# Physics 215 Fundamentals of Physics with Calculus I Fall 2015

**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, 1:10 – 2:00 PM. CHCB Room 131 |
| Office Hours: | We will figure out my office hours (4 a week) during the first week. |
| Course Website: | Moodle. https://moodle.umt.edu |
| Homework Site: | WileyPLUS http:// www.wileyplus.com/class/472490 |

**Homework:**
7-10 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 Tuesday 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 3×5 index card of notes 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 Monday Dec. 14th, from 1:10pm to 3:10pm.

**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.

**Laboratory:**
Each student must also register for PHSX 216, a separate 1- credit hour laboratory course that meets once a week. The exception is if a student has taken PHSX 216 in a previous year and wishes to keep her/his original grade. Lab sections are held M, Tu and W, 3:10 – 5:00 pm in room CHCB 229.

**General Remarks:**
This will be an intensive course; we will cover 16 chapters in 14.5 weeks. Be sure to keep up on reading assignments and problem assignments. **Drop/Add** can be performed online until **September 21th**, and with the instructor's and advisor's signatures until **November 2th**. No drop petitions will be signed after this date without written verification of extreme circumstances. Prerequisite to this course is a working knowledge of college algebra, trigonometry, and pre-calculus. Co-requisites to this course are Math 171 (Calculus I), and Physics 216 (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: | 40% |
| Homework: | 25% |
| Participation/Attendance: | 10% |
| Final Exam: | 25% |

# Physics 215 Weekly Schedule, Fall 2015

| Week | Chapters | Topics | Notes | Exams |
|---|---|---|---|---|
| Week 1<br>8/31 – 9/4 | Ch.1, Ch.2 | Introduction<br>1 – D Kinematics | | |
| Week 2<br>9/8 – 9/11 | Ch.2, Ch.3 | Vectors<br>2 – D Kinematics | No Class<br>Monday | |
| Week 3<br>9/14 – 9/18 | Ch. 3, Ch. 4 | Projectiles | | |
| Week 4<br>9/21 – 9/25 | Ch. 5 | Force and Motion | | Exam 1: 6-8 pm<br>Tues. Sept. 22 |
| Week 5<br>9/28 – 10/2 | Ch. 6, Ch. 7 | Work<br>Energy | | |
| Week 6<br>10/5 – 10/9 | Ch. 7, Ch. 8 | Conservation of Energy | | |
| Week 7<br>10/12 – 10/16 | Ch.9 | Collisions; Linear Momentum | | Exam 2: 6-8 pm<br>Tues. Oct. 13 |
| Week 8<br>10/19 – 10/23 | Ch. 10 | Angular Motion | | |
| Week 9<br>10/26 – 10/30 | Ch. 10, Ch. 11 | Torque<br>Angular Mom. | | |
| Week 10<br>11/2 – 11/6 | Ch. 11, Ch. 12 | Angular Mom.<br>Statics | | |
| Week 11<br>11/9 – 11/13 | Ch. 13 | Gravitation | No Class<br>Wednesday | Exam 3: 6-8 pm<br>Tues. Nov. 10 |
| Week 12<br>11/16 – 11/20 | Ch. 14 | Fluids | | |
| Week 13<br>11/23 – 11/27 | Ch. 15<br>***Thanksgiving Wk*** | Oscillations | No Class<br>Wed - Thurs | |
| Week 14<br>11/30 – 12/4 | Ch. 15, Ch. 16 | Oscillations<br>Waves | | |
| Week 15<br>12/7 – 12/11 | Ch. 16 | Waves<br>Evaluations | | Exam 4: 6-8 pm<br>Tues. Dec. 8 |
| Week 16<br>12/14 – 12/18 | | Finals Week | | Final Exam<br>Mon. Dec. 14<br>1:10 – 3:10 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:**
It is expected that the student will:

**Kinematics**
Apply knowledge of the relationships between time, displacement, distance, velocity, speed and acceleration to situations involving objects in one and two dimensions

**Vectors**
Perform vector analysis in one and two dimensions

**Forces**
Solve problems involving the force of gravity
Analyze situations involving the force due to friction
Solve problems that involve application of Newton's laws of motion in one and two dimensions

**Energy**
Perform calculations involving work, force, and displacement
Analyze the relationship between work, kinetic and potential energy, with reference to the law of conservation of energy
Solve problems involving power and efficiency

**Linear Momentum**
Apply the concept of momentum, impulse, and conservation of linear momentum in one and two dimensions

**Rotation**
Understand the relation between angular acceleration, rotational inertia and torque
Apply the concept of kinetic energy and work to rotation

**Angular Momentum**
Apply the concept of angular momentum to problems involving rotation and torque, with reference to the law of conservation of angular momentum

**Equilibrium**
Use knowledge of force, torque, and equilibrium to analyze various situations

**Gravitation**
Analyze the gravitational attraction between masses
Apply Kepler's laws and Newton's Law of Universal Gravitation to the motion of planets and satellites

**Fluids**
Understand the nature of compressible and incompressible fluids through a study of their density and pressure
Apply and Archimedes' Principle and Pascal's Principle to understand the forces and pressures exerted by fluids
Understand fluid flow by using the equation of continuity and Bernoulli's Principle

**Oscillations and Waves**
Apply the principle of Simple Harmonic Motion to the periodic motion of springs, pendulums and other oscillatory systems
Become familiarized with the nature of standing and traveling waves, and the Principle of Superposition