Physics 4B – General Physics with Calculus – (Lecture (23972) MW 1-2:50 and Lab (23973) M 6-8:50 in ATLAN 100)

"Be doers and not hearers only, deceiving yourselves."

Course Description: Comprehensive study of major topics of physics: thermodynamics, electric forces and fields, magnetic forces and fields, electricity, and AC and DC circuits
(AA/AS area 1; CSU area B1, B3; IGETC area 5A/5C; transferable to CSU and UC)

Prerequisites: Physics 4A and Math 3B

Textbooks: All course textbooks are available at: reserve desk at the library, Math Lab, and the tutoring center.

- Required: *Physics for Scientists and Engineers* by Giancoli, volumes 1 and 2, 4th edition or a recent version
  - ISBN for entire textbook (volumes 1 – 3): 0131495089
- Recommended: *Portable TA: A Physics Problem Solving Guide* by Elby, Vol. 2
  (ISBN 0132317214, available on Moodle with author's permission)
- Other supplementary material will be distributed in class and posted on Moodle.

Instructor: Andrew Park

E-mail: bpark@peralta.edu (also available at a@bkpark.com)

Office Hours: Monday 11 – 1, Tuesday 11 – 12, Thursday 11 – 1 and 3 – 3:30 in Room 100, and Friday 12 – 2 in Room 125 (MESA), Peralta Science Annex, 860 Atlantic Ave., or by appointment

Class: Lecture Monday and Wednesday 1 – 2:50 p.m. and Lab Monday 6 – 8:50 p.m., both in Room 100, Peralta Science Annex, 860 Atlantic Ave., Alameda.

Course website: on Moodle at http://eperalta.org/spring2017

Learning Outcomes:

1. Students discuss and apply the concepts of physics.
2. Students develop descriptions of physical systems using mathematics and calculate measurable quantities.
3. Students set up laboratory equipment safely, plan and carry out experimental procedures, identify possible sources of error, reduce and interpret data, and prepare clear written reports.

Tutoring: Physics tutors are usually available in Tutorial Center in the Math Lab on the 2nd floor of the LRC. Register for the free COA course, Learning Resources LRNRE 501, 24 hours in advance of using any tutoring services. Physics tutoring is also available at MESA center in Room 125.

Course Policy

Registration: After the last day to register for classes (Feb. 5), you must be registered in the class in order for you to receive credit. No students will be added after this date.

Attendance: Please come ready to work at the beginning of every class. Instructor may drop a student if the number of unexcused absences exceeds 6 (number of times the class meets in two weeks; refer to pg. 31 of College of Alameda 2015-2017 catalog for the college policy on attendance).

Participation: Asking questions is encouraged during lecture (please direct them to me, not your neighbors). *Answering* my questions is even more encouraged (I try not to ask rhetorical questions). Also, please come ready to participate in occasional group discussions and work. Taking notes is good, but participating is *better*.

Disruptions: Please take care of your personal needs before class, or during scheduled breaks. Also, please turn off cell phones and other communication devices and put them in your bag. If you must arrive late or leave early, or take other breaks, please do so quietly without disrupting other students. See pg. 237-238 of College of Alameda 2015-2017 catalog for student standards of conduct. (In short, please act like an adult.)

Academic Integrity: Everything you turn in must be your own work. If you use sources other than the textbook, please clearly cite it and give credit where it is due. Please refer to pg. 237-246 of College of Alameda 2015-2017 catalog for the college policy on academic dishonesty and possible disciplinary measures.

Physics 4B Grading Policy

Course Grade Breakdown:

- Homework (10%): a total of 4 homework sets (one for each exam) are assigned for the semester.
- Labs (20%): 9 labs assigned throughout the semester, according to schedule below
- Quizzes (10%): 9 quizzes (2 or 3 before each exam) throughout the semester
- Exams (60%): four (4) exams through the semester

Grading Rubric: A holistic grading scale is used for grading exams and quizzes.

- 5 (out of 5 points possible): Excellent understanding. The student clearly understands how to solve the problems; one or two minor mistakes can appear on a "5" solution, if they don't lead to larger conceptual errors.
- 4: Good understanding. The student understands the main concepts and problem-solving techniques but is missing one major concept, or made one major mistake that may involve conceptual misunderstanding.
- 3: Fair understanding. The student started to set up the solution and is on the right track of applying the problem-solving techniques but is several major steps (or mistakes) away from being able to solve it.
- 2: Poor understanding. The student jots down some formulas from memory that may be relevant to the problem but shows little conceptual understanding of how they should be used.
- 1: No understanding. The student writes down something that has something to do with the problem.
- 0: Blank answers.

