

# Syllabus for College Physics I, PHYS 104X Spring 2015

## Lecture

**MWF 9:15-10:15 AM, REIC 201**

## Laboratory (REIC 258)

**35920 T 6:00-9:00 PM**

**40012 T 2:15-5:15 PM**

**35922 W 2:15-5:15 PM**

**35923 R 2:15-5:15 PM**

**35924 W 6:00-9:00 PM**

**40011 R 6:00-9:00 PM**

**Instructor:** Ataur R. Chowdhury

**Office:** REIC 118

**Office Hours:** TR 4:00-5:00 PM  
MWF 10:30-11:30 AM, or feel free to drop in whenever I am in my office.

**Contact:** Phone (907) 474-6109  
Fax (907) 474-6130  
Email [archowdhury@alaska.edu](mailto:archowdhury@alaska.edu)

**SI Instructor:** TBA

**Teaching Assistants:** TBA

**Lab Instructor:** Jeannie Talbot, jktalbot2@alaska.edu, 474-7857

**Prerequisites:** PHYS 103X; placement in ENGL111x or higher; placement in DEVM 105 or higher; or permission of instructor.

**Text:** Physics, Douglas C. Giancoli, Seventh Edition, Pearson.

**Course Objectives:** To acquire a basic understanding of (1) the fundamentals of electricity and magnetism, (2) physical and geometrical optics, (3) foundations of modern physics, and (4) atomic and nuclear physics.

**Course Outline:** **Coulomb's law**, electrical potential, capacitance, **Kirchoff's Laws**, magnetic field, **Faraday's Law**, **electromagnetic waves**, **physical and geometrical optics**, waves and particles, **atomic and nuclear physics**. The **highlighted** topics will form the major focus of this course, and the students will be assessed for the mastery of these concepts through homework, quizzes, labs, and tests.

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**Credits:** 4 credits: 3 hours of lecture, and 3 hours of lab per week.

**Help Session:** 1. Help with homework and lab is available through the teaching assistants during their designated hours (to be posted on the door of REIC 122).

MTWR: 10 AM-5 PM (REIC 122)

2. SI sessions: An SI instructor will conduct help sessions during his/her scheduled hours (TBA).
3. Additional help with the homework is available through the instructor during his designated office hours.

MWF: 10:30-11:30 AM (REIC 118), and  
TR: 4:00-5:00 PM

### Natural Science Core Classes:

PHYS 104X is one of the core courses under the natural science component of UAF Core Curriculum, and the intended goal of any natural science core courses is to prepare students for lifelong learning in natural sciences. The basic premise of these courses is to educate our students for making decisions based on “scientific method” and this entails making informed decision based on experimental observations. For this course, the students will learn this method by doing hands-on laboratory exercises during their laboratory sessions. The students will collect data, perform statistical analysis of the data, and draw conclusions following “scientific method” that is appropriate for physics and perhaps for all physical sciences.

A second expectation of Core courses, the so called “science and society”, is related to scientific knowledge as it applies to public policies and issues. The students will be exposed to some illustrative examples in class to study the interplay between sound scientific knowledge and resulting public policies. These examples should help students with decision making processes that involve scientific data, and should help to sharpen their abilities as how to scientific knowledge applies to develop public issues/policies and how some of the policies/issues were put in place without any sound scientific reasoning. Every student will pick a topic of highly debated current societal issue, such as global warming, genetically modified food, partial birth abortion, cloning, etc, discuss both pros and cons of the issue based on scientific data, and draw conclusion about public policy of such an issue.

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### Course Requirements/ Policies:

#### Class Attendance:

For a better understanding of the course material attendance and participation in classroom activities are very important. This particular course is generally regarded as one of the basic courses that deal with the fundamentals of classical and modern physics, and it is highly expected that the students will commit themselves to attend the class regularly. There will be supplemental materials for this course and the students will be held responsible for all the materials that will be brought in from outside the text. The students will be expected to take part in meaningful discussion and ask questions to better comprehend the subject material.

#### Homework:

On the average, 8-12 problems/exercises/questions will be assigned each week on Friday. The homework will be due back by 12:00 Noon the following Friday. There will be a designated dropbox for homework for PHYS 104x inside physics office (REIC 102). **NO LATE HOMEWORK WILL BE ACCEPTED. NO EXCEPTIONS** (barring emergencies and extreme situations). Group work is highly encouraged for solving problems, and for additional help with the homework the students are most welcome to consult the instructor during the office hour or any other time by prior appointment. Any homework you submit should reflect you own best effort. Copying of homework is absolutely not acceptable and will result in a grade of zero for the assignment.

