Physics 190: Physics & Engineering Colloquium
Fall 2017

Meeting: Trexler 272 Time: R 2.50 – 4.20 PM Instructor: Matthew Fleenor
Office: Trexler 266D email: fleenor@roanoke.edu Office Hours: W 2.30–4 PM
webspace: R 1–2.30 PM

Required Readings: *The Flying Circus of Physics* (TFCP), 2nd edition, J. Walker (J.S. Wiley, 2007) Other assigned readings that the Instructor will provide.

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.

Grades: 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	30%		

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.

Relections /Problems: Each week you will be responsible for reading the assigned material (TFCP or GRFP), critically reflecting on this material, and submitting 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 reflections are due by Monday midnight. Any problems and/or GRFP workbooks are due WED by 5:00PM. There will be a box outside of my office door to place them.

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."

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 – http://roanoke.edu/A-Z_Index/Registrar/Policies_and_Information/Academic_Integrity.htm
Included here is an explanation of how violations of the College's academic integrity policy are handled.

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.

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.

PHYS190 Course Outline: FALL 2017

Week	Date	Topic	Topic	Instructor
1	30-Aug 31-Aug		Introduction- What are we trying to do?	Fleenor
2	3-Sep 6-Sep 7-Sep	TFCP = 1—40	In-class: Orders of Magnitude; Motion (conversions, estimates, dimensions)	Fleenor
3	10-Sep 13-Sep 14-Sep	TFCP = 40—83	In-class: Engineering and Physics; Mechanics (geometry/trigonometry)	Fleenor
4	17-Sep 20-Sep 21-Sep		Experimentation: Logger Pro in TREX 273 (measurement)	Price
5	24-Sep 27-Sep 28-Sep	TFCP=242—264	In-class: Atmospheric Optics (atomic modeling, ideal gas)	Fleenor
6	1-Oct 4-Oct 5-Oct	TFCP = 178—217	Laboratory Exercise: Diffraction	Fleenor
7	8-Oct 11-Oct 12-Oct	TFCP = 83—146	In-class: Fluids (modeling)	Robb
8	15-Oct 18-Oct 19-Oct	*No Classes - Fall Break*		
9	22-Oct 25-Oct 26-Oct	TFCP = 218 – 246	In-class: Electricity and Magnetism (differentiating, rates of change)	Bala
10	29-Oct 1-Nov 2-Nov		Laboratory Exercise: Ray Optics (uncertainty)	Bala
11	5-Nov 8-Nov 9-Nov	TFCP = 147—177	In-class: Sound (wave motion)	Grant
12	12-Nov 15-Nov 16-Nov		Laboratory Exercise: Resonance Tubes (graphical interpretation)	Fleenor
13	19-Nov			
	22-Nov 23-Nov	*No Classes – Thanksgiving Break*		
14	26-Nov 28-Nov 30-Nov		Research Experiences	Students
15	3-Dec 5-Dec 7-Dec		In-class: Theoretical Physics	Lancaster