Course Grade Scale: Following is the course grade scale.

A: 85 – 100%	B: 70 – 85%	C: 50 – 70%	D: 40 – 50%	F: below 40%

Homework: There will be one homework set for each group of topics covered in each exam. Please work through the homework set regularly (the quiz problems will be drawn from the homework set!) and turn in the set on the day of exam. Each set will be graded for completeness and effort demonstrated.

Quizzes: One problem at the level of the exam will be given for each quiz. It is meant to be an exam practice, to familiarize you with both problem-solving under exam-like conditions and the grading rubric .

Laboratory: Come prepared with writing instruments (pen and paper) and a calculator.

- Please arrive on time, so that your group can start on time. If you are tardy by more than 10 minutes, instructor may exclude you from participating in the lab, in order to avoid unduly burdening other students.
- For all labs: Follow all lab directions carefully and ask questions. The main purpose of the lab is to help you develop physical intuition—make sure you do that during the assigned lab time (it will take much more time to do it "later").
- All labs are due at the end of the lab period unless there are extenuating circumstances.

Exams: Four (4) exams will be given on following days and times:

- Exam 1, 2, and 3 (in class): February 15, March 20, and April 24
- Final Exam (during final exam period): Wednesday, May 24, 12 p.m. – 2 p.m.

Please contact me immediately if you have an unavoidable conflict with these times. There are no scheduled make-up exams; if you have an unavoidable conflict, you must make an arrangement for the missing exam with me individually.

Disability: Students who may need accommodation for their disabilities are encouraged to contact Disabled Students Program and Services (available in Room D-117 or by phone, 510-748-2328) as soon as possible in the semester so that reasonable (and legally-mandated) accommodations may be made by the instructor and college. Usual accommodations made include extended exam time and/or note-takers. Most students with a diagnosed learning disability (such as ADHD) are eligible. If you are not sure whether you are eligible, please check with a DSPS counselor. The details regarding the nature of your disability are confidential and not shared with your instructor.

Physics 4B Schedule, Spring 2017

Wk	Class Plan			References	Notes
1	M LEC (Jan 23) Introductions & Kinetic Theory of Gases	M LAB (Jan 23) Crash Course in Physics Problem-Solving	W LEC (Jan 25) Ideal Gas Law; Intro to thermodynamics	Giancoli Ch 17-18	
2	M LEC (Jan 30) Heat and Calorimetry; Latent Heat (Quiz 1)	M LAB (Jan 30) Lab 1: Calorimetry	W LEC (Feb 1) First Law of Thermodynamics	Giancoli Ch 19	Last week to add & drop w/o W
3	M LEC (Feb 6) Thermodynamic Processes; P-V Diagram	M LAB (Feb 6) Lab 2: Heat Engines	W LEC (Feb 8) Equipartition Theorem; Specific Heat of Gases (Quiz 2)	Giancoli Ch 20	
4	M LEC (Feb 13) Second Law of Thermodynamics	M LAB (Feb 13) Review Problems for Thermodynamics	W LEC (Feb 15) **Exam 1: Thermodynamics**	Gianc. Chs 17-20	review questions to be posted
5	M LEC (Feb 20) *President's Day Holiday*	M LAB (Feb 20) *President's Day Holiday*	W LEC (Feb 22) Introduction to Electricity; Conductors	Giancoli Ch 21 P. TA Ch 33	
6	M LEC (Feb 27) Electric Forces and Fields; Superposition	M LAB (Feb 27) Gauss's Law (regular lecture)	W LEC (Mar 1) Electric Potential (Voltage) (Quiz 3)	Giancoli Ch 22 P. TA Ch 34	
7	M LEC (Mar 6) Capacitance; Dielectrics	M LAB (Mar 6) Lab 3: Static Electricity and Equipotentials	W LEC (Mar 8) Review of Topics in Electrostatics (Quiz 4)	Giancoli Ch 23-24 P. TA Ch 35-36	
8	M LEC (Mar 13) *Problem-Solving Session: Electrostatics 1*	M LAB (Mar 13) *Problem-Solving Session: Electrostatics 2*	W LEC (Mar 15) Electric Currents and Resistance	Giancoli Ch 21-24 P. TA Ch 33-36	See posted Portable TA chapters for exam prep
9	M LEC (Mar 20) **Exam 2: Electrostatics**	M LAB (Mar 20) Lab 4: Introduction to Circuits	W LEC (Mar 22) DC Circuits: Kirchoff's Rules	Giancoli Ch 25-26 P. TA Ch 37-38	
10	M LEC (Mar 27) DC Circuits: Kirchoff's Rules Cont'd (Quiz 5)	M LAB (Mar 27) Lab 5: Introduction to Oscilloscope	W LEC (Mar 29) Introduction to Magnetism	Giancoli Ch 27-28 P. TA Ch 39-40	
11	M LEC (Apr 3) Sources of Magnetic Field: Biot-Savart's Law	M LAB (Apr 3) Lab 6: Charge-to-Mass Ratio	W LEC (Apr 5) Magnetic Field: Ampere's Law (Quiz 6)	Giancoli Ch 29 P. TA Ch 41-42	
SPRING BREAK					
12	M LEC (Apr 17) Ampere's Law: More Applications	M LAB (Apr 17) *Problem-Solving Session: Circuits and Magnetism* (Quiz 7)	W LEC (Apr 19) Faraday's Law	Giancoli Ch 27-29 P. TA Ch 39-42	See posted Portable TA chapters for exam prep
13	M LEC (Apr 24) **Exam 3: Magnetism**	M LAB (Apr 24) Lab 7: AC transformers	W LEC (Apr 26) Inductance & Inductors	Giancoli Ch. 30 P. TA Ch 43	Last week to drop with W

