guaranteed to be available. Invite students to make appointments with you at other times. Seeing students after class can be useful.

E-mail is an essential tool. “Good electronic communication may serve many of the purposes that office hours serve. Email works very well for many instructors. Students typically get answers within 24hr, rather than having to wait for assigned hours. In addition, instructors get to spend more time thinking their response through: An answer off the top of one’s head, face to face, may not be as complete. Most useful of all, professors are able to easily share one student’s concerns with the rest of the class by resending the message. When a student asks a question, it’s probably true that another wanted to ask the same question, but hadn’t been able to put words to the issue.” [TV] Course management software establishes a system for reflecting e-mail. The writer uses *yahogroups* (see, for example, <http://groups.yahoo.com/group/665Su2001> .)

“Regarding privacy of communication: Any issue that affects only a specific student or set of students is confidential. One usually treats questions about assignments, grading policy (but not specific grades), etc. as public information. However, every student has the right to ask that any question be answered privately.” [TV]

2.5 Plagiarism

Unfortunately, plagiarism is rife among students, especially using the Internet. Plagiarism has to be rigorously countered, not because we want to be policemen, but out of fairness to the majority of students who do honest work. Plagiarism includes copying from the Internet and from another source without proper attribution. Incidents must be reported to Assistant Dean Carl Sessa at 617 353 2977.

“Students may not know how or when to give proper attribution. Spend some time describing valid uses of work from other sources, and proper ways to cite the source. Try to create assignments with unique answers, so there is no chance of taking solutions from the net. It’s a way of helping honest people stay honest. Go over the plagiarism policy and the consequences in class. Some students seem not to realize the storm they unleash by copying. I had a special case of a married couple. I assigned them different problems, and this worked well.” [TV]

2.6 Teaching Students To Learn

Many professors use journals, professional societies, reference materials, the Web, tutorials, specifications, and published specifications: They do so in an almost automatic fashion. Many of our students have no knowledge of some of these sources, however. They should be told about them, and encouraged to teach themselves. (Thanks to Tom VanCourt for this reminder.)

3 Preparing for Classes

Good classes are a combination of preparation and communication. Class preparation can be divided into long-term and short-term phases. Long-term preparation can begin months in advance of the course. The writer performs short-term preparation for a given class on the day after the previous class. This allows him to take into account the state of the class. It provides ample time, as long as the long-term preparation has been performed. He also allows time for last-minute tasks on the day of the class.

“I find it helpful with long class sessions (two hours or more) to script the class in blocks of time. That way, I can pace myself during the class and know if I am running faster or slower than anticipated.” [JH]

Here are some of the most important parts of class preparation. A much more complete checklist is given in appendix 1.

1. Prepare the learning goals for the beginning of the class and a summary of goals accomplished for the end
2. Prepare notes with technical content
3. Prepare ways to make the class participatory
4. Include foundations or theory
5. Include real world experiences
6. Prepare an agenda for the class
7. Prepare homework and project assignment(s)
8. Prepare solutions for homework or test problems
9. Publish to the web

4 The First Class

Here are some pointers for your first class.

- Introduce yourself.
- Go over the course prerequisites. Be strict about this because a large factor lowering class standards is a lack of student preparedness.
- Discourage students whose background already includes the course contents
- Explain your availability and how to reach you.
- “It is important to not only convey information in the first class session, but to create some excitement about the subject matter. This can be accomplished by showing the importance and relevance of the subject, and by engaging students immediately in addressing some type of problem related to the subject. This not only suggests why the course will be valuable, but enlists the participation of students from the start.” [JH]
- Set high expectations.

The following comments apply to graduate courses. Tell students that B means “very good” and there is nothing wrong with a B. Tell them that A

means “excellent,” and that those wanting that grade will have to prove that they are indeed excellent.

Note that this puts an onus on you to provide them with a basis to prove their excellence.

- Go over the syllabus. Tell students what to expect week by week.

“I always suggest to faculty that they err on the side of over prescribing assignments. They can always be the students' hero by cutting back; on the other hand, faculty should not add work to the course that was not included in the syllabus.” [JH]

- Warn students about plagiarism, which you are obliged to report to the Dean. The Metropolitan College Student Academic Conduct Code is at http://www.bu.edu/met/students/conduct_code.html
- Tell students exactly how they will be evaluated. Here is an example.