Quizzes: There will be one quiz every week on Friday during regular class period, except the first week and the week of the midterm. These quizzes will be open-book, and will be administered during the last 15 minutes of the class and are designed to test students understanding of the subject material covered during the preceding week. The quizzes may include problems similar to the homework and may also include 'intuitive' question pertaining to the subject materials.

#### Examinations:

There will be a midterm examinations (March 13, Friday, 9:15-10:15 AM, REIC 201) and a final comprehensive examination (May. 7, Thursday, 8:00-10:00 AM, REIC 201) for this course. Examinations will consist of, in most part, material similar to those in the homework, quizzes and those worked out in class. The midterm will cover the material covered in class, quizzes and homework prior to the date of test, and the final will be comprehensive and will include material covered in chapters 16-33, with more weight on material covered after the midterm examination. All examinations are close-book, close-note, but all the relevant equations will be provided along with the tests.

#### Laboratory:

The laboratory is an integral part of this course, and each student must register for and attend the lab section and perform all ten labs that are listed in this handout. All labs and reports must be completed. Every effort must be made to make up a lab during the same week if possible. Last week of the semester would be set aside for makeup lab. Lab

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reports must be turned in on time, any lab turned in late will get deducted 20% for each week after the date it is due. A PASSING GRADE IN THE LAB IS REQUIRED TO PASS THE COURSE. For details about the lab, please consult the lab policy posted on the blackboard by the lab instructor.

### Paper on CORE Relevance:

PHYS 104X is a CORE course, and like any other CORE course it requires that the experience and knowledge you gain through this course bears some relevance to the society. You will be working in groups (4 to 5 students in each) and be required to write a short paper (3-5 pages, double-spaced, not including the references) on a selected topic and show how it relates in a meaningful way to any public policy/guidance issue based on scientific training. Detailed instructions about writing the paper will be provided in class. An outline for the paper is due before the midterm, and the complete paper is due on or before April 17, 2015.

### **Grading Policy:**

Homework	15%
Lab	15%
Quizzes	30%
Paper	8%
Midterm	12%
<u>Final</u>	<u>20%</u>
Total	100%

The final grading for this course will be based on a curve, the average of which is usually taken to be the break-point of letter grade B and C, and the standard deviation of the grade point distribution will separate subsequent letter grades. Allowed grades are limited to A,B,C,D,F,IN,BN, and no plus-minus grades will be given for this course.

### **Academic Honesty**

UAF expects and requires academic honesty from all members of the University community, and takes any act of plagiarism and cheating seriously. It is expected that all assignments, including homework and reports, that are turned in for this course must be the original work of the individual student. Failure to comply with this policy will result in penalty as stipulated under UAF regulations.

### **Disabilities Services**

The UAF Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Any student who may need assistance with disabilities, should feel free to

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contact the instructor or directly to the Office of Disabilities Services (208 WHIT, 474-5655, disabilityservices@alaska.edu).

### General Remarks

*“Physics is just the refinement of everyday thinking,”* A. Einstein

Physics is the subject that requires you to think and ponder. Physics is not mathematics, but it does require mathematics to make it useful. In order for you to succeed in this course you may pay heed to the following suggestions.

1. Read the chapter before it is discussed in class so that you know the material and know what questions to ask for clarification.
2. Start your homework on day one so that you have ample time to think about the questions and get the help you need.
3. Think the problems through and follow the logical sequence to get the result.
4. Do not hesitate to ask for help. We wish all of you to excel and we are here to help.

