Spring 2-1-2017

# PHSX 217N.01: Fund of Physics w/Calc II

Daniel B. Reisenfeld
*University of Montana - Missoula*, dan.reisenfeld@umontana.edu

# Physics 217 Fundamentals of Physics with Calculus II Spring 2017

**Overview:**

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| Instructor: | Dan Reisenfeld |
| Office: | CH Clapp Bldg. Office 121 |
| Phone: | 243-6423 |
| Text: | *Fundamentals of Physics*, Halliday and Resnick 10e with WileyPlus Access<br>Purchase *iclicker* and bring it to class every day |
| Optional Text: | *Quick Calculus*, Ramsey and Kleppner 2e |
| Lecture: | M, T, W, Th, 1:00 – 1:50 PM. CHCB Room 131 |
| Office Hours: | M: 11 – 12; Tu: 2 – 3; W: 3 – 4; Th: 12 – 12:45, 2 – 3 |
| Course Website: | Moodle. https://moodle.umt.edu |
| Homework Site: | WileyPLUS http:// www.wileyplus.com/class/564414 |

**Homework:**
~10 problems per chapter will be assigned through the WileyPlus course page. Complete solutions to these problems will be provided after the due date of the assignment. **No late homework** will be accepted but I will drop your lowest 10 question scores (the equivalent of a single homework assignment). In addition, further problems and solutions will be posted for practice.

**Exams:**
There will be 4 mid-term exams during the semester: given on Wednesday evenings from 6-8 PM. Since each new topic will build on all previous concepts, a general working knowledge of previous material will be expected on all exams. The exams will be closed book except for a calculator and one index card of notes (max size: 4" x 6") that each student must prepare for her/himself prior to the exam. Solutions to the exams will be posted on the Moodle course website. Make-up exams will be given only in extreme situations and must be arranged IN ADVANCE. Please do not miss any exams. The **final exam** is comprehensive and will be held on Thursday May 11th, from 3:20 pm to 5:20 pm.

**Participation/Attendance:**
**S**everal questions will be posed during most lectures to gauge student understanding of the topics being discussed and answers will be supplied using your *iclicker*. Some credit will be given for participation in this process and additional credit will be given for correct answers to these questions. For those students who have an *iclicker* from the first semester of this course, your *iclicker* registration will stay in place.

**Laboratory:**
Each student must also register for PHSX 218, a separate 1-credit hour laboratory course that meets once a week. The exception is if a student has taken PHSX 218 in a previous year and wishes to keep her/his original grade. Lab sections are held W and Th, 3:00 – 4:50 pm in room CHCB 229.

**General Remarks:**
This will be an intensive course; we will cover 19 chapters in 14 weeks. Be sure to keep up on reading assignments and problem assignments. This course can be taken for a traditional letter grade only. **Drop/Add** can be performed online until **February 10th**, and with the instructor's and advisor's signatures until **April 3rd**. No drop petitions will be signed after this date without written verification of extreme circumstances. Prerequisites to this course are PHSX 215/216 and M171 (Calculus I). Co-requisites to this course are M172 (Calculus II), and PHSX 218 (Physics Laboratory) or equivalents.

**Grading:**
This course can only be taken for a traditional grade (A,A-,B+, etc.), and cannot be taken Credit/No Credit.

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| Mid-term Exams: | 50% | (4 at 12.5% each) |
| Homework: | 20% | |
| Participation/Attendance: | 10% | |
| Final Exam: | 20% | |

