General description:
Introductory physics for students seeking a in-depth experience than PHYS 1100. Covered topics are similar to PHYS 1100 (Newton’s Laws, Energy and Momentum in linear and rotational motion, Waves). Calculus and vector mathematics are fully integrated into the course material. Laboratory exercises are carried out emphasizing scientific logic, measurement uncertainty and clear, concise reporting.

All of the information for this course will be provided on the Rensselaer BlackBoard LMS site. Be sure to look there early and frequently.

lecture: M,R 2:00-3:50pm, SAGE 3510
labs: sec 1: W 10:00-11:50am, SC2C22
       sec 2: W 2:00-3:50pm, SC2C22
mentor session hours: TBA

instructor: Peter Persans  office hours: W 5-6, F 5-6
office: JROWL 1C10
e-mail: persap@rpi.edu
phone: office: 276-2934; cell:518-505-5602
course page: www.rpi.edu/~persap and on BB-LMS

Graduate Teaching Assistants (graders)
TBA

Undergraduate lab facilitators:
TBA

Mentors:
TBA

prerequisites: A rigorous high-school physics course. An introductory calculus course.
co-requisite: MATH 1010 or higher

learning outcomes: Students will be able to employ fundamental physics concepts and theories to set up and formulate problems and experiments, and analyze data in mechanics, thermodynamics, and special relativity at the introductory level; students will be able to apply concepts of differential and integral calculus to solve associated problems.

text: Robert Resnick, David Halliday, and Kenneth S. Krane
      (You will use Vol 2 for PHYS 1250)
      MasteringPhysics (Young and Freedman 13th as associated text)
      online homework and tutorial system.

      I recommend Quick Calculus, Kleppner and Ramsey for students who want to strengthen concepts in calculus.
I recommend *An Introduction to Mechanics* by Kleppner and Kolenkow (Cambridge University Press) for students who want more of the rigorous math behind much of what we do.

**grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Online Homework</td>
<td>10%</td>
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<tr>
<td>Written homework</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory/lab report</td>
<td>20% (10% active participation in class, 10% lab report)</td>
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<tr>
<td>Weekly Quizzes (best N-1 of N)</td>
<td>40% (N~11)</td>
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<tr>
<td>Mid-Term Exam</td>
<td>10%</td>
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<tr>
<td>Final exam</td>
<td>10%</td>
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<tr>
<td>Mentor session attendance</td>
<td>2% extra credit</td>
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Quizzes are 30 minutes and are topical – dealing mostly with material from the previous two classes and homework due at the previous classes. Quizzes are on Thursdays. Nominal dates are given in the schedule.

Final Exam (mandatory) is comprehensive: as scheduled by the registrar.

Here are the nominal conversions between numerical and letter grades. I reserve the right to bend the limits slightly.

- A=92 to 100; A-=89 to 92; B+=86 to 89; B=82 to 86; B-=79 to 82; C+=76 to 79; C=72 to 76; C-=67 to 72; D=55 to 67.

**Lecture attendance:**

Lecture class times involve both formal lecture and interactive activities. The purposes of the lecture itself are to highlight key ideas and address students’ questions and difficulties. Attendance at lecture is not taken, but a large fraction of your grade is associated with lecture-class activities and quizzes. Quizzes will be given during the lecture time slot.

**Homework assignments:**

Homework is due on the date indicated, **at the start of class at 2pm**. Late homework will not be accepted for full without prior approval from the instructor. Homework handed after it is collected will have a 10% deduction, with 10% additional deduction for each day late until a maximum grade of 20% is hit. After that homework will earn a maximum of 20%. Most of your learning will be outside of class as you do homework and analyze experiments. I encourage you to form regular study/discussion groups and mentors will help you to learn to work in collaboration. I encourage group meetings in the Huntington Room so you can visit me or the TA’s when questions arise that you can’t resolve among yourselves.

**Laboratories:**

The laboratory schedule (posted on the course webpage) includes information on that day’s laboratory exercise (with which you should be familiar **before** coming to class) as well as potentially useful links. Since some labs involve electronic data collection and analysis, you must bring your laptop to the lab activities. You must keep a written notebook for lab, which we will check for completeness. Reporting work for which you have no notebook record is unacceptable laboratory practice. You are expected to take all of your data, keep notes, and begin some data analysis, during the laboratory class day for which the activity is assigned. Your lab report
should also reflect the work you’ve done on that exercise outside of the classroom. The completed lab report should be turned in at the beginning of the following lab. Your lab notebook will be inspected for content and completeness near midterm and at the end of the course. The lab notebook will count for 20% of your lab grade.

Make-up exams and labs:
You will be given the opportunity to take a conflict quiz or exam if you have a valid excuse for an exam day. Valid excuses usually involve a letter from the Dean of Students’ office. Quizzes and Exams should be made up as soon as possible after the missed day.

There will be one make up lab period at the end of the semester. If you have a valid excuse (official letter from Dean of Students or Office of Student Experience) you may make up one lab.

Academic Integrity Policy:
I follow the Rensselaer Student Handbook in which integrity is based on mutual trust that we will each fulfill our responsibilities. You are encouraged to collaborate on homework, activities, and labs with one another, but all work that you hand in must be your own. You may find it useful to form a working group - many people learn best from teaching and learning interactions with peers - but do not substitute a partner's understanding for your own. Homework or laboratories that are clearly copied will receive a maximum grade of 50% of the possible score for the first offense and 20% for later offenses. The degree to which you have individually mastered the material will be determined by exams and quizzes. Collaboration on examinations and quizzes is not permitted and will result in a zero grade on that exam and a letter to the Dean of Students for appropriate action.

Other notes:
Formula sheets: During each in-class topical examination, you will be permitted one-half of one side of an 8.5x11" sheet for notes. I will give you any necessary constants and a short table of useful math formulas. Use of any other materials is not permitted and will result in a zero grade on that exam and a letter to the Dean of Students for appropriate action.

You will be permitted one sheet of paper, both sides, for the mid-term and for the comprehensive final exam.

Special needs: If you have special academic needs, please inform me early in the semester so I can try to accommodate you. Examples include: extended time for examinations, quieter space for examinations, large type examinations, or exams with extra space for large handwriting.

Student Learning Outcomes
1. Students will demonstrate the following development of skills and knowledge:
   a) development of conceptual understanding through observation of physical phenomena
   b) reasoning about physical phenomena on the basis of available evidence.
   c) use of experimental data in the development, testing, and refinement of theoretical models.
   d) evaluation of datasets containing extraneous information and or noise in regard to identifying relevant/important information.
   e) be able to design experiments
   f) application of physical knowledge to engineering/design problems
2. Applying Course Material to Improve Thinking Skills through quantitative problem solving involving the application of
a) 1d and 2d motion with position or time dependent acceleration.
b) Newton’s second law in 1d and 2d
c) conservation of momentum, angular momentum, and energy
d) calculation of work done by a force
e) potential energy
f) rotational inertia
g) Newton’s universal law of gravitation

3. Demonstrate the ability to integrate all the above principles of physics to solve multifaceted problems in the topics of this course.