

# Syllabus for General Physics II, PHYS 212X

Spring 2016

**Lecture**  
**MWF 10:30-11:30 AM, REIC 201A**

**Laboratory**  
**REIC 257**

**F01, 34858, M 2:15-5:15 PM**

**F02, 75471, M 6:00-9:00 PM**

**F03, 75472, T 2:15-5:15 PM**

**F04, 75473, T 6:00-9:00 PM**

**F05, 75474, W 2:15-5:15 PM**

**F06, 75475, W 6:00-9:00 PM**

**F07, 75476, R 8:00-11:00 AM**

**F08, 75477, R 2:15-5:15 PM**

**F09, 75478, R 6:00-9:00 PM**

**Instructor:** Ataur R. Chowdhury

**Office:** REIC 118

**Office Hours:** MWF 9:00-10:00 AM  
TR 4:00-5:00 PM, 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)

**Teaching Assistants:** TBA

**Lab Instructor:** Jeanie Talbot, [j.talbot@alaska.edu](mailto:j.talbot@alaska.edu), 474-7857

**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, Third 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

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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.

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

**Help Session:** Help with homework and lab is available through the teaching assistants (TAs) during the following hours.

MTWR: TBA (REIC 122)

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

MR: 4:00 -5:00 PM (REIC 118)

MWF: 9:00-10:00 AM (REIC 118)

## 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 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. 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.

### Homework:

On the average, 8-12 problems/exercises/questions will be assigned each week on Thursdays. The homework will be due back by 12:00 Noon on Fridays the following week. There is a designated drop-box for PHYS 211X homework 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

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appointment. Any homework you submit should reflect your 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 of the semester on Fridays, except the first week and the week of the midterm. These quizzes will be administered during the last 15-20 minutes of the class and are designed to test students' understanding of the subject material covered during the preceding week. The quiz may include problems similar to the homework, those worked out in class, and may also include 'intuitive' questions pertaining to the subject material covered during the previous week.

### Examinations:

There will be a midterm examination (October 30, Friday, 10:30-11:30 AM) and a final comprehensive examination (Dec 16, Wednesday, 10:15-12:15 PM) for this course. Examinations will consist of, in most part, material similar to those in the homework, quizzes, and those covered in class. Midterm will cover the material covered in class and homework prior to the date of test, and the final will be comprehensive and will include material covered in chapters 1-15 and 20-21, with more weight on material covered after the midterm.

### 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 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 Jeanie Talbot.

### **Grading Policy:**

|              |            |
|--------------|------------|
| Homework     | 15%        |
| Lab          | 15%        |
| Midterm      | 15%        |
| Quizzes      | 30%        |
| <u>Final</u> | <u>25%</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. The curve is based on the weighted scores, according to the grading policy, after the final. Allowed grades are limited to A, B, C, D, F, IN, NB, and no plus-minus grades will be given for this course.

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## 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 contact the instructor or directly to the Office of Disabilities Services (204 WHIT, 474-5655, [uaf-disabilityservices@uaf.edu](mailto:uaf-disabilityservices@uaf.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.

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### Tentative Schedule

#### Lecture, Reading, Quizz and Exam

| <u>Dates</u> | <u>Topics</u>                     | <u>Reading Assignment</u> |
|--------------|-----------------------------------|---------------------------|
| Jan. 15      | syllabus, scope                   |                           |
| 18           | AK Civil Rights Day               | (no classes)              |
| 20           | temperature                       | Ch 16: sections 1-3       |
| 22           | heat and energy                   | Ch. 16: sections 4-6      |
| 25           | ideal gases                       | Ch 17: sections 1-4       |
| 27           | first law, calorimetry            | Ch 17: sections 5-8       |
| 29           | pressure, temperature             | Ch 18: sections 1-3       |
|              | <b>Quiz#1</b>                     |                           |
| Feb. 1       | thermal interaction               | Ch 18: sections 4-6       |
| 3            | second law of thermodynamics      | Ch. 19: sections 1-2      |
| 5            | heat engine                       | Ch 19: sections 3-4       |
|              | <b>Quiz#2</b>                     |                           |
| 8            | carnot engine                     | Ch 19: sections 5-6       |
| 10           | electric charge                   | Ch 25: sections 1-3       |
| 12           | Coulomb's law                     | Ch 25: sections 4-5       |
|              | <b>Quiz#3</b>                     |                           |
| 15           | electric field                    | Ch 26: sections 1-2       |
| 17           | electric field calculation        | Ch 26: sections 3-5       |
| 19           | charges in electric field         | Ch 26: sections 6-7       |
|              | <b>Quiz#4</b>                     |                           |
| 22           | electric flux, Gauss's law        | Ch 27: sections 1-3       |
| 24           | applications of Gauss's law       | Ch 27: sections 4-6       |
| 26           | potential and potential energy    | Ch 28: sections 1-3       |
|              | <b>Quiz#5</b>                     |                           |
| 29           | potential of charge distributions | Ch 28: sections 4-5       |
| Mar.2        | potential energy                  | Ch 28: sections 6-7       |
| 4            | <b>Midterm</b>                    | Ch (16-19, 25-28)         |

