Introduction

Physics 215 is an introduction to the basic principles of *classical mechanics*, the foundation of physics. Our topic is the description and prediction of the motion of ordinary (macroscopic) objects. This subject is a cornerstone of modern science and technology, and is integral to understanding a vast range of phenomena and applications in subjects from aeronautics to physiology and geology to astronomy. Over the course of the semester we will learn about several different aspects of classical mechanics, including:

- **Kinematics** - The mathematical *description* of motion, in terms of the physical quantities of displacement, velocity, and acceleration
- **Dynamics** - The mathematical *explanation* of motion, through the use of Newton's Second Law of motion, \( F=ma \).
- **Energetics** - The concept of *energy*, first discovered in the context of classical mechanics, is one of the most powerful unifying principles in all of natural science.

This course is geared towards students in the Honors Program and students considering majoring in physics. Thus, we will try to touch on a couple of more advanced topics beyond the standard Mechanics curriculum.

The learning objectives of this course are:

1. To develop a basic understanding of the principles we use to describe the motion of macroscopic objects;
2. To learn the predict the motion of an object based on the forces applied to it;
3. To develop the ability to apply these principles, both qualitatively and quantitatively, to familiar and unfamiliar physical situations;
4. To develop an appreciation for the essential role that this subject plays both in our modern society and in the natural world at large; and
5. To appreciate how cool physics is.
Course Details

Instructor
Prof. Peter R. Saulson, psaulson@syr.edu, 315-443-5994.
Office: 263-4 Physics Bldg.
Office hours: I will always want to meet with you about any question or concern. Please email to set up an appointment.

Teaching Assistant
Mr. Prashant Mishra
Office: 310 Physics Bldg.
E-mail: prmishra@syr.edu

Lecture times
Tuesdays & Thursdays, 11:00AM – 12:20 PM, Rm. 208, Physics Bldg.

Credits
3

Co-requisites
(i) PHY 221 (General Physics I Laboratory) (ii) MAT 286 or MAT 295.

Recitation
Your recitation section will meet twice weekly for 55 minutes at a time and place in the Physics Bldg. to be determined.

Getting forms signed
To add or drop this course, please contact Patricia Whitmore. E-mail: pawhitmo@syr.edu. Office: Physics Building Room 111.

Blackboard
Course information, including assignments, announcements and grades, will be posted at Syracuse University’s blackboard website http://blackboard.syr.edu/

Physics clinic
A physics clinic is operated in Room 112 of the Physics Bldg. You can drop by to get help with physics problems. The clinic hours are posted here: http://web.physics.syr.edu/syllabi/clinic-pdfs/physicsclinicschedule.pdf
The clinic is staffed by the recitation instructors, who do not usually have separate office hours.

Textbook & Workbook


# Calendar (including exam dates)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan 19, 21</td>
<td>Concepts of motion (1.1-1.8). Kinematics in 1D (2.1-2.3).</td>
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<tr>
<td>2</td>
<td>Jan 26, 28</td>
<td>Kinematics in 1D (2.4-2.7). Properties of vectors (3.1-3.4).</td>
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<tr>
<td>3</td>
<td>Feb 2, 4</td>
<td>Tues: Projectile motion (4.1-4.3) Thur: Prepare for Exam</td>
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<td>4</td>
<td>Feb 9, 11</td>
<td>Tues: Midterm Exam, Thur: Enrichment topic</td>
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<tr>
<td>5</td>
<td>Feb 16, 18</td>
<td>Circular motion (4.5-4.7) Forces, Newton’s 1st &amp; 2nd laws (5.1-5.7)</td>
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<tr>
<td>6</td>
<td>Feb 23, 25</td>
<td>Applying Newton’s laws (6.1-6.6)</td>
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<tr>
<td>7</td>
<td>Mar 1, 3</td>
<td>Newton’s 3rd Law (7.1 – 7.5)</td>
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<tr>
<td>8</td>
<td>Mar 8, 10</td>
<td>Prepare for, take exam</td>
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<tr>
<td>10</td>
<td>Mar 29, 31</td>
<td>Momentum &amp; Impulse (9.1-9.6)</td>
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<tr>
<td>11</td>
<td>Apr 5, 7</td>
<td>Kinetic energy and gravitational potential energy (10.1-10.3); Elastic energy and collisions (10.4-10.7).</td>
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<tr>
<td>12</td>
<td>Apr 12, 14</td>
<td>Prepare for, take exam</td>
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<tr>
<td>13</td>
<td>Apr 19, 21</td>
<td>Energy Transfer: Work (11.1-11.5) and Power (11.9). Rotation (Chapter 12)</td>
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<tr>
<td>14</td>
<td>Apr 26, 28</td>
<td>Angular momentum Newton’s Theory of Gravity (13.1-13.6);</td>
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<tr>
<td>15</td>
<td>May 3</td>
<td>Review for Final Exam</td>
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Exam 1: Tues Feb 9
Exam 2: Thur Mar 10
Exam 3: Thur Apr 14

**SPRING BREAK**

Final Exam: Fri, May 6, 8:00 – 10:00 a.m.; Location: probably Room 208, Physics Building
Homework, recitation, exams, and grading

Reading Assignments

There will be weekly reading assignments from your textbook corresponding to the material covered in lecture. These assignments will be announced the preceding week in class and posted on Blackboard. It is expected that you will read the assigned sections before the respective lecture. Moreover, for the examinations, you will be expected to know all material covered in the assigned readings even if the material is not discussed in lecture.

