Physics 203: Modern Physics
SPRING 2010

Meeting: Trexler 271
Instructor: Matthew C. Fleenor
e-mail: fleenor@roanoke.edu
webservice: http://faculty.roanoke.edu/fleenor/

Time: MWF 1:10 – 2:10p
Office: Trexler 266D
Office Hours: MW 2:15-5p


Required Prerequisites: Physics 202

Components of Learning

There are several factors that are required to make a course “good” (by good, I mean a healthy combination of the intellectual and the affective). Below I have described my own ideas regarding several essential facets of any course, but particularly how I will operate within PHYS 203. The following descriptions also include my expectations of a student who is enrolled in PHYS 203.

Descriptions

Aspiration: Perhaps there is no greater field of study than physics; one that is so broad in its scope yet permeating into every nook and cranny of the sciences, philosophy, history, and sociology. Modern physics (i.e., the physics of primarily the 20th century) is the crown jewel of this realm, and we are honored this semester to admire the many facets of its beauty. I endeavor to provide the proper atmosphere and avenues so that the conceptual delicacy of the principles are not trampled for the sake of analytical problem solving. That said, our lofty goal includes a balanced understanding of both the theoretical underpinnings of Modern Physics without sacrificing their beauty.

Objectives: Below is a broad list of intended course objectives for PHYS 203. These objectives will be infused into every chapter, class, and assignment that is associated with this course. Therefore, the following objectives are a concrete example of the course aspiration given above. A more specific list of concepts covered can be obtained from the course outline (see last page) or at the Bb site under ‘Concept-related Outcomes’.

At the end of the course, successful students will:

(1) Identify underlying quantum phenomena related to foundational experiments in the field.
(2) Explain the conceptual ramifications for various special relativistic conditions.
(3) Attach and manipulate units as a viable source of knowledge about the physical world.
(4) Construct organized problem solutions that demonstrate logically connected steps of thought.
(5) Synthesize numerical information, physical assumptions, and previous concepts to correctly solve modern physics problems.
(6) Analyze the personal life of a particular modern physicist to better understand the process of science.

Attendance: Although roll will not be taken, daily attendance is expected. Due to the mathematically rigorous nature of the course, you may not miss more than four classes without a legal excuse (court, hospital, police, etc.). Late arrivals greater than 5 minutes will constitute an official absence. A fifth unexcused absence will result in a automatic drop from the course.
OFFICE HOURS: Besides the normal class hours, my office door is open to each student (at least) five more hours each week. If you are unable to meet with me during these times and still desire some help, please make an appointment with me.

BLACKBOARD (BB): The information found within the Bb environment is an essential component to the course itself. Notes, announcements, assignments (and solutions), links, and course documents will all be placed within the Bb pages for the course. Please do NOT forget to check the Bb before you come to class or if you have a question about previous assignments.

ACADEMIC INTEGRITY: I want to foster a mutual respect for the classroom hours that we have together. In light of this, please remember to turn off cell phones, PDAs, etc., during the class (including laptops unless you receive permission) and come prepared (e.g., book, paper, and pencil). Plagiarism exists when someone takes personal credit for another's creative (usually written) work and will not be tolerated. Please refer to the “Integrity” page and links on Bb.


Modes of Learning

Rubric

Your grade is determined according to the following distribution.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exams (3)</td>
<td>30%</td>
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<tr>
<td>Final</td>
<td>25%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Problem Sets</td>
<td>20%</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
</tr>
<tr>
<td>History/Bio</td>
<td>5%</td>
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</tbody>
</table>

Descriptions

EXAMS: All exams are designed for completion within the class hour. However, I will arrive on test days earlier to administer the test ASAP. Furthermore, you may include the 5–10 minutes after the class hour is complete. Exam 3 will be given on the day of the final, and so, you will have two different exams during that period. Make-up exams will only be allowed as a result of a discussion with me beforehand or a note related to the emergency (death, hospitalization, misdemeanor, etc.) signed by a governing official (medical doctor, parent, law enforcer, etc.).

PROBLEM SETS: Un-assignment problems (like those in the problem sets) are “when and where” you will learn the course material. For better and for worse, there is no way to appreciate the depth of Modern Physics within the one-hour sessions that we will have together. Due to the nature of problem solving, I expect that you will work together toward a solution. However, I also expect that you will individually create an original solution to each assigned problem. Substitutions and simplifications should NOT be left to the “reader” (that’s me) to figure out. If necessary, words and phrases need to be properly placed so that I can follow your train of thought. Problem sets are your final draft essays and/or compositions that display the fruit of your higher-level critical thinking skills, so you need to view them in that light.

Life (and therefore, this course) is NOT about obtaining the correct answer. The questions that need answering are ‘Do you understand how the answer was/is obtained?’ and ‘Are you able to apply the answer
to other questions and applications and within other contexts?'

**QUIZZES:** Bi-/weekly quizzes (FRIs) are completed individually in class and graded. These are test-prep opportunities. The quiz will consist of one problem from the problem set and/or class discussion, which contain the more important concepts and/or phenomena. This could be in the form of multiple choice and/or short answer about the problem in question.

**HISTORY/BIO:** Physics holds a significant place in history with tie-ins into many other scientific fields, technology, and philosophical thought. You will choose a particular physicist related to the course. I will list some potential personalities, OR you may suggest one to me. Each student will complete a written report (~2 pages) discussing facets of the life of your physicist. Ideally, these reports will coincide with the flow of the chapters during the semester. Therefore, you will have the opportunity to complete this portion at your discretion (i.e., "now" or later). I plan to ask some of the reports to be introduced within the class time (e.g., after a quiz).

**COLLOQUIUM:** The MCSP department offers a series of discussions that appeal to a broad range of physics-related interests. Students in this course are invited to all offerings, but participation in at least two is required. After attending and within one week of the meeting, you will submit a one-page (single-spaced, normal margins) thoughtful reflection on the Colloquium. Please note that a reflection is NOT summative, but it selects specific portions to provide a personal and/or intellectual elaboration on the material. Any substitutions with other physics-related discussions must be agreed to before attendance.

**Philosophy**

We all operate under a philosophy of life, i.e., a meta-narrative or a 'lifepath.' Because I spend a lot of time teaching (and even more time thinking about teaching), I also have a philosophy of education. Although the whole spiel is on-line, I've included a portion of it below so you understand (partially) my expectations as an Instructor:

Education is a two-way, relational venture. The teacher is responsible to initiate learners in the process of education, but at some point, the learner must stake personal claim in the educational endeavor. Education results when individuals open themselves transparently to the subject at hand and to the community of learners.

Education involves transformation and extends much further than information, merely acquiring a grade. If you are not convinced, or at least the slightest bit curious, that education (and therefore, this physics course) is a holistic journey (emotional, physical, intellectual, and spiritual) then this class is not for you. Not this year with me as your teacher. My goal and purpose is not just to present the material. If that is what you want from me, then you will be disappointed and frustrated.