The course will consist of homework, a midterm and one or more projects, weighted as follows:

Homework:	15%
Midterm:	25%
Project:	60%

The project will be in three phases, weighted as follows:

phase 1 (problem statement):	1/6
phase 2 (analysis & design):	1/3
phase 3 (implementation and critical review):	1/2

Parts of assignments evaluated equally unless otherwise stated.

The writer brings a hard copy of the class website to the first class for students' convenience. However, he also tells them to check Web material regularly because the content changes throughout the semester.

5 What to Do in Class: An Agenda Template

At the beginning of each class hand out the class agenda or write it on the board. This explains to students the purposes of the class.

The writer's agenda template is as follows.

1. Write this agenda & the class goals for tonight on the board
2. Take attendance

- (Know who shows up and who does not: Being there, in the case of face-to-face classes, is part of learning)
3. Review syllabus status
(Where the class is at this point in the semester)
 4. Present and discuss the subject matter for the class
(To aid concentration the writer usually splits this in two parts with other topics such as homework review in between)
 5. Review solutions and hand back graded homework
 6. Assign homework and projects; explain the requirements
 7. Review ongoing homework or project assignments
 8. Present and discuss the rest of the subject matter for the class
 9. Present and discuss backup topic prepared in case you end your main topics early
(Avoid ending class before 9 pm or going past 9)

6 Classroom Techniques

6.1 Securing the Involvement of Students

When students are actively involved they learn well and they enjoy the class. This is particularly true of evening classes since students work all day; it is particularly true too of classes that last over an hour as ours do. There are several techniques to attain class participation.

Always encourage questions. This includes

- Involving as many students as possible
- Having student feel free to express their ignorance (after thinking about the issue first)
- Encouraging students to answer each other's questions (before answering a student's question, consider asking the class if anyone can suggest an answer)
- Encouraging students to question what they hear; not to accept received wisdom uncritically, including yours
- "Some questions need to be answered after checking references outside of class. ... Students seem to feel a motivating sense of reward when their questions are taken seriously enough to be worth extra effort and class time." [TV] Be sure to follow up, however, Tom VanCourt points out.

"Most faculty do not know how to pause for student questions or comments. Too often, even a few seconds of silence make the professor uncomfortable. Discipline yourself to give students a chance to think and to speak. This requires the patience to pause periodically." [JH]

A good way to encourage questions is to invite them at many points during the class. If "are there any questions?" draws too little response, mention a potentially difficult point, and encourage questions about it specifically.

When students ask questions, “instructors can often misunderstand student questions and statements. Beginners won’t always have the right vocabulary for describing an issue. It may even happen that you don’t realize what was being asked until after the class has ended. It’s worth the extra time to check the sense of the question and, if needed, give a more suitable answer.” [TV]

For some subjects it is effective to introduce activities for small groups in the class. For example, here is an activity that promotes the learning of knowledge acquisition and rule formation in Expert Systems.

- (1) Identify an expert system application that seem to be difficult to express in terms of rules. (Note: Must be an expert system; avoid sensory problems, for example) Express it in about two sentences.
- (2) When indicated, hand this to the next group. (This progresses in a circular fashion)
- (3) Try to express key issues of the expert system application you have been handed using 4-8 rules.
- (4) When indicated, hand the problem statement to next group.
- (4) Develop two basic queries from the problem statement you have been given.
- (5) Use your rules to solve the given queries.

Properly designed activities are interesting, engaging, and a time-efficient way for students to gain understanding.

Some instructors grade students on classroom participation, and this can be a perfectly fine technique. The writer does not, because he usually gets productive classroom participation without it.

The vast majority of questions are effective for the class as a whole. Some are not, and should be responded to off line. Identifying these is a matter of experience. We have probably all wasted class time being drawn into discussions that would better be conducted after class.

Ensure that questions come from a large cross section of students. Not every student will want to ask questions: It is not in everyone’s nature to do so. However, the majority of students should have questions at some point, and you can invite questions from an inactive section such as “are there any questions from the back row?”

