Physics 303K-MI: Engineering Physics I, Discussion Section, Spring 2012

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ClassWebsite	**http://chaos.utexas.edu/people/faculty/harry-l-swinney/303k-s2012**
TA/LA Website	**http://www.ph.utexas.edu/ 303kcom/swinney/**
Class Times	**Mo 5-6pm, RLM 7.116** **Tu 6-7pm, RLM 7.116** **Tu 7-8pm, RLM 7.116** **Th 5-6pm, MEZ 1.120**
Office Hours	**Su 6-8pm,RLM 7.116**

Week	Class Type	Assignment
1 (1/16)	No Class	-
2 (1/23)	Modeling	Model 1: Intro to VPython
3 (1/30)	Modeling	Model 2: Projectile Motion
4 (2/6)	Group Problem	GP 1
5 (2/13)	Modeling	GP 2, exam week
6 (2/20)	Modeling	GP 3
7 (2/27)	Group Problem	GP 4
8 (3/5)	Group Problem	Model 3: Spring Oscillations, exam week
9 (3/19)	Modeling	GP 5
10 (3/26)	Group Problem	GP 6
11 (4/2)	Modeling	Model 4: Collisions and Interacting Matter
12 (4/9)	Group Problem	GP 7, exam week
13 (4/16)	Modeling	Model 5: Spacecraft voyage
14 (4/23)	Group Problem	GP 8
15 (4/30)	Group Problem	GP 9, exam week

Welcome to the Discussion Section for Physics 303K-MI! This class accompanies the regular lecture and attempts to integrate with the course objectives in two separate ways: depending on which week we meet, we will have 1) a group problem session, or 2) a group modeling session. Both class types are unique to the Matter and Interactions course and are important components of the curriculum. Moreover, we hope you find them an engaging part of the process of learning physics. On the first day of discussion class you will form **groups of three** in which you will be working for the rest of the semester on problem sessions and modeling. If you are familiar with basic programming techniques, try to pair up with students who will benefit from your experience. These groups are not set in stone, and reasons for changing them may come up. Most commonly, if a group member of yours drops the class causing your group to be short-staffed, it is permissible to combine with another group in similar circumstances. Do not to exceed four members though, as this will make it more difficult to closely collaborate.

Each discussion class will be attended by two/three LAs, one of whom is specifically assigned to your class to anwser your questions or concerns. You can contact your LA by email or in person, since you will be seeing them every week here. Think of your LA as your resource for "big picture" physics questions, study tips, exam strategies, etc. They have all taken this course recently and can identify with your concerns. If you have homework related questions, please attend any of our office hours with first preference given to your LA's office hours. All information regarding office hours and LAs can be found on the TA and LA homepage.

Group Problem Session

On a typical group problem session day, you will break up into groups and work on solving a selected textbook problem (15-20 minutes). Each group will be issued a whiteboard and dry erase markers, which help focus the collective train of thought in one place and also communicate your ideas to your TA and LAs, who will be periodically checking up on your progress. Afterwards, a randomly chosen group will present their solutions to the class and take any questions (5-10 minutes). The process then repeats for a second selected problem. The textbook problems I choose will be some of the more challenging ones in the book, but you will have me and the LAs to consult with while you are working with your group. (Variations on these problems may show up on exams, hint, hint.) You may find presenting problems to the class challenging, but it will help you reach a better understanding of physics. Remember that what you are trying to convey is the *process* of getting from one step to the next more so than the final answer. Here are some tips to keep in mind for presenting to the class.

What **to do**	What **not to do**
Introduce yourselves before you start talking.	Assume that your TA remembers the names of all 100+ students in the class.
Use clearly drawn diagrams to help motivate the steps you are taking.	Draw an illegible diagram at the beginning of your presentation to which you never again refer.
When appropriate, explain why one line leads to the next, e.g. "And the sum of the forces, as you can see from the diagram, is tension minus gravity."	Write equation after equation without saying anything.
Occasionally address the class (and not only your TA), especially when discussing conceptual matters.	Exclusively speak to the chalkboard as if you were confiding secrets to your dearest friend.
Pause between sections of a problem to take questions.	Assume that because your presentation makes sense to you, it must make sense to everyone else too.

Don't stress about presenting–the rest of the class is there to help you if you get stuck on something.

Computer Modeling Session

On computer modeling days, you will work as groups to code a computer model and then answer a set of Reflection questions together, requiring you to use the model you developed to test various

scenarios and input parameters. Each modeling assignment will have an accompanying Reflection assignment located on Quest. All of the files related to modeling can be found in the "Modeling File Index" link on the TA and LA Homepage. Please bring your laptops to class, as each group will need at least one computer. One strategy you might use is to bring two laptops, one for coding and the other for viewing the instructions and Reflection questions. If your group doesn't have two laptops, I recommend printing out a hard copy of the instructions to bring to class. I also recommend alternating the roles of "coder" and "assistants" from class to class to make sure you are all getting the same experience. If you are already familiar with programming you should let your other groupmates do most of the code writing so that they may learn from you. Your group's goal is not to be the fastest but to learn the most!

Our computer modeling sessions are designed to give you a "hands on" feel for the laws of physics you are learning in lecture by allowing you to create physical scenarios and tweak parameters. You may have heard of the programming language called Python, which will be our language of choice in this course. Python is both extremely easy to learn and also of wide applicability in the real world, making it particularly valuable for you to pick up now. It is used by wide-ranging entities, from Google to CERN (the world's largest particle physics laboratory). We will only be working with Python at a very rudimentary level, but nonetheless, the basic programming skills you learn will translate over to any other programming language, such as Matlab, Mathematica, C++, Java, etc. All of our models will feature 3D visuals to give you an immediate, visceral connection to the physics being simulated. As you will have ample opportunity to work out numerical solutions in your homework, our models will be mostly of a qualitative character to aid your intuitive grasp of the subject. In short, modeling should be the fun part!

Grading

There are two grade categories related to the discussion class:

- **Attendance - 5 %**
- **Model Reflection - 5%**

Attendance Grade

There are 14 or so meetings of this discussion class throughout a semester. Should the need arise to miss a class for any reason, you will have 2 get-out-of-class-free credits to use at your discretion. This is intended to cover unavoidable absences as well, so please do not ask for additional exemptions. Your score is computed thus:

$$\%\ score = \frac{classes\ attended + 2}{total\ semester\ classes} * 100$$

with the maximum score being 100. Note that attendance includes *both* types of discussion classes. To receive credit you must be punctual, so don't expect to sign the attendance roster if you are more than 10 minutes late. Also, signing in means that you pledge to attend the *full* class, i.e. you cannot sign in and then leave. If you need to leave class early for a valid reason, please inform me before class begins; otherwise, cross your name off the list if you decide to leave early. If you are able to finish a modeling assignment before the end of the class period, you must stay until 40 minutes of class have elapsed before leaving.

Reflection Assignments

Each of the models and its Reflection assignment is intended to be completed within the time frame of a single discussion class. However, if you feel like you need more time or would like additional assistance from me or the LAs, the assignment is not officially due until the following week. Reflection assignments will be made available to you on Quest. Remember that a working program is a prerequisite for answering the Reflection questions, so make sure it does what it is supposed to do before you embark on the questions.

Warning: You only get **one** try for each multiple choice Reflection question, so make sure to discuss among yourselves or ask your TA/LA for help before you settle on an answer choice. This is to prevent multiple guessing strategies. Clearly, from class to class you should choose different groupmates to log into Quest and answer the Reflection questions so that the risk of choosing incorrect answers is evenly spread among you.