

Physics 190: Physics & Engineering Colloquium

Fall 2019

Meeting: Trexler 372

Instructor: Matthew Fleenor

email: fleenor@roanoke.edu

webspaces:

Time: R 2.50 - 4.20 PM

Office: Trexler 266D

Office Hours: W 2.30-4 PM

R 1-2.30 PM

Required Readings: Get Ready for Physics (GRFP), E. Adelson (Addison-Wesley, 2011) Other assigned readings that the Instructor will provide.

I. Components of Learning

There are several factors that make a course "good" (by good, I mean a healthy combination of the intellectual and the affective). Good courses are also clear about their essential components. Below is an attempt to be clear about how will I operate within PHYS 190, as well as my expectations of a student who is enrolled in PHYS 190.

Descriptions

Aspiration: Physics and engineering are disciplines that are often linked and require a particular manner of viewing the world in which we occupy. However, there are differences between the approach to a physics problem and one involving engineering. Over the course of the semester, we will examine the similarities between the two disciplines as well as their differences. We will learn (and review) some basic techniques for solving real-world problems with a mathematical quality. We will also discuss new discoveries and familiar phenomena within the subdisciplines of the physical sciences. Lastly, an understanding of the role of science in society and history is also needed for the future scientist or engineer.

Expected Learning Objectives: Students will—

1. practice the steps of estimation and approximation to establish order-of-magnitude solutions.
2. develop strategies for problem solving.
3. list and delineate the differences between physics and engineering.
4. reflect and examine on discoveries from different subdisciplines of physics and engineering.
5. develop an appreciation for the role of science and engineering in society.

Collaboration/ Group Work: One stark distinctive of 21st century science and engineering is the degree of collaboration within the community. As a part of this class, time will be spent in group collaboration in [outside of class. We will spend some time discussing the difference between collaboration and plagiarism. Plagiarism exists when someone takes personal credit for another's creative (usually written) work, which includes your classmates. Collaboration relies on the individual strengths and contributions of each group member to produce a deeper level of understanding. With a collaboration, individuals remain responsible for their own portions of the work and its completion.

Inquire (NQR): I use the NQR environment extensively to place notes, announcements, assignments, proofs, solutions, links, and other course documents. Please do NOT forget to check NQR before you come to class or if you have a question about previous assignments.

Office Hours: Please take advantage of the office hours prescribed above, or make an appointment with me. Please also understand that drop-ins (aka. 'academic drive-bys') are at the total mercy of my daily schedule, for which I have the freedom to say, "I'm too busy" (though typically, that is NOT the case :).

Assessments

The grading for this course is pass/ fail (P/F). A final grade of 70% is considered passing. See the rubric below for the grading criteria.

Grading Rubric: Your grade is determined according to the following distribution:

Attendance + Participation 40% Reflections 30% Problems

Reflections / Problems: Each week you will be responsible for reading the assigned material (GRFP), critically reflecting on this material. Sometimes you will submit a 2-page reflection paper on parts of the reading you find interesting, relevant or puzzling. You should strive for thoughtful, critically-reflective original work, even if you do not understand every part of the reading. These are also due the following WED by 23:59 (midnight).

At other times, problems and/or GRFP workbooks will substitute for the reflection. These are also due the following WED by 23:59 (midnight). There will be a box outside of my office door to place them. Electronic assignments (usually in the form of reflections) will have the same due date.

You also need to attend one MCSP Conversation talk and submit a reflection. Yes, this can be a copy of a similar reflection for another MCSP class. In regards to late-work, I will only accept assignments past the due date, for one-week at 50% credit. After that, no late work will be accepted. If you miss class, it is your responsibility to visit my office hours and receive instruction about the assignment you missed.

Attendance: Due to the collaborative nature of the course, it is essential that you attend and contribute to the discussion. Since 40% of your grade is based on attendance and participation, your overall grade in the class will be negatively affected by missing class. I will aspire to track daily attendance, and the following modes of learning also highlight a student's presence or absence: group work, discussion, and quizzes within the class hour. Because the class only meets weekly, you are allowed a total of 1 absence (either un/excused) for which I do not require a note, but only an email ahead of time forewarning me of your absence (if possible). At the second un/excused absence, I will request a meeting with you and send an email to you, your Advisor, and the Registrar alerting them of the situation. After the third absence, you will be dropped (forcibly, with a "DF" or "DP," or willingly with a "W" before the ninth week) from the class. Late arrivals greater than 10 minutes will constitute an official absence.

