MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CENTER FOR THEORETICAL PHYSICS

ROOM 6-209
77 MASSACHUSETTS AVENUE
CAMBRIDGE, MASSACHUSETTS 02139-4307

Phone: (617)-253-6265
Fax: (617)-253-8674
GUTH@CTP.MIT.EDU

Alan H. Guth
Victor F. Weisskopf Professor of Physics
Margaret MacVicar Faculty Fellow

To: 8.01 Students
From: Alan Guth
Subject: Information about the final exam
Date: April 27, 2005

Dear 8.01 Students,

As it says on the course web page, there will be an exam in 8.01 during the Final Examination period. However, since the weekly testing during the term has been quite extensive, this last exam will not be a traditional final exam. Instead, one third of the exam will substitute for the weekly quiz on the last week's material, and it will contribute to your grade exactly as if it were the 13th weekly quiz. The remaining 2/3 of the exam will be used as a "make-up" exam, which will offer you the opportunity to prove that you learned more than was demonstrated by the weekly quizzes.

While the first 1/3 of the final will count as a 13th weekly quiz, it will differ from the others in that it cannot be the quiz that is dropped. The reason for this restriction is related to the intrinsically cumulative nature of the subject matter of 8.01. If any of the first 12 quizzes is dropped, the material included on the dropped quiz will generally resurface on later quizzes and will still have some reflection in a student's final grade. If the last quiz were dropped, however, then a whole week's work would have zero influence on the student's final grade, which I view as inappropriate.

The details of how the make-up part of the final exam will count were not described in the original web page posting, but have now been worked out. I am using PDF for this memo so that I can take advantage of equations in describing how the make-up part of the final exam will count in determining your grade. The memo is a bit longwinded (even by my standards!), but I am trying to avoid any possible misunderstanding.

First, the average of your 12 weekly quizzes during the term would be calculated, dropping the lowest of these quizzes. If there are excused absences, they will be processed as described on the course web page, assigning to each excused quiz a predicted grade based on the student's performance on the quizzes he or she has taken. The details of the predicted grade calculations will be explained in more detail at the end of this message. The predicted grades will be calculated first, then the lowest of all the 12 weekly quiz grades will be dropped, and then the remaining 11 weekly quiz grades will be averaged to obtain a term weekly quiz average, which I will call $\bar{Q}_T$. I will call the grade on the make-up part of the final G_{MU}. A new term weekly quiz average, $\bar{Q}_N$, will be computed according to the following formula:

$$\begin{aligned} &\text{If } G_{MU} \le \bar{Q}_T \text{ , then } \quad \bar{Q}_N = \bar{Q}_T \ ; \\ &\text{If } G_{MU} > \bar{Q}_T \text{ , then } \quad \bar{Q}_N = 0.65\,\bar{Q}_T + 0.35\,G_{MU} \ . \end{aligned}$$

In words, if your score on the make-up is lower than your previous score, the make-up does not count. But if your score on the make-up is higher, then the make-up will be counted as 35% of your term weekly quiz average. In either case, your final quiz average will be calculated by including the 13th weekly quiz grade, Q_{13}, which is your grade for the first 1/3 of the final exam. Your final quiz average $\bar{Q}_F$ is then

$$\bar{Q}_F = \frac{11}{12} Q_N + \frac{1}{12} Q_{13} \ .$$

The final quiz average $\bar{Q}_F$ will count 75% of your total grade for 8.01, as specified on the general information page of the course website.

While the questions on the final exam will be divided into a weekly quiz section of $1/3$ the total length and a make-up section of $2/3$ the total length, you will be free to distribute your time in any way you wish.

Finally, I would like to announce a shift in course policy that will affect a small number of students. We have received a larger number of requests for excused absences than we expected, and for some students it has reached the point where a significant fraction of the course work will be excused. In order to assure that the grades in 8.01 give a reasonable reflection of the student's mastery of the relevant material, we are introducing a small change in our policy concerning missed quizzes. The acceptable reasons for missing a quiz will remain the same, but from now on, when a student with four or more missed quizzes (whether excused or unexecused) is unable for good reason to take the quiz at the regular time, we will try to arrange a make-up quiz at a later time, rather than to use an excused absence.

I hope you have enjoyed the course so far, and the last unit — on special relativity — should be especially interesting.

Best wishes,

Alan 

P.S.: Elaboration of predicted grade calculation:

The procedure of using predicted grades is intended to prevent a student from being penalized by being excused from an easy quiz, or from benefiting unfairly from being excused from a difficult quiz. Specifically, each excused quiz grade will be replaced by a "predicted grade," determined by calculating, for each quiz the student took, the number of standard deviations by which the student's grade differed from the class mean. The average number of standard deviations is then applied to the excused quiz to determine the predicted grade.

For example, suppose a student has an excused absence on Quiz 5, and has taken all the other quizzes. Let Q_1, ..., Q_4, Q_6, ..., Q_{12} denote the grades the student obtained on the quizzes taken. Let $\bar{Q}_1$, $\bar{Q}_2$, ..., $\bar{Q}_{12}$ denote the class averages on the 12 weekly quizzes, respectively, and let σ_1, σ_2, ..., σ_{12} denote the corresponding standard deviations. Then calculate

$$f = \frac{1}{11}\left[\frac{Q_1-\bar{Q}_1}{\sigma_1} + \ldots + \frac{Q_4-\bar{Q}_4}{\sigma_4} + \frac{Q_6-\bar{Q}_6}{\sigma_6} + \ldots + \frac{Q_{12}-\bar{Q}_{12}}{\sigma_{12}}\right] ,$$

which is the average number of standard deviations by which the students' grades have differed from the class mean. The predicted grade for Quiz 5 is then defined by

$$Q_5^{\rm predicted} = \bar{Q}_5 + f\sigma_5 \ .$$

The standard deviation for a particular quiz, by the way, is defined by

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(q_i-\bar{Q})^2} \ ,$$

where q_i is the grade of the ith student on the particular quiz, with i runinning from 1 to N, and $\bar{Q}$ is the average of all the grades in the class for this particular quiz.