- Lecture topic schedule is subject to change, but I will try to keep on pace within a day or two of above schedule
- Come to problem-solving sessions (during lab periods as noted in schedule) prepared to work on exam-type problems. You will have 1.5 hours to work on some exam-type problems, and remaining time will be used for class discussions.

Wk	Class Plan			References	Notes
14	M LEC (May 1) Time-Dependent Circuits: RC Circuits	M LAB (May 1) Lab 8: RC Circuits	W LEC (May 3) Circuits: LR Circuits (Quiz 8)	Giancoli Ch. 26 P. TA Ch 38	
15	M LEC (May 8) Time-Dependent Circuits: LRC Circuits	M LAB (May 8) Lab 9: LR and LRC Circuits AC Circuits	W LEC (May 10) Driven AC Circuits	Giancoli Ch 30 P. TA Ch 44	
16	M LEC (May 15) Maxwell's Equations: Displacement Current (Quiz 9)	M LAB (May 15) *Problem-Solving Session: Electromagnetism and Circuits*	W LEC (May 17) Electromagnetic Wave	Giancoli Ch 31 P. TA Ch 45-46	See posted Portable TA chapters for exam prep
Fin			**W Final (May 24) 12:00 p.m. – 2:00 p.m. Final Exam: Electromagnetism and Circuits**		

Tips for Success in Physics 4B

Follow these advices to maximize your chance of success in this class.

First, here's a little bit on my grading approach. My goal in grading is to reward two things: (1) the effort you put into this class, and (2) your understanding of laws of physics. If you want to just pass this class, I have a good news: *my* goal is to pass every student who stays engaged with the course to the end of the semester, and so far, I have not failed. But most of you will want to do better than a C. So, how do you get a B or an A in this class?

The only way to do that is to demonstrate that you can *solve* problems involving a physical situation, like an engineer, chemist, or a physicist might. In some sense, it's the same thing you had to do for your first semester of engineering physics, and the same problem-solving techniques you used then will continue to apply (if you feel like you didn't learn enough problem-solving technique in your first-semester physics, make sure you come to the "Crash Course in Physics Problem Solving"!). In addition, whereas most of first-semester was spent teaching you how to analyze a mechanical situation, majority of *our* time will be spent teaching you new laws of physics (thermodynamics and electromagnetism) and helping you develop new intuition for these new laws of physics.

So, how do you excel in this class? Here's what you need to do

- First, attend and fully participate in every class (7 hours every week), and organize your life so that you have about 13 hours of study time each week—that's about 3 hours for every day you don't have class (2 hours each for Saturday and Sunday). A total of 20 hours per week *is* what you are expected to spend for a 5-unit class.
- Second, get your reading done early. We move at a pace of about one chapter each week. This is about 20 pages per week of dense, technical reading. Some of you might get this done in 1 hour; some may need 3 hours. After you are done reading, you still have about 10 hours of studying outside the class to do.
- Third, practice solving problems. This is where you should spend those 10 hours/week of study time. For your problem-solving practice, two important resources are available to you:
    - Homework problems (solution to be made available after each quiz) and
    - *The Portable T.A.* (for the electromagnetism portion of the class).

  The Portable T.A. is a particularly useful resource, because you can *immediately* check if you did the problem right. I want all of you to get to a point when you simply know that you did a problem right, but until you get to that point, it's a useful feedback.

That's enough advice for first day. Attend every lecture and lab. I will emphasize key physical laws you need to know, point out common conceptual mistakes, and problem-solving techniques to simplify problems—alongside the examples of physical intuition you should continue to develop as an engineer or a scientist.