Physics 121: Physics for the Physical Sciences I

Vancouver Island University

Course Description, Fall Semester, 2009

Website: http://web.viu.ca/hearnd/Courses
Schedule: Sections 01, 02: **M, W**: 13:00 – 14:30, **F**: 14:30 – 15:30
Sections 03, 04: **M, W**: 14:30 – 16:00, **F**: 13:30 – 14:30
Location: Building 315, Room 216

Instructor: Dr. Debbie Hearn
Office: Building 315, Room 208
Hours: Mon, Tue, Wed, Fri: 10:30 – 11:30
Please note: If these office hours are not convenient for you, you are welcome to drop by my office whenever I am there. Also, you can always leave a phone message or send email, and I will reply as soon as I can.
Phone: (250) 753-3245, local 2641
Email: Deborah.Hearn@viu.ca

Prerequisites: Min. "C+" in either Principles of Physics 12; min. "C+" in either Principles of Math 12 or Math 152. Notes: Math 100 or 121 is a prerequisite for Phys 122. Calculus 12 is recommended.

Course Objectives:

Together with Physics 122, this course generally satisfies the first-year requirement for students proceeding towards degrees in the physical sciences (including physics, astronomy, chemistry, engineering, and earth science). In Physics 121, we study Newtonian mechanics, including rotational dynamics and angular momentum. Calculus is introduced gradually, as needed. In addition to a **good understanding of the physics content**, this course aims to strengthen your skills in the following areas:

Problem Solving Skills – You will often need to analyze a complex situation, decide what information is needed/relevant, model the situation conceptually and mathematically, and apply the principles of physics to find a solution.

Communication Skills – You will practice technical writing as you explain your reasoning on problem assignments, tests, and lab reports. In class and in the lab, you will work in groups to solve problems.

Abstract Reasoning Skills – You will often be asked to go beyond specific situations to more general principles. For example, you will sometimes be asked to find a general formula for a physical quantity, rather than simply calculating its value in a particular situation. You will also be asked to identify the principles you apply in solving a problem, and to identify the common features of superficially different situations.

Textbook: Serway and Jewett, **Physics for Scientists and Engineers with Modern Physics**, 7th edition, Thomson/Brooks/Cole, 2008. (The 6th edition of this text is also acceptable.)
Optional: Student Solutions Manual and Study Guide (Volume 1) (available from the bookstore).

Grades: The final grade for this course will be based on the following weights:

1. In-class group work	5%
2. Problem assignments	15%
3. Laboratory	25%
4. Tests (2)	25%
5. Final examination	30%

The final letter grades will be determined as follows:
A+ (90 – 100), **A** (85 – 90), **A–** (80 – 85), **B+** (76 – 80), **B** (72 – 76), **B-** (68 – 72), **C+** (64 – 68), **C** (60 – 64), **C-** (55 – 60), **D** (50 – 55), **F** (< 50).

Academic integrity:

The following standards of academic integrity are copied from the Student Academic Code of Conduct. The entire policy can be found on the VIU website at http://www.viu.ca/policies/policy.asp?rdPolicyNumber=99.01. All students are expected to read the entire policy document.

STANDARDS OF ACADEMIC INTEGRITY
Students are expected to meet the standards of academic integrity as indicated in this policy. Standards of academic integrity include, but are not limited to:

- independently producing work submitted under one's own name;
- properly and appropriately referencing all work;
- identifying all collaborators in work;
- completing examinations without giving or receiving assistance, excepting those students requiring assistance due to a documented disability;
- respecting the integrity of examination materials and/or the examination process; and
- respecting the integrity of computer security systems, software copyrights and file privacy of others.

Classroom Expectations:

Class time is valuable. Please ensure that your behavior is not disruptive to other students and the instructor. For example, if you need to sleep in class, please don't snore! If you must come to class late or leave early, please enter/leave the classroom as quietly as possible. Talking to your neighbor when you are not supposed to, or using your laptop inappropriately, can be very distracting to the rest of us in the class. If you need to miss a class for any reason, it is considerate to let the instructor know ahead of time.

Course Schedule: (see the course website for more details)

Week	Topics	Text Chapter	Laboratory
1 Sep 8 – 11	Motion concepts: position, displacement, speed, velocity, acceleration; Motion diagrams	2	No lab
2 Sep 14 – 18	Finding the acceleration for all types of motion (straight, curved); Radial and tangential acceleration; Mathematical description of motion: coordinate systems, representation with graphs, equations of motion.	3, 4	Measurements and uncertainties
3 Sep 21 – 25	Force concepts: force as an interaction, kinds of forces, free-body diagrams, net force	5	Graphical analysis (simple pendulum)
4 Sep 28 – Oct 2	Newton's laws	5, 6	Force constant of a spring
5 Oct 5 – 9	Applications of Newton's laws; Unit vectors	5, 6, 3	Force and acceleration
6 Oct 12 – 16 No class on Monday	Energy concepts: system, work, kinetic energy, potential energy, conservative forces; Work done by a force; Scalar product	7, 8	Force and acceleration cont'd
7 Oct 19 – 23 **Test 1 : Wed, Oct. 21**	Conservation of mechanical energy; Work done by non-conservative forces; Linear momentum conservation	8, 9	Ballistic pendulum /Collisions in 1d
8 Oct 26 – 30	Collisions; Combining Newton's second law with conservation laws	9	Ballistic pendulum /Collisions in 1d
9 Nov 2 – 6	Impulse; Elastic collisions; Centre of mass;	9	Static equilibrium – forces
10 Nov 9 – 13 No class on Wednesday	Rotational kinematics; Torque ; Moment of inertia	10	No lab
11 Nov 16 – 20	Angular momentum; Vector (cross) product	11	Static equilibrium – torques
12 Nov 23 – 27 **Test 2: Mon, Nov. 23**	Newton's second law in rotational form; Pulleys with mass	10	Linear and angular momentum
13 Nov 30 –Dec 4	Conservation of energy in rotation; Rolling motion	10	**Lab Exam**
14 Dec 7	Review		