

Syllabus for General Physics II, PHYS 212X

Fall 2023

Lecture
MWF 5:50-6:50 PM, REIC 201

Laboratory
REIC 257
F01, 73274, W 2:15-5:15 PM
F02, 73275, R 2:15-5:15 PM

- Course:** PHYS 212X
- CRN:** 73276 FE1
- Course Type:** In person classroom teaching and Laboratory
- Instructor:** Ataur R. Chowdhury
- Office:** REIC 118
- Office Hours:** MW 3:00-4:30
- Contact:** Phone (907) 474-6109
Fax (907) 474-6130
Email archowdhury@alaska.edu
- Prerequisites:** Concurrent enrollment in MATH 202X; PHYS F211X or ES 208 or concurrent enrollment in ES 210; placement in ENGL F111X or higher; or permission of instructor.
- Texts:** Physics for Scientists and Engineers: A Strategic Approach, Randall D. Knight, 4th Edition, Pearson.
- Course Objectives:** To acquire a basic understanding of (i) the fundamentals of heat and thermodynamics; (ii) the concepts of electricity and magnetism; and (iii) Maxwell's equations and electromagnetic waves.
- Course Outline:** **Heat, temperature, laws of thermodynamics, Coulomb's Law, Gauss's Law**, electrical potential, **electrical energy**, capacitance, Kirchhoff's Laws, Biot-Savart Law, **Faraday's Law, Maxwell's equations**, and electromagnetic waves.
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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Student Learning Outcomes:

1. Understand the basics of heat and thermodynamics.
2. Apply thermodynamic laws to physical problems.
3. Understand the basic concepts of electricity and magnetism.
4. Learn how to build and analyze simple electric circuits.
5. Acquire basic knowledge of Maxwell's equations and their simple applications.
6. Describe the societal relevance of physics and its connection to other fields of science.
7. Ability to safely use basic laboratory equipment, to develop a testable hypothesis, to systematically collect and analyze data, and to report and interpret experimental results.

Instructional methods: Interactive face-to-face

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

Help Session: Help with homework and lab is available (online?) through the teaching assistants (TAs) during the hours posted on the door of REIC 122.

MTWR: TBA (REIC 122)

Additional help with homework is available through the instructor during his designated office hours.

Course Requirement and 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 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. **It is highly expected that the students will cause least disruption of class activities by showing up before the class starts, not leaving the class before it stops, keeping cell phones in silent mode, and refraining from talking during the class.**

Quizzes and Pop Quizzes: During the lecture, the students will be expected to take part in meaningful discussion and ask questions to better comprehend the subject material. To engage students in active participation, there may be, from time to time, some pop quizzes (clicker questions) during the class. The students will be divided into small groups, and each group will put their heads on a given question and provide an answer.

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Everyone in a group will receive the same score, but you must be present to get the credit. This willow with a lively discussion as to what is the right answer and some of the groups may be asked to explain their reasoning for the answer.

A weekly quiz will be administered anytime during the lecture and are designed to test students' understanding of the subject material covered during the preceding week. The quiz may include problems like the homework, those worked out in class, and may also include 'intuitive' questions pertaining to the subject material covered during the previous week.

No digital media of any kind is allowed during the pop quizzes and quizzes. Make-up quizzes, if you miss class for valid reasons, may be arranged with approval from the instructor.

Homework:

On average, 8-12 problems/exercises/questions will be assigned each week on Fridays, and these will be posted on the blackboard. The homework will be due back by 5:00 PM on Fridays the following week. The homework solutions must be uploaded on the blackboard. **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 office hours or any other time by prior appointment. Any homework you submit should reflect your own best effort. **Copying homework from someone or from some online sources, including AI resources is not acceptable and will result in a grade of zero for the assignment. Make-up homework, if you miss it for valid reasons, may be arranged with approval from the instructor.**

Examinations:

There will be one midterm/sectional examination (October 20, Friday, 5:50-6:50 PM) and a final comprehensive examination (December 13, Wednesday, 5:45-7:45 PM) for this course. Examinations will consist of, in the most part, material like those in the homework, quizzes, and those covered in class. The midterm will be based on material covered in class and homework prior to the date of test, and the final will be comprehensive and will include all material covered in the semester, with more weight on material covered after the first midterm. All exams will be held during their designated time in class or at another place with prior approval from the instructor.

Make-up exams, for valid reasons, may be arranged with approval from the instructor.

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

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week if possible. The last week of the semester would be set aside for makeup lab. Lab 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 Joe Storm.

Course Evaluation:

The final grade for this course will be based on the student's performance for the entire semester and will be weighted as follows.

Homework	14%
Lab	15%
Pop Quiz	12%
Quiz	24%
Midterm	15%
<u>Final</u>	<u>20%</u>
Total	100%

The final grading for this course will be based on a curve. For a given score, your letter grade will not be lower than what it would be expected based on standard grading scale (90-100 = A, 80-90 = B, etc.). Allowed grades are limited to letter grades A, B, C, D, I, NB, and no plus-minus grades will be given for this course.