# Physics 217 Weekly Schedule, Spring 2017

| Week | Chapters | Topics | Notes | PHSX 218 Lab | Exams |
|---|---|---|---|---|---|
| Week 1<br>1/23 – 1/26 | Chp. 18 | Temperature, Heat & Work, 1st Law of Thermo. | | Review and More Python | |
| Week 2<br>1/30 – 2/2 | Chp. 19 | Kinetic Theory, Ideal Gases | Begin *iclicker* work for credit | Thermal Expansion | |
| Week 3<br>2/6 – 2/9 | Chp. 20<br>Chp. 21 | Entropy, 2nd Law,<br>Electric Force | | Mechanical Equiv. of Heat | |
| Week 4<br>2/13 – 2/16 | Chp. 21<br>Chp. 22 | Electric Field and Flux | | No Lab | Exam 1: 6-8 pm<br>Wed. Feb. 15 |
| Week 5<br>2/21 – 2/23 | Chp. 22<br>Chp. 23 | Fields from Charge Distributions, Gauss' Law | No Class Monday | Electric Fields | |
| Week 6<br>2/27 – 3/2 | Chp. 24<br>Chp. 25 | Electric potential,<br>Capacitance | | Raspberry Pi Part 2 | |
| Week 7<br>3/6 – 3/9 | Chp. 26<br>Chp. 27 | Current & Resistance,<br>Simple Circuits | | Ohm's Law | |
| Week 8<br>3/13 – 3/16 | Chp. 27<br>Chp. 28 | RC Circuits,<br>Magnetic Fields & Forces | | Slow and Fast RC Circuits | Exam 2: 6-8 pm<br>Wed. March 15 |
| Week 9<br>3/20 – 3/23 | | *Spring Break* | | | |
| Week 10<br>3/27 – 3/30 | Chp. 29 | Magnetic Fields from currents, Ampere's Law | | Ampere's Law | |
| Week 11<br>4/3 – 4/6 | Chp. 30 | Faraday's Law,<br>Lenz's Law | | No Lab | |
| Week 12<br>4/10 – 4/13 | Chp. 31<br>Chp. 32 | AC current, Transformers,<br>Maxwell's Equations | | Magnetic Field Mapping | Exam 3: 6-8 pm<br>Wed. April 12 |
| Week 13<br>4/17 – 4/20 | Chp. 33<br>Chp. 34 | EM waves, Reflection & Refraction, Mirrors | | Lenses | |
| Week 14<br>4/24 – 4/27 | Chp. 34<br>Chp. 35 | Lenses, Interference | | Index of Refraction | |
| Week 15<br>5/1 – 5/4 | Chp. 36 | Diffraction<br>Review | | Interference & Diffraction | Exam 4: 6-8 pm<br>Wed. May 3 |
| Finals Week<br>5/11 | | Final Exam: Thursday May 11, 3:20 – 5:20 pm | | | |

## Student Conduct Code

*All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://www.umt.edu/vpsa/policies/student_conduct.php*

## Disability Modification

*Students with disabilities will receive reasonable modifications in this course. Your responsibilities are to request them from me with sufficient advance notice, and to be prepared to provide verification of disability and its impact from Disability Services for Students. Please speak with me after class or during my office hours to discuss the details. For more information, visit the Disability Services for Students website at http://www.umt.edu/disability*

LEARNING OUTCOMES:
The overarching objectives of this course are to enable the student to:

1. Demonstrate a comprehension of the physical world by understanding how fundamental physical principles underlie the huge variety of natural phenomena and their interconnectedness.
2. Build critical thinking and quantitative skills by gaining insight into the thought processes of physical approximation and physical modeling, and by practicing the appropriate application of mathematics and calculus to the description of physical reality.
3. Comprehend the physical interpretation of mathematical results.

SPECIFIC LEARNING OUTCOMES:

At the end of this course, students will:

(1) Understand basic calorimetry and phase transformation;

(2) Be familiar with entropy and understand its role in limiting engine efficiency;

(3) Be able to perform Coulomb's Law calculations;

(4) Understand the differences between electric field and electric potential;

(5) Be able to apply Gauss' Law to determine electric fields;

(6) Perform simple electric circuit analysis;

(7) Be able to determine magnetic forces and fields in simple geometries;

(8) Be able to apply Lenz' Law and Faraday's Law;

(9) Be familiar with the EM spectrum;

(10) Grasp the basics of geometrical optics;

(11) Develop an understanding of interference; and

(12) Understand optical diffraction and the limitations it places on optical instruments.