6.2 Pacing Your Classes

Start on time. Some students arrive x minutes after you begin teaching and “x” is usually constant. Starting late to cater to them is a waste of time. “It also devalues the effort put in by other students at being punctual.” [TV]

“There are ways to signal that class starts on time. Discuss important matters at the beginning of class (and do not give positive reinforcement to those who come late by

either waiting for them or by repeating points you made). Close the door about ten minutes into the class. Pause when someone arrives very late, and acknowledge the person.”[JH]

Three hours (and a half during the summer) is a long time for students to concentrate. The writer take two 15-minute breaks and thinks this works well. Announces the times for reconvening, and be punctual in resuming class. Students are able to ask questions during breaks. Some students ask about eliminating all breaks and ending at 8:30 instead. This is a spurious application of arithmetic.

6.3 Effective Slide Presentations

[see future editions]

7 Student Use of Software Tools

This section concerns the use of software tools by students. Rational Rose is an example. Consider the following.

A course can be significantly enhanced by the judicious use of tools in the following ways.

- Students gain hands-on learning
- Students may enjoy the course more
- Students can point to tool experience as a job hunting benefit

There are downsides to the use of tools. These include

- Too much tool use can replace course content with a superficial “how-to” information
- There can be long learning curves that sacrifice the learning of concepts.
- “Tools change more quickly than basic principles do, so tool-based knowledge will have a shorter useful lifetime. Students sometimes jump at the concrete rather than the abstract parts of a class, and may mistake tool use for knowledge.” [TV]

In some cases one can allow students to use tools if they wish, but learn how to use them on their own. You can have students report to the class on the costs (including time to learn) and benefits.

8 Tests and Homeworks

The purpose of tests and homework is to motivate students and to provide them with timely feedback.

There are many forms of testing, including question / answer, multiple choice, and project work. There are take-home and in-class forms of each of these. Some instructors give a short quiz at the beginning of class to ensure that students have fulfilled their reading requirement.

Several forms of testing should be used in a course rather than just one. This contributes to fairer evaluations, and gives each student the opportunity to excel in the forms that suits him.

8.1 Reducing Grade Inflation

An excess of easy test problems is a significant source of grade inflation. It is unfair and educationally unsound to address grade inflation by nitpicking answers to easy questions. It is far better to set challenging (but not impossible) questions, and grade the answers naturally. This places the burden on the instructor to prepare students for challenging questions in the first place.

For upper-level graduate classes, include open-ended questions. For example, ask for improvements in a design or implementation. On projects, ask for critiques and some original thinking, classification or organization. This prepares students for the way in which bachelor's and especially M.S. engineers should be working in business and industry.

8.2 Creating Questions

It takes quite a bit of effort to create a good test question. Here are some ideas for creating tests.

- Develop solutions for each question in advance of giving a test. The writer has made many a mistake assuming that an answer is easy or straightforward, only to find that the problem is actually very difficult: Or vice versa, thinking a problem challenging, but finding that there is an easy solution. Eventually, you will have to solve all problems yourself anyway in order to grade it, so why not do it up front.
- Think of a test as a means to get a student to learn something. In this sense, tell students what the test will cover. Time that students spend studying unimportant topics detracts from what you want them to study.
- “Consider including questions that connect the most recent content with what was learned early in the semester. There is nothing wrong with expecting cumulative understanding of the material, which then reinforces the long-term memory of the material.” [JH]

- Be sure that the problem statement is clear. The number of interpretations of an unclear English sentence can be very large. When the problem statement is not clear, you need to understand how each student interpreted the question to be fair and, if this interpretation is reasonable, grade relative to this interpretation. This can be very unproductive.
- Make about 20-30% of the test truly challenging. This is where you can distinguish excellent performances: If there is no such component, you get a vanilla, inflated grade distribution.
- Make 20-30% of the test very straightforward. Allow all students to show that they have learned the fundamentals.

