

Physics 106: University Physics for Science Majors.

Spring 2017

Instructor: Maia Magrakvelidze; **JEPS 429**

Textbook: "Fundamentals of Physics" (10th Edition) by Halliday, Resnick, and Walker

ISBN10: 1118230647

Pre-requisites: Physics 105 and Math 121

Co-requisites: Math 122.

Section	Time	Room #
LECTURE (MWF)	3:00-3:50 p.m.	JEPS 313
LAB (F)	9:00 -10:50 a.m.	JEPS 217

Course Description and Objectives: This (one of the two semester course) is a calculus based introductory course **primarily for science students** designed 1) to understand the foundations of calculus-based electrostatics, electrodynamics, electromagnetic waves, optics, atomic and nuclear physics; to develop: 2) a strong conceptual understanding of the physical concepts introduced in the course 3) critical thinking and mathematical skills and 4) the problem-solving techniques needed for scientist and engineers 5) to gain the scientific writing skills (mainly in the lab write-ups).

Reading: Please read the textbook before each lecture class and before doing homework. Reading from the textbook is assigned for each week. Completing the reading before class will greatly improve your learning experience (please see the tentative schedule for reference).

Homework: There will be one homework (on average) assigned each week. Doing homework problems is an important part of obtaining success in physics, helping you organize your thoughts, learn the concepts, and apply them. Try to do Homework as soon as possible after the lecture. So you don't get behind. Please see **the written homework procedure**. **NO LATE HOMEWORK IS ACCEPTED.**

Help: Any student needing help should take full advantage of instructors during her/his office hours or by appointment. **Students should give an honest and exhaustive effort and have her/his questions clearly formulated BEFORE seeking help.**

Labs: The laboratory is a required and integrated part of the course, and counts 20% towards your grade. **A passing grade (60%) in the laboratory is required to pass the course.** See the lab manual and listen to your lab instructor for rules and grading procedures. Take the lab seriously and do well - the lab can greatly affect your overall grade. **NO LATE LABS ARE ACCEPTED and you must not be late to the lab - attendance will be taken.**

Exams: There are three 1-hour exams during the semester and one two-hour final exam. No makeup exam. **The final exam is mandatory and comprehensive.** The exams are closed-book and closed-note. A sheet of "useful equations" will be provided with your exam, but please note that having equations available does not guarantee success – understanding the physics is the key. Try to study the concepts and how to apply them; **do not** just try to memorize how to solve

particular problems. **Make-up exams are given only in extraordinary circumstances and only with prior arrangement.**

Grading: Grades are determined on a 1000 point scale as shown below. You cannot get a good grade in the course unless you do all the homework, take all the exams, and do well in the laboratory. You must pass the laboratory to pass the course.

A	A-	B+	B	B-	C+	C	D	F
930-1000	900-929	870-899	830-869	800-829	770-799	700-769	600-699	Below 600

Available points:

Exams: 300 points;
Final exam: 200 points
Laboratory: 200 points *;
Homework: 300 points;
Total available: 1000 points.

* A passing grade in laboratory is required to pass the course.

Plagiarism: Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper or project; failure in the course; and/or expulsion from the university.

Note: If you have any condition such as a physical or learning disability, which will make it difficult for you to carry out the work as I have outlined it or which will require academic accommodations, please notify me.

Honor Code: I encourage students to work collaboratively; however, cheating is a serious offense. Please read and understand your University of Mary Washington Honor

Written Homework Procedure

Please write your name on the front page. Staple multiple pages together. Start each problem on a new page.

1. Organize the problem.
 - Write out knowns and unknowns if possible.
 - Think about what are you trying to solve for?
 - Draw a diagram, if relevant
2. Determine how you are going to solve the problem.
 - Always write out the full equations before plugging in any values.
3. Solve and manipulate equations.
 - Try as often as possible to solve using variables only. Often variables cancel out!
 - Lay out your work in a manner that is easy to follow. I will take off points if I can't read your solution.
 - Plug in numerical values
 - DO NOT FORGET UNITS AND DIRECTIONS (if a vector)
 - Circle/box your answer
4. Think about your answer. Does your answer seem reasonable?
 - You don't need to write anything for this.
 - Think about your value. Does it seem about the right order of magnitude? Does the sign (+/-) make sense?

*****Reminder*****

You are welcome to help each other and/or get help from office hours. However, each solution must be your own. Remember that your test questions will be similar to your written homework problems. Make sure you understand how to solve these problems on your own. Good luck!!