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|        |  |                      |
|--------|--|----------------------|
| 7      | electric field and potential   | Ch 29: sections 1-4  |
| 9      | capacitors, electrical energy  | Ch 29: sections 5-6  |
| 11     | dielectrics  | Ch 29: sections 6-7  |
|        | <b>Quiz#6</b>  |                      |
| 14-18  | <b>Spring Break (no classes)</b>   |                      |
| 21     | current and resistance   | Ch 30: sections 1-3  |
| 23     | Ohm's law  | Ch 30: sections 4-5  |
| 25     | electric circuits, Kirchhoff's rules   | Ch 31: sections 1-2  |
|        | <b>Quiz#7</b>  |                      |
| 28     | basic circuits, power  | Ch 31: sections 4-7  |
| 30     | electric power   | Ch 31: sections 8-9  |
| Apr. 1 | magnetism, magnetic field  | Ch 32: sections 1-3  |
|        | <b>Quiz#8</b>  |                      |
| 4      | Ampere's law   | Ch 32: sections 4-6  |
| 6      | electric force and torque  | Ch 32: sections 7-10 |
| 8      | em induction   | Ch 33: sections 1-2  |
|        | <b>Quiz#9</b>  |                      |
| 11     | Lenz's law   | Ch 33: sections 3-4  |
| 13     | Faraday's law  | Ch 33: sections 5-7  |
| 15     | induced current, inductors   | Ch 33: sections 8-10 |
|        | <b>Quiz#10</b>   |                      |
| 18     | em waves   | Ch 34: sections 1-3  |
| 20     | Maxwell's equations  | Ch 34: sections 4-5  |
| 22     | properties of em waves   | Ch 34: sections 6-   |
|        | <b>Quiz#11</b>   |                      |
| 25     | AC circuits  | Ch 35: sections 1-3  |
| 27     | RC, RLC circuits   | Ch 35: sections 4-6  |
| 29     | make up lectures   |                      |
|        | <b>Quiz#12</b>   |                      |
| May 3  | <b>Final Examination</b> (chapters 16-19, 25-35), Tuesday, 10:15-12:15, REIC 201 |                      |

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## Laboratory Schedule REIC 257

| Lab # | Week starting | Lab                                   |
|-------|---------------|---------------------------------------|
|       | Jan. 11       | <b>No labs</b>                        |
| #1    | Jan. 18       | Uncertainty Analysis                  |
| #2    | Jan. 25       | The Ideal Gas Law, $pV = nRT$         |
| #3    | Feb. 1        | The Latent Heat of Fusion             |
| #4    | Feb. 8        | Thermal Conductivity                  |
| #5    | Feb. 12       | Coulomb's Law                         |
|       | Feb. 29       | Recitation for Midterm                |
| #6    | Mar. 7        | Mapping Equipotentials                |
|       | Mar. 14       | Spring Break                          |
| #7    | Mar. 23       | The Capacitance of Parallel Plates    |
| #8    | Mar. 30       | The Charge to Mass Ratio of Electrons |
| #9    | Apr. 4        | DC Circuits                           |
| #10   | 11            | The Charge to Mass Ratio of Electrons |
|       | 18            | Make up Labs                          |
|       | 25            | Recitation for Final                  |