8.3 Grading criteria

If you can, specify in advance how questions will be evaluated. This helps students to focus their energies and it creates an atmosphere of fairness. For example, a criterion could be “accommodates the two most important ways to make the design flexible.” The student has the responsibility to assess what those ways are, but this helps to focus the student’s energies where you believe those energies should be focused.

8.4 Other Points in Creating Test and Homework Questions

- Students are not generally motivated to produce outstanding work when the grade is pass/fail: Use pass/fail when you want students to learn something binary in nature (either you know it or you don’t). Consider using pass/fail homework at the beginning of the semester to get students accustomed to your style. This helps you to be demanding from the beginning without penalizing students who needs time to adjust to your teaching and evaluation style.
- Your first few assignments help students to learn what the teacher’s grading criteria mean and how to interpret later assignments. Teachers present assignments differently from one another and students needs feedback to make sure they’ve understood your personal style.
- Have students write their names on the back of the question paper rather than on the front. This reduces the possibility that you will be subjected to bias. You can write the grades on the back. This saves some time in recording the grades and it allows students to pick up their homework from a pile without compromising their privacy. To identify their papers without turning them over, students can recognize their own handwriting or use a four-digit number for the front of the paper.
- Avoid giving exam questions on topics that you have not covered thoroughly both through class work and homework. Note that this results in a significant gap in time between the coverage of topics in class and tests on those topics. If you have

specifically asked students to read and prepare material you have not covered yourself, then it may be acceptable to test them on this.

8.5 Examples of Tests

Ask your colleagues, especially the full time faculty, for examples of their tests and homework assignments. The writer is glad to share the writer past exams with faculty. Contact him for his 665 summer 2002 final, for example, at ebraude@bu.edu.

9 Assigning Projects

We often assign projects to our 600- and 700-level classes. You can allow students to select their own subjects or you can assign the same subject to all students. You can assign projects to teams or to individuals. Here are some of the pro's and con's.

9.1 Single Subject vs. Subject Selected by Students

The advantages of a single subject for the entire class are as follows.

- Clearer grading criteria
- Better definition of expectations
- It can be instructive to compare different approaches to the same problem
- "It is easier to ensure that a teacher-selected problem supports specific didactic goals." [TV]

The advantages of allowing students to choose their own subjects include the following.

- Students are more motivated because the subject is their own idea. When give a choice, students usually choose topics of their own instead of those announced by the instructor.
- Students can learn from the diverse experience of others
- There is less possibility of plagiarism

Consider having a mixture: Some students work on a predefined subject and the rest choose theirs.

9.2 Team vs. Individual Projects

It is difficult to fairly evaluate team efforts and individual efforts on the same assignment: Better aim to give all individual assignments or all team assignments.

The writer generally encourages students to work on projects individually. He forms teams only when learning the team process itself is a goal of the course. An example of the latter is Software Engineering.

Many student teams function harmoniously, with everyone contributing more or less equally. A common problem with student teams, however, is uneven contribution. This can be difficult to address. The writer provides team members with an option to evaluate each other. This provides students a way to redress unfair contribution levels and rewarding exceptional contributions. Here is an example of how this can work.

All members of the group will receive the same grade for each joint submission, factored by peer evaluations within the group. To fulfill your peer evaluation option, you must individually send me e-mail after the group's final submission is made, apportioning your evaluation of the relative contribution of each team member to the group's performance as follows. Be fair and rational. Suppose that your group has n participants. Apportion $10(n-1)$ points among the team members excluding you. For example, members of a team consisting of A, B, C, and D could be evaluated by member B as A=8, C=12, and D=10. The effect of peer evaluations will be decided by the instructor near the end of the course on a team-by-team basis. Students have the option to decline to provide peer evaluations by simply not e-mailing me one.

In the writer's experience, this option is exercised about one in ten projects.

Regardless of how ones deals with these issues, remember that grading decisions are the prerogative of the instructor, and not of students.

Dealing with underperforming team members is part of the learning experience, but it should not be allowed to infect other aspects of the learning process. You can remove a non-performing student from a team and give him individual work, which is usually preferable to allowing significant continuing team discord. The disadvantage is that the student in question does not obtain the team experience that you may require.

10 Grading

Grading takes up a significant amount of time. Here are some pointers to using that time well.