Participation: What it means to participate in Physics 190 includes the following: completion of online assignments, listening (and responding) to audio-video lectures, attentive attendance, engagement in question and answer, working on in-class problems, reflective write-up for one extracurricular lecture or presentations, and responsibility for your own learning (office hours, etc.). This course expects you to spend at least 6 hours of work each week inside and outside of class.

II. Support of Learning

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 and come prepared. Lastly, please be advised that the RC AI policy will be upheld within this course as detailed online at _

<https://www.roanoke.edu/inside/a-z-index/academic-integrity>

Included here is an explanation of how violations of the College's academic integrity policy are handled.

Accessible Education Services: Accessible Education Services(AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment.

Subject Tutoring: Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm — 9 pm, Sunday — Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are highly trained Roanoke College students who offer one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences (see all available subjects at www.roanoke.edu/tutoring). Tutoring sessions are available in 15, 30, or 45-minute appointments. Feel free to drop by for a quick question or make an appointment at www.roanoke.edu/tutoring for a longer one-on-one appointment. For questions or concerns, please contact us at 540-375-2590 or subject-tutoring@roanoke.edu.

Diversity: I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Preferred Name/Pronoun: I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

III. Daily Course Outline


Course Outline: The outline that follows is a weekly reminder of what is due and what will be covered on a given date. Please consult the Outline to ascertain which topics will be covered in a given week.

Course Philosophy: There are several goals that the course holds. One, I hope that you will meet other folks who are interested in the same topics and the same activities as are you. Two, I hope you will have the opportunity to (re-)learn some of the topics that you may have forgotten since high school algebra,

which some of you took in middle school. Three, I hope you will gain some appreciation for the physical world through the eyes of those who have experienced it.

PHYS 190 Course Outline: Fall 2019

Week	Date	Reading		Instructor
1	27-Aug 29-Aug 30-Aug	GRFP = 1 -29	Introduction- What are we trying to do? (learning style, goals)	Fleenor
2	2-Sep 5-sep 6-Sep	GRFP = 30 -55	In-class: Wow Physics!	Fleenor
3	9-sep 12-Sep 13-sep	GRFP = 57 - 67	In-class: Orders of Magnitude; Motion (conversions, estimates, dimensions)	Fleenor
4	16-Sep 19-sep 20-Sep	GRFP = 68 - 79	In-class: Engineering and Physics; Mechanics (algebra, operations)	Fleenor
5	23-Sep 26-Sep 27-Sep	GRFP - _ 80 - 90	Experimentation: Logger Pro in TREX 273 (measurement)	P rice
6	30-Sep 3-Oct 4-Oct	GRFP = 90 -	In-class: Ray Optics I (geometry/trigonometry)	
7	7-Oct 10-Oct 11-Oct	GRFP = 101 - 110	Laboratory Exercise: Ray Optics II	
8	d4-oct 17- Oct 18-Oct	No Classes - Fall Break		
9	21 -Oct 24-Oct 25-Oct	GRFP = 114 — 130	In-class: Mechanics/ Fluids (differentiating, rates of change)	
10	a-Oct 31-Oct 1 -Nov	GRFP = 131 - 142	Laboratory Exercise: (modeling)	
11	4-Nov 7-Nov 8-Nov	GRFP = 144 — 166	In-class: Electricity and Magnetism (uncertainty)	
12	11-Nov 14-Nov 15-Nov	GRFP = 167 - 186	In-class: Thermal Physics/ Oscillations (wave motion)	
13	18-Nov 21 -Nov 22-Nov		Laboratory Exercise: Resonance Tubes (graphical interpretation)	
14				

	25-Nov a-Nov 29-Nov	 No Classes — Thanksgiving Break		
15	2-Dec 4- Dec 6- Dec		In-class: Student Research	Students