Incomplete Grade Policy: "The letter "I" (Incomplete) is a temporary grade used to indicate that the student has satisfactorily completed (C or better) most of the work in a course but for personal reasons beyond the student's control, such as sickness, has not been able to complete the course during the regular semester. Negligence or indifference are not acceptable reasons for an "I" grade."

Syllabus Addendum (Revised 8/22/2022)

COVID-19 statement: Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:

<https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0>

Further, students are expected to adhere to the university's policies, practices, and mandates

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and are subject to disciplinary actions if they do not comply.

Student protections statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site:
<https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

Disability services statement: I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

ASUAF advocacy statement: The Associated Students of the University of Alaska Fairbanks, the student government of UAF, offers advocacy services to students who feel they are facing issues with staff, faculty, and/or other students specifically if these issues are hindering the ability of the student to succeed in their academics or go about their lives at the university. Students who wish to utilize these services can contact the Student Advocacy Director by visiting the ASUAF office or emailing asuaf.office@alaska.edu.

Student Academic Support:

- Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)
- UAF Math Services, uaf-traccloud@alaska.edu, Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List (https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf)

Student Resources:

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
- Student Health & Counseling [**6 free counseling sessions**] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Gruening 215)
- Center for Student Rights and Responsibilities (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

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Nondiscrimination statement: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination. For more information, contact:

UAF Department of Equity and Compliance

1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775

907-474-7300

uaf-deo@alaska.edu

Additional syllabi statement for courses including off-campus programs and research activities:

University Sponsored Off-Campus Programs and Research Activities

We want you to know that:

1. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/nondiscrimination.
2. Incidents can be reported to your university's Equity and Compliance office (listed below) or online reporting portal. University of Alaska takes immediate, effective, and appropriate action to respond to reported acts of discrimination and harassment.
3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: <http://alaska.edu/bor/policy-regulations/>.
5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

For further information on your rights and resources [click here](#).

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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>Reading Assignment</u>
Aug. 28	syllabus, scope	
30	temperature	Ch 18: sections 1-3
Sept. 1	heat and energy	Ch. 18: sections 4-6
4	Labor Day (no classes)	
6	ideal gases	Ch 19: sections 1-4
8	first law, calorimetry	Ch 19: sections 5-8
	Quizz#1	

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11	pressure, temperature	Ch 20: sections 1-3
13	thermal interaction	Ch 20: sections 4-6
15	second law of thermodynamics	Ch. 21: sections 1-2
	Quiz#2	
18	heat engine	Ch 21: sections 3-4
20	carnot engine	Ch 21: sections 5-6
22	electric charge	Ch 22: sections 1-3
	Quiz#3	
25	Coulomb's law	Ch 22: sections 4-5
27	electric field	Ch 23: sections 1-2
29	electric field calculation	Ch 23: sections 3-5
	Quiz#4	
Oct. 2	charges in electric field	Ch 23: sections 6-7
4	electric flux, Gauss's law	Ch 24: sections 1-3
6	applications of Gauss's law	Ch 24: sections 4-6
	Quiz#5	
9	electric potential	Ch 25: sections 1-3
11	potential of charge distributions	Ch 25: sections 4-5
13	potential energy	Ch 25: sections 6-7
	Quiz#6	
16	electric field and potential	Ch 26: sections 1-4
18	capacitors, electrical energy	Ch 26: sections 5-6
20	Midterm	Ch (18-26)
23	dielectrics	Ch 26: sections 6-7
25	current and resistance	Ch 27: sections 1-3
27	Ohm's law	Ch 27: sections 4-5
	Quiz#7	
30	Ohm's law	Ch 27: sections 4-5
Nov .1	electric circuits, Kirchhoff's rules	Ch 28: sections 1-2
3	basic dc circuits	Ch 28: sections 3-4
	Quiz#8	
6	basic circuits, power	Ch 28: sections 5-7
8	electric power, RC circuits	Ch 28: sections 8-9
10	magnetism, magnetic field	Ch 29: sections 1-3

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Quizz#9

13	Ampere's law	Ch 29: sections 4-6
15	electric force and torque	Ch 29: sections 7-10
17	em induction, Lenz's law	Ch 30: sections 1-4

Quizz#10

20	Faraday's law	Ch 30: sections 5-7
22	application of Faraday's law	Ch. 30:sections 6-7
24	Fall Break (no classes)	

27	induced current, inductors	Ch 30: sections 8-10
29	em waves, Maxwell's equations	Ch 31: sections 1-5
Dec.1	properties of em waves	Ch 31: sections 6-7

Quizz#11

4	AC circuits	Ch 32: sections1-3
6	RLC circuits, power	Ch 32. Sections 4-6
8	review for final	

Quizz#12

13	Final Examination (chapters 18-32), Wednesday, 5:45-7:45, REIC 201	
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Laboratory Schedule REIC 257

The weekly schedule of the lab will be posted on the blackboard/canvas.