10.1 Preparing to Grade

- If you don't grade anonymously, grade first what you guess will be the best 1-3 papers. This sets high expectations, and helps to prevent grade inflation. If you are correct about your choice, the papers in question probably get an "A", and the rest of the papers are calibrated against this standard. If you choose a mediocre or poor paper first, accidentally give it a "B," possibly a B+ or A- (hopefully not an "A"!), then you must give better papers a higher grade, pressuring you to call undeserving papers "excellent."

- “It is helpful to read a few papers before grading any of them. This helps calibrate the instructor’s expectations before assigning scores.” [TV]
- Try expressing common errors by writing a numbered list of them and distributing the list to all students. You can cite the applicable errors in your grading by number. You can even hand out the list of errors to the class in advance so that students will tend avoid the listed mistakes. Use the list to evaluate students. If you do not have a pre-existing list, you can write each error description as you encounter it in student papers.

Tom VanCourt points out that when many students commit the same error, it is an opportunity for the instructor to improve instruction in the future to focus on the issue when teaching.

The writer divides errors into three groups as shown in the example below. Errors in the *Most room for improvement* category usually result in the loss of a full grade in one or more of the evaluation criteria. Errors in the *Room for improvement* category result in the loss of a half grade, and those in the *Small room for improvement* category $\frac{1}{4}$ of a grade. This increases grading consistency, provides an explanation for the evaluation, and teaches students about the subject.

When a student’s paper contains one of these errors, the writer indicates this by number on the paper. For example, R3 α means that the third issue listed under “Room for improvement” applied in the student’s paper, resulting in the loss of half a grade in criterion α .

Here is an example of a list of errors.

Most room for improvement:

1. Loops should show the arrow returning to a choice diamond.
2. Pseudocode is not the same as source code. Its advantage is that it is comprehensible English. Usually we should be able to use it without change as useful comments to the source. Using code for pseudocode removes the advantages of pseudocode and merely doubles the work.
3. Postconditions and preconditions should not reference variables local to the method: They concern the method’s external environment and effect.
4. Use English for the words on activity charts if possible. This provides added value rather than merely representing the code in a graphical form. Activity diagrams precede code.

Room for improvement

1. On choices (diamonds), state a condition on one side and “else” on the other. This is standard UML. It is usually safer than specifying the positive and the negative conditions, which can leave gaps in conditions when an error is made. The UML convention also maps to the code more faithfully.
2. Pseudocode and flowcharts apply to specific methods: State clearly which ones.

3. The comments in the code should match those in the flowchart and/or pseudocode when they correspond.
4. Postconditions specify state after the completion of the method. They are not intended to describe an algorithm. If you want to specify that an output sequence has taken place, you can describe this as follows. "X has appeared, Y has appeared" If you need to describe the algorithm, do it separately.
5. Choice diamonds are set up for two-way choices. Don't use them for more than two.
6. Several of the questions concern "the application," such as making it more flexible. The answer to such a question should be given in terms of requirements of the application, not in terms of classes and functions. The latter are design responses to flexibility of the application.
7. Each pseudocode line should appear, typically, as a comment preceding each line or set of lines of code.
8. Use expressive names; e.g., don't waste an opportunity by using a name such as *hashTable*; Use *nameAutoTable* instead or perhaps *nameAutoHashTable*
9. Make a clear distinction between pseudocode keywords and non-keywords. This helps to clear up doubts about the meaning of the algorithm.
10. "Reusability" applies primarily to the parts of a design. A class (current or envisaged) can be reused, for example.
11. In giving preconditions, don't list the circumstances under which the method can be called (e.g. "retrieve button was pressed") unless *necessary* to the execution of the method. A method can be used in many possible ways, and it is not the responsibility of method documentation to list them (usually not possible anyway).
12. When "reusing" pseudocode as comments, intersperse it with the code rather than listing it in one block at the head of the code.

Small room for improvement

1. The trouble with drawing flowcharts by hand is that they are difficult to modify. As our understanding of a problem improves, we usually need to redraw parts of a diagram. Powerful tools are available for this kind of purpose, but even using Visio, or PowerPoint with the "connector" feature, can save a lot of time.
2. Reduce tab width and font size to avoid line wraparound except in rare cases.