Homework

There will be weekly homework assignments corresponding to the readings and lecture material of the week. These assignments will consist of end-of-the-chapter textbook problems and workbook problems. Each assignment and its due date will be announced in class and posted on Blackboard. Completed assignments are to be turned in to your T.A. at the beginning of your recitation session on the due date. \textbf{In all cases, late homework will not be accepted.} The assignments will be checked for completeness and selected parts will be graded by the T.A. in detail. Solutions to some problems will be posted on Blackboard. At the end of the semester, the lowest two homework scores will be dropped in calculating your semester homework grade.

Recitation

Each week there will be two 55 minute recitation sections, during which time you will work in small groups (of around three people each) on a variety of conceptual problems from your workbook and textbook. (Please be sure to bring your workbooks and textbooks to each session.) These exercises are designed to enhance your conceptual understanding of the material covered each week in lecture and on the homework and give you the opportunity to maximize your learning experience by interacting with both other students and your T.A. in the problem solving process. Recitation assignments will not be collected. Nonetheless, attendance and participation in recitation is mandatory. You may miss up to two recitation sections over the course of the semester without grade penalty.

Examinations

Three midterm examinations and one final examination will be given in this course. The dates and times are listed on the course calendar.

The midterm examinations occupy an entire lecture period of 80 minutes. The midterm examinations are closed book. However, you may bring a single sheet (8.5x11 inches, or A4) of handwritten notes (no photocopies) to each examination. You can write on both sides of your sheet. The notes should be turned in with your exam. Please bring a calculator to the examinations. Use of smartphones or other wireless devices for the exams is strictly prohibited.

There are \textit{no makeup midterm examinations}; if you are ill, or if you have a family emergency, the examination which you miss will be dropped in computing your grade. For students who take all three examinations, the lowest of your three examinations scores will be dropped before your grade is
computed. If you miss two exams entirely due to illness or family emergencies, please consult the professor.

The final examination is cumulative and covers all the material in the course. You will be allowed four (4) sheets of handwritten notes on the final examination, which is otherwise closed book; one possibility is to re-use your sheets of notes from the earlier examinations.

Grading

The distribution of points used in determining your final grade is:

Recitation participation: 10%
Homework: 25%
Midterm Examinations (20% apiece, best 2 out of 3): 40%
Final Examination: 25%

Grading scale

Your grade in this course is not based on how well other students are doing. It is possible for every student in the class to get an "A". Grades will be assigned on a scale no stricter than the following:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100</td>
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<tr>
<td>A−</td>
<td>88-92</td>
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<tr>
<td>B+</td>
<td>85-87</td>
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<tr>
<td>B</td>
<td>80-84</td>
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<tr>
<td>B−</td>
<td>76-79</td>
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<tr>
<td>C+</td>
<td>72-75</td>
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<tr>
<td>C</td>
<td>68-71</td>
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<tr>
<td>C−</td>
<td>60-67</td>
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<tr>
<td>D</td>
<td>50-59</td>
</tr>
<tr>
<td>F</td>
<td>0-49</td>
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Laboratory

PHY 221 is the laboratory component of PHY 215, but it is taught independently of PHY 215. The syllabus and schedule for PHY 222 is posted here: http://web.physics.syr.edu/undergraduate/current-courses.html.
**Academic Integrity**
Syracuse University’s Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the policy and know that it is their responsibility to learn about course-specific expectations, as well as about university policy. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first offense by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of Academic Integrity Policy. The standard sanction for a first offense by a graduate student is suspension or expulsion.

For more information and the complete policy, see [http://academicintegrity.syr.edu/academic-integrity-policy/](http://academicintegrity.syr.edu/academic-integrity-policy/)

**Disability-Related Accommodations**
If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), [http://disabilityservices.syr.edu](http://disabilityservices.syr.edu), located in Room 309 of 804 University Avenue, or call (315) 443-4498, TDD: (315) 443-1371 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

**Religious Observances Policy**
SU’s religious observances policy, found at [http://supolicies.syr.edu/emp_ben/religious_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm), recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to are religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through [MySlice/StudentServices/Enrollment/MyReligiousObservances](http://myslice.syr.edu/student-services/enrollment/myreligiousobservances) from the first day of class until the end of the second week of class.