Tentative Course Schedule: University Physics 106, Spring 2016

Week	Date	Lecture topic	Textbook Reading	Labs
1	1/16 (M)	University Holiday (no class)		
	1/18 (W)	1. Electric charge, Coulomb's Law	21.1-21.3	
	1/20 (F)	2. Electric fields 1	22.1-22.3	
2	1/23 (M)	3. Electric fields 2	22.4-22.7	
	1/25 (W)	4. Gauss' Law 1	23.1-23.4	
	1/27 (F)	5. Gauss' Law 2	23.5-23.6	
3	1/30 (M)	6. Electric potential 1	24.1-24.4	#1 Electric fields
	2/01 (W)	7. Electric potential 2	24.5-24.8	
	2/03 (F)	8. <i>Review</i>		
4	2/06 (M)	Exam #1		#2 Ohm's law
	2/08 (W)	9. Capacitance	25.1-25.6	
	2/10 (F)	10. Currents, resistance, Ohm's law	26	
5	2/13 (M)	11. Circuits DC	27.1-3	#3 DC circuit
	2/15 (W)	12. RC circuits	27.4	
	2/17 (F)	13. Magnetic field	28.1-28.5	
6	2/20 (M)	14. Magnetic forces	28.6-28.8	#4 Oscilloscope
	2/22 (W)	15. Magnetic fields due to current	29.1-29.2	
	2/24 (F)	16. Ampere's Law	29.3-29.5	
7	2/27(M)	17. Ampere's Law examples, <i>Review</i>	29.3-29.5	#5 Oscilloscope
	3/01 (W)	Exam #2		
	3/03 (F)	18. Magnets	32.4-32.8	
8	3/06 (M)	Spring Break (no class)		
	3/08 (W)			
	3/10 (F)			
9	3/13 (M)	19. EM induction	30.1-30.5	
	3/15 (W)	20. RL circuits and inductors	30.6-30.9	
	3/17 (F)	21. AC circuits	31.1-31.3	
10	3/20(M)	22. Resonances	31.4-31.6	#6 Reflection
	3/22 (W)	23. Oscillations & waves (repeat)	15-17	
	3/24 (F)	24. Maxwell's equations	32	
11	3/27 (M)	25. EM waves	33.1-33.4	#7 Spherical lenses
	3/29 (W)	26. Reflection & Refraction	33.5-33.7	
	3/31 (F)	27. Optics: Mirrors	34.1, 34.2	
12	4/03 (M)	28. Optics: Lenses	34.4-34.6	#8 Atomic line
	4/05 (W)	29. Interference	35	
	4/07 (F)	30. Diffraction, <i>Review</i>	36	
13	4/10 (M)	31. Exam #3		#9 Nuclear radioactivity
	4/12 (W)	32. Photons, photoelectric effect	38	
	4/14 (F)	33. Quantum elements	39	
14	4/17 (M)	34. Atoms	40	#10 Nuclear radioactivity
	4/19 (W)	35. Nuclear physics	42	
	4/21(F)	36. Nuclear energy	43	
15	4/24 (M)	37. <i>Review week.</i>		
	4/26(W)	38. <i>Preparation for final</i>		
	4/28 (F)	39. <i>Preparation for final</i>		
16	5/01(M)	Final Exam		

Tentative schedule for the HW: University Physics 106, Spring 2017

W-HW	Given on	Due date			Points	Total	Chapters		
		Date	Day	Time					
1	1/17	1/25	Wednesday	4:45 PM	25	25	21,22	week1	
2	1/25	02/01	Wednesday	4:45 PM	25	50	22,23	week2	
3	02/01	2/8	Wednesday	4:45 PM	25	75	24	week3	
4	2/8	2/15	Wednesday	4:45 PM	25	100	25,26	week4	
5	2/15	2/22	Wednesday	4:45 PM	25	125	27	week5	
6	2/22	3/1	Wednesday	4:45 PM	25	150	28	week6	
7	3/1	3/15	Wednesday	4:45 PM	25	175	29	week7	
		Spring break							week8
8	3/15	3/22	Wednesday	4:45 PM	25	200	32,30	week9	
9	3/22	3/29	Wednesday	4:45 PM	25	225	31,32	week10	
10	3/29	4/5	Wednesday	4:45 PM	25	250	33,34	week11	
11	4/5	4/12	Wednesday	4:45 PM	25	275	35,36	week12	
12	4/12	4/19	Wednesday	4:45 PM	25	300	38,39	week13	
13	4/19	4/28	Friday	4:45 PM	25	325*	40,42	week14	
								week15	

***NOTE:** Attendance of PASS sessions are required to earn that extra 25 points in HW

Dr. Magrakvelidze ☺

	Monday	Tuesday	Wednesday	Thursday	Friday
7:00					
8:00	Gen. Physics Jepson 219		Gen. Physics Jepson 219		Gen. Physics Jepson 219
9:00	OFFICE HOUR	Gen. Phys. Lab Jepson 217	OFFICE HOUR	Gen. Phys. Lab Jepson 217	Univ. Physics Lab Jepson 217
10:00	OFFICE HOUR		OFFICE HOUR		
11:00					
12:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00	Gen. Physics Jepson 313		Gen. Physics Jepson 313	Research	Gen. Physics Jepson 313
2:00		OFFICE HOUR		Research	
3:00	Univ. Physics Jepson 313	Research	Univ. Physics Jepson 313	Research	Univ. Physics Jepson 313
4:00	Research	Research	Research	Research	Research
5:00	Research	Research	Research	Research	Research