10.2 General Points Concerning Grading

- "Return work promptly. Discipline yourself to tell students when they can expect tests, papers, and projects to be returned, and try to do so by the following week." [JH]
- "Students are not generally motivated when work is allowed to be returned late. Take your deadlines seriously: If you don't, students won't either." [TV]
Stretching deadlines also causes unfairness in the time available for students to

complete assignments. The real world is one of deadlines, and our students need to be trained for this.

- Each time you subtract points on a test or homework, explain your reasons. Students have a right to expect comments for exercises on which they obtain a poor grade. The writer tries to always provide comments if the grade is less than an “A.” (See also the discussion above on explanations.)
- The first few exam papers will take you much longer to grade than the rest. The writer typically finds that the first five exams take about three times longer than the next five.
- If the writer does not understand a student’s solution, he has found it best to ask the student to see him to explain. This is fair to the student. At the same time, the evaluation has to be based on what’s written, and not substantively on additional contributions made by the student when interviewed.
- It’s an easy trap to fall into the practice of merely criticizing. Remark on good work too, which you will find in abundance. One effective practice is to look for good or even satisfactory work every time you make a corrective comment.
- Before the end of the semester, show students the grades that you have on record. This can prevent mistakes, which are likely given the complexity of the grading and recording process. Online class-management tools usually allow students to inspect their records at all times.
- Do not allow students to pass in work beyond the end of the semester unless you have assigned them an “Incomplete.” Rules for the legitimate assignment of an “Incomplete” can be obtained from the Dean’s office – or consult the faculty manual. Courses have time limits, and it is not appropriate or fair to stretch the semester without a special reason as specified in the “Incomplete” rules.
- Many companies tie their educational reimbursements to grades. The writer deals with this by pointing out at the beginning of his courses that my average graduate grade is usually a B+, and that student whose company reimbursement policy are at odds with this should discuss this with him. None ever has. He has heard exaggerated accounts of failure to reimburse. For example, it is sometimes claimed that student must receive an “A” to be reimbursed, but this is rarely true. We must be sensitive to the reimbursement issue, but reimbursement is a corporate issue and not a University responsibility.

10.3 Preventing Grade Inflation

It is hard for many students to realize that “A” does not mean “good” or “very good:” It means “excellent.” Remind them continually.

Grading “on a curve” usually means assigning numbers to papers, then grouping number ranges into grades (e.g., “38 – 45 are A’s”) after the fact. Sometimes the grouping is done before the fact.

The writer has graded on a curve for some classes, especially beginning classes, but uses absolute grading for more advanced courses. In other words, he gives a grade for work that reflects his assessment of whether or not this work is “excellent,” “good” etc. He finds it consistent to always ask the question “If this student were to do work at this level through the entire semester, what grade would he deserve for the course?” You can use “B+” as the baseline for an average graduate performance. The writer also assigns an “A+” grade at times, otherwise a student would have to obtain an “A” for every graded piece of work – a virtual impossibility – to get an “A” in the course. However, he gives an “A+” only when the *question* is challenging enough and the answer is outstanding – otherwise “A” is the highest grade.

Don’t start the semester being lax about grading, and then end it by being strict to lower the grade average. This is unfair to students and de-motivating for them.

Since grade inflation is systemic, upon receiving a “B,” students will often ask “what’s wrong with it?” An acceptable answer is “nothing: It’s very good. I don’t consider it *excellent* because to be excellent,” At the same time, you should give students the opportunity to attain “A” work on every problem.

“Experienced and full-time instructors can be very helpful in explaining a department’s grading policies – they may not be what you expect, even if you’ve taught elsewhere.”
[TV]

10.4 When Student Question Your Grading

Regardless of how careful you are in stating questions, they will be misunderstood by some of your students some of the time. The writer’s rule of thumb is to ascertain how the student understood the question, and then evaluate them based on this understanding. He makes an exception to this when the student misunderstands a very hard problem as a very easy problem. The writer recommends giving them a “Pass” or “Fail” grade for this. A “pass” means that their grade is averaged from of the remaining parts. If you are sure that a student has willfully interpreted a hard problem in a way that replaces it with an easy one, grade accordingly: The student is entitled to the benefit of any doubt, however.