### Tentative Schedule

#### Lecture, Reading, Quizz and Exam

<u>Dates</u>	<u>Topics</u>	<u>ReadinAssignment</u>
Jan 16	syllabus, electric charge, Coulomb’s Law	Ch 16: sections 1-4
19	AK Civil Rights Day (no classes)	
21	electric field, Gauss’s Law, DNA	Ch 16: sections 5-11
23	electrc potential, electrical energy <b>Quiz#1</b>	Ch 17: sections 1-5
26	capacitance, energy storage, EKG	Ch 17: sections 7-10
28	electric current, Ohm’s Law	Ch 18: sections 1-3
30	electric power, alternating current <b>Quiz#2</b>	Ch 18: sections 5-7
Feb 2	electrical conduction in human nervous system	Ch 18: sections 10
4	DC circuits and Kirchhoff’s Rules	Ch 19: sections 1-3
6	capacitors, RC circuits <b>Quiz#3</b>	Ch 19: sections 5-7
9	magnet and magnetic field	Ch 20: sections 1-4
11	magnetic force, Ampere’s Law	Ch 20: sections 5-8

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	13	emf, Faraday's Law <b>Quiz#4</b>	Ch 21: sections 1-4
	16	electric generator, transformer	Ch 21: sections 5-8
	18	induction and inductance	Ch 21: sections 8-10
	20	Maxwell's equations, EM waves <b>Quiz#5</b>	Ch 22: sections 1-2
	23	light as EM waves, speed of light	Ch 22: sections 3-4
	25	reflection of light, image formation	Ch 23: section 1-3
	27	refraction of light, thin lenses <b>Quiz#6</b>	Ch 23: sections 4-7
Mar	2	combination of lenses	Ch 23: sections 8-9
	4	wave nature of light, Huygens' Principle	Ch 24: sections 1-2
	6	interference and diffraction of light <b>Quiz#7</b>	Ch 24: sections 3-6
	9	camera, human eye, magnifying glasses	Ch 25: sections 1-3
	11	telescope, microscope, CT scan	Ch 25: sections 5-9
	13	<b>Midterm</b>	
	16	<b>Spring Break</b> (no classes)	
	18	<b>Spring Break</b> (no classes)	
	20	<b>Spring Break</b> (no classes)	
	23	special relativity	Ch 26: sections 1-3
	25	time dilation, length contraction	Ch 26: sections 4-5
	27	relativistic momentum, mass, energy <b>Quiz#8</b>	Ch 26: sections 7-9
	30	blackbody radiation, photoelectric effect	Ch 27: sections 1-3
Apr.	1	Compton effect, interaction of radiation	Ch 27: sections 6-8
	3	electron microscope, Bohr Model <b>Quiz#9</b>	Ch 27: sections 9-12
	6	quantum theory, uncertainty principle	Ch 28: sections 1-3
	8	quantum view of atoms and molecules	Ch 28: sections 5-8
	10	overview of molecules and solids	Chapter 29

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### Quiz#10

13	radioactive decays	Ch30: sections 1-6
15	half-life, detection of radiation	Ch30: sections 8-13
17	nuclear energy, fission, fusion	Ch31: sections 1-3

### Quiz#11

20	measurement of radiation, MRI	Ch31: sections 5-9
22	elementary particles, antiparticles	Ch 32: sections 1-6
24	<b>SpringFest</b> (no classes)	

27	charm, quarks, grand unified theory	Ch32: sections 8-12
29	universe and stellar evolution	Ch33: sections 1-3
May 1	expanding universe, big bang theory	Ch33: sections 5-7

### Quiz#12

4	Overview for final exam	
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May 7 **Final Examination** (chapters 16-33), 8:00-10:00 AM, REIC 201

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## PHYSICS 104X LABORATORY

Room: 258 (REIC)

### Laboratory Schedule

<b>Week #</b>	<b>Dates</b>	<b>Lab</b>
1	1/20-1/24	<b>No labs</b> (due to Holiday on Monday)
2	1/27-1/31	Lab #1: Coulomb's Law
3	2/3-2/7	Lab #2: Mapping Equipotentials
4	2/10-2/14	Lab #3: The Capacitance of Parallel Plates
5	2/17-2/21	Lab #4: DC Circuits, Part I
6	2/24-2/27	Lab #5: DC Circuits, Part II
7	3/3-3/7	Lab #6: The Charge to Mass Ratio of Electrons
8	3/10-3/14	<b>Recitation for Midterm Exam</b>
9	3/17-3/21	<b>Spring Break</b>
10	3/24-3/28	Lab #7: The Current Balance
11	3/31-4/4	Lab #8: Reflection and Refraction of Light
12	4/7-4/11	Lab #9: Thin Lenses and Image Formation
13	4/14-4/18	Lab #10: Spectroscopy Lab
14	4/21-4/25	<b>Make-Up Labs</b>
15	4/28-5/2	<b>Recitation for Final Exam</b>
16	5/5-5/9	<b>Finals week, No Labs</b>