UNIVERSITY OF WATERLOO

Physics 115: Physics for Engineers - Fall 2015

“All Science is either Physics or stamp collecting” E. Rutherford

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(* Course Coordinator)

UW LEARN Web site for the course: [http://uwaterloo.ca/pathway/current-students](http://uwaterloo.ca/pathway/current-students)
Pick Waterloo LEARN

UserID: Your Engineering UserID
Password: Your QUEST password

Assignment Solutions, Old Mid Term tests, Old Final exams and other information will be available on the web site.

Lectures: Three hours have been scheduled on your time table.

Tutorials: A two-hour tutorial slot is scheduled on your timetable. This is essentially a problem solving session. Be sure to bring your textbook to each problem-solving session.

Tutorials begin the week of September 15th (the second week). Attempt as many assigned questions before you come to the problem-solving session. It is only through your individual effort that you will become proficient at solving problems. There are no laboratories associated with this course.

Text: Hawkes, Iqbal, Mansour, Milner-Bolotin and Williams
Physics for Scientists and Engineers
First Edition

Practice Test: Wednesday Oct 14th 7.00 pm to 9.00 pm (All courses)

Term Test: Physics Midterm: Wednesday, October 21st, 2015, 1.30 pm - 3.30 p.m.
Type: Multiple Choice, marked by computer.
AIDS: a Calculator (Non-Programmable) and A formula sheet provided by your Instructor

Final Exam: December xxth. Time and Location: TBA
Marked partly by computer and partly by hand.
AIDS: A Calculator (Non-Programmable) and a formula sheet provided by your Instructor

Students are expected to show work on their examination booklets to support their choice of answers on the computer marked questions on the term test and on the final exam.
Assignments:
The weekly assignment will consist of approximately ten problems, 3 of which are to be handed in (to the boxes opposite PHY 204) by 12.00 noon on the following Friday. One of these will be graded, and the set will be returned one week later. (Note the attached schedule shows the week that each problem set is due, e.g. Assignment 1 is due the Friday of week 2.) Solutions must be laid out properly, with all steps shown, answers underlined, and diagrams properly labeled. Marks will be deducted for missing name, I.D. or Section number. Solutions will be discussed in tutorials, posted (a) near the WEEF lab and (b) on the Physics web site.

Quizzes:
A short quiz will be held during the last fifteen minutes of each tutorial. The quiz will consist of a single question based on work covered in lectures the previous week and/or on that week's assignment. The question will be of a difficulty to be expected on the term test or the final exam, and in many cases may be a question off an old term test or final exam. The intent of the quiz is to provide you with feedback on your understanding and learning of the material covered during that week.

Assessment of grade: Each student will receive the higher of M1 or M2, where
M1 = 0.1 P + 0.1 Q +0.3 T +0.5 F
M2 = 0.1 P + 0.1 Q +0.1 T +0.7 F
Here P, Q, T, and F denote percentage grades for the assignment problems (P), tutorial quizzes (Q), midterm test (T), and final exam (F).

Holiday: October 12th (Monday)

Learning Outcomes:
By the end of this course you should be able to be a good problem solver.

A good problem solver must be able to
- Identify and/or recognize the theories/Laws required to solve the problem.
- Convert a Physical situation into a mathematical model.
- Recognize and employ the proper math task required to solve the problem.
- Analyze and deconstruct the problem.
- Gain enough confidence to defend their answer.

Visits with your Instructor and/or T.A :
Not all learning happens in the classroom! In order to enhance your understanding of the course material you may find it necessary to meet with your Instructor either during office hours or by making an appointment. In order to maximize your learning opportunity we expect you to come prepared with a specific question or questions. However, please be free to contact your Instructor if you need any assistance.

Missed tests and/or assignments:
If you happen to miss or will have to miss a test, quiz or an assignment due to extenuating circumstances or sickness, please make sure to contact the first year Engineering office. You may be asked to provide valid written documentation.

Academic Integrity and Plagiarism:
Policy 71 on student academic discipline(http://www.adm.uwaterloo.ca/infocat/UW/policy_71.html) outlines academic offences that are punishable. The first year Engineering web site also refers to this. Please refer to http://www.eng.uwaterloo.ca-year1web/a_integrity.html.
Concept Map for Physics 115

Kinematics  1D and 2D Motion  Forces  Work  Energy  Statics  Rotational Motion

Concepts

Laws: i.e Newton’s Laws.

Theories/principles i.e Huygens Principle

Good Problem Solver

- Attendance
- Practice
- Discussion
- Experiments
- Technology
**Topics:** Chapter 1 and 2 are assumed to be familiar to the student and so will not be covered explicitly in class: **Students should** check that they are familiar with this **material.**

**Note:** In the following, the notation Ch.4 [1-6] means sections 1 through 6 of Chapter 4, whereas Ch.8.5 means section 5 of Chapter 8.

<table>
<thead>
<tr>
<th>Week</th>
<th>Beginning Monday</th>
<th>Material Covered</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sept. 14</td>
<td>Kinematics. This week we cover Ch.3 [1-4] (kinematics in 1 dimension) &amp; Ch.4 [1-3] (kinematics in 2 &amp; 3 dimensions including projectile motion).</td>
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<tr>
<td>2</td>
<td>Sept. 21</td>
<td>Ch. 3.4 and Ch.4 [3-4] &amp; Force and Motion-1 Ch.5 [1-6].</td>
<td>#1</td>
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<tr>
<td>3</td>
<td>Sept. 28</td>
<td>Force and Motion- including Friction Ch.5.7.</td>
<td>#2</td>
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<td>4</td>
<td>Oct. 5</td>
<td>Kinetic energy &amp; work. Ch.6 [1-5 and 9].</td>
<td>#3</td>
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<tr>
<td>5</td>
<td>Oct. 12</td>
<td>Potential energy. Conservative forces. Conservation of Mechanical energy. Ch.6 [5-7] but omit Ch.5.8.</td>
<td>#4</td>
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<td><strong>NOTE: Use make up lectures to compensate for mid term test week</strong></td>
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<tr>
<td></td>
<td></td>
<td>Center of mass, and Conservation of linear momentum. Ch.7 [1-2 and 4]</td>
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<tr>
<td>6</td>
<td>Oct. 19</td>
<td>Mid Term Test week (No lectures)</td>
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<tr>
<td>7</td>
<td>Oct. 29</td>
<td>Conservation of Linear Momentum, Collisions, Impulse and Variable Mass Problem. Ch. 7 [3, 5 and 8].</td>
<td>#5</td>
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<td>8</td>
<td>Nov. 2</td>
<td>Elastic and inelastic collisions in one dimension. Collisions in two dimensions. Ch. 7 [6, 7]</td>
<td>#6</td>
</tr>
<tr>
<td>9</td>
<td>Nov. 9</td>
<td>Statics. Ch.10[1-5] (You should read Ch.10.7)</td>
<td>#7</td>
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<tr>
<td>10</td>
<td>Nov. 16</td>
<td>Rotational Motion Torque and Angular momentum. Conservation of Angular momentum. Ch.8 [1-7]</td>
<td>#8</td>
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<tr>
<td>11</td>
<td>Nov. 23</td>
<td>Rolling bodies. Kinetic energy. Ch.9 [1-7]</td>
<td>#9</td>
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<tr>
<td>12</td>
<td>Nov. 30</td>
<td>Review (and any catch-up)</td>
<td>#10</td>
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<tr>
<td>13</td>
<td>Dec. 7</td>
<td>Review (last lecture)</td>
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