Whether or not there was misunderstanding of your questions, some students question some grades. It is their right to ask for explanations and it is the instructor’s duty to explain evaluations. Here are a few points concerning this process.

- Instructors are required to provide their unbiased opinions and evaluations. The discontent of a student with a grade does not necessarily signify a problem.

- The desire of a student to obtain a higher grade is not, in itself, adequate justification for a re-evaluation.
- “Make it clear to your students that if they request that you re-evaluate and perhaps re-grade something substantial in a test, paper, or project, that your evaluation will be zero-based -- that is, they run the risk that the grade might be lowered as well as raised.” [JH]

10.5 Time Management

Grading is very time-consuming, and this can inhibit instructors from giving enough homework. However, grading need not be very time consuming if you concentrate your attention on key points. In particular, it may not be necessary to grade every single paragraph in a computer science paper. To assess how well a student has understood an issue, there are usually a limited number of key places to look. If you do focus like this, tell students in advance that you will concentrate on key issues -- otherwise, they can feel that their work is not being appreciated, or that there is chance involved in your grading. If your selection concentrates on the most important issues rather than random issues or sections, then selection can be fair and productive.

To maintain your concentration while grading, consider evaluating papers in small batches, interspersing each batch with a few hours of non-grading work.

“Graders are human, and they will find some students exasperating. Approach student work with a cool head.” [TV]

11 Evaluations

MET instructors are evaluated by students. You can obtain a sample evaluation form from the Dean’s office at any time. For logistical reasons, you do not receive the results of this process until well after the semester is over.

It is wise to obtain feedback while the semester is in progress. Your first sources for this is regular communication with students. Their questions, comments, and test performances provide continual feedback.

The writer requests (unsigned) feedback from students about one third of the way through the course using a simple form. The form has the following sections, with space for narrative responses.

ASPECTS OF THE CLASS AND INSTRUCTION YOU WOULD LIKE RETAINED:

_____

ASPECTS OF THE CLASS AND INSTRUCTION YOU WOULD LIKE CHANGED:

_____

OTHER COMMENTS

In the writer's experience, it is necessary to allow 10 minutes of class time for this process: Asking students to fill these out at home does not produce enough returned sheets. The writer finds students' responses very useful, and refers to them throughout the course.

The writer has experimented with encouraging students to provide anonymous feedback at any time – using *hushmail*, for example. Few if any students have responded.

12 Resources

[This section is mostly “under construction”.]

View the department's website through <http://www.bu.edu/met/programs/> or contact the department to arrange the following.

- copying resources
- advice from full time instructors
- past syllabi
- *CourseInfo* course management software
- points of contact in the department
- available software
- advice on getting your work published
- lab facilities
- lab scheduling

Be sure that you have the MET instructor manual.

13 Conclusion

Enjoy your classes: It will make your classes much more enjoyable to attend.

The writer once again invites additions, alternatives, and comments to this pamphlet. Please send these to ebraude@bu.edu. Alternatively, if you possess a soft copy of this, intersperse the original with your comments and contributions. You can consider using the Word “Notes” style for this. Please state whether you are giving permission to the writer for your contribution to appear in all other media. You will be gratefully acknowledged as the source in any case.

Contributors

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Appendix 1. Thorough checklist for class preparation

Here is an extensive checklist for class preparation. Several of these activities are elaborated on in other parts of this pamphlet.

1. Precede material with a global roadmap
2. State class learning goals up front
3. Motivate and provide introduction: Frame the subject
4. End class with an account of goals accomplished
5. Account for course feedback from previous classes
6. Fix errata in existing notes
7. Establish a group web site /forum
8. Update notes from new external sources
9. Prepare notes with technical content
10. Check material for technical challenge
11. “Check for currency. It may be wise to check references again, to see if a new edition/version has come out since the last time you looked. Some newer editions *omit* information you may have seen in older editions.” [TV]
12. Check details
13. Include more source code?
14. Compare the latest versions of languages etc., and the most widely accessible versions of languages. “The latest is ideal, but may be expensive, unstable, or hard to locate.” [TV]
15. Prepare ways to make class participatory
16. Check the order of topics
17. Read & leverage the course textbook
18. Coordinate with principles covered in the text
19. Insert section headings in your notes
20. Include real world experiences
 - a. Your own
 - b. Those of others
21. Avoid too many bullets in your materials
22. Create more diagrams and pictures?
23. “Create more *effective* pictures and diagrams. Test your pictures,— does another person really see what you hoped she would? If anything, pictures seem more subject to misunderstanding than text.” [TV]
24. “You’ll probably test your sample code on a real machine. You may test your text on colleagues, to confirm its completeness and clarity.” [TV]
25. Assess your use of color. You may need to use more color, but “use better design, which may mean using less color. Tufte’s books are excellent sources, but graphic design guidelines may help.” [TV]
26. Make header with date
27. Make notes footers
 - a. title

- b. date
 - c. pagination
 - d. copyright
28. Make bullets and slides transition appropriately
 29. Make an agenda for the class
 30. Make full, separate code listings
 - a. Include line numbers
 - b. pagination
 31. Make solutions for problems
 32. Consider a style template (the writer finds most of them distracting for technical material)
 33. Post case study and templates
 34. Consider in-class group activity
 35. Prepare homework and project assignment(s)
 - a. Check exercise errata
 - b. Ensure challenging
 - c. Pass/fail part(s)?
 - d. Assign paper(s)?
 - e. Make exercise completely detailed (Ensure students know what they are supposed to do)
 - f. Prepare solutions
 - g. Create special assignments (e.g., for experienced students)?
 - h. Emphasize technical aspects to avoid receiving “marketing pieces”
 - i. Prepare homework template?
 - j. Write out problem statements clearly
 - k. Provide clear and objective grading criteria & allocation
 - l. Explain grading criteria
 - m. Try to specify what students have to do to get an “A” etc.
 - n. Name the homework?
 - o. Number the homework?
 - p. Enter assignment into web?
 - q. Set length (page) limits?
 - r. Require tabbed response?
 - s. Give examples
 - t. Post starter code?
 - u. Provide samples of past homework and answers?
 36. Prepare backup topic in case you run out of time?
 37. “I keep a dozen or so mini-lectures in my back pocket, 10-30 minutes. They are directly related to the course topics, but have very little direct continuity with the syllabus or with each other. I do not hold students responsible for these addenda. In my case, the mini-lectures are advanced Java language features, programming techniques, etc. .” [TV]
 38. Schedule student presentations?
 39. Prepare demo’s
 40. Run off papers for handout if permission is available
 41. Conduct your own midcourse evaluation to get feedback?

42. Is there a project assignment this week?
43. Publish to the web (e.g., homework due times, glossary, references, appendices, boilerplate)
44. “In particular, publish each week’s slides on the web. If the class notes are available by noon on the day of the (evening) lecture, that seems adequate lead time for most students.” [TV]
45. Create or review for midterm?
 - a. create mock midterm?
 - b. announce midterm
46. Optional homework for extra credit? (this is not always a good thing)
47. Identify recommended readings; include the textbook
48. Paginate notes
49. Impose transitions between lecture sections
50. Make special lecture copy of notes?
51. Attach line numbers to listings
52. Post material / updates to the web? – distance students/boilerplate ...
53. Print
 - a. handout version of notes without solutions
 - b. the class agenda
 - c. code listing test problem project handout
 - d. homework cover sheet?
 - e. web material for this class
 - f. notes for next week(s) in advance?
54. Post notes and assignments?
55. Order projector or video player?
56. Print out grades for student inspection?
57. Publish encoded contents of grade book?
58. Compute & report average grade on last homework?
59. Xerox or present best homework solutions?
60. “I also do the opposite – I review each homework assignment with emphasis on common problems. I never leave the problem attributable to any particular student, but I think learning from errors has a place. Properly anonymous, no one has complained about this.” [TV]
61. Record homework grades
62. Prepare an attendance sheet for class
63. Order required software for yourself or the lab?