DAWSON COLLEGE

PHYSICS
Science
Mechanics

203-NYA-05 (all sections)
Fall 2013

Pre-requisites Sec. V Physics 504, Mathematics 506 (or equivalent)

Co-requisites Calculus I (201-NYA-05)

Ponderation 3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class per week)

Course objectives

The role of this course in the program is two-fold. First, it presents the basic principles of mechanics – kinematics, dynamics, and the three conservation laws (energy, momentum and angular momentum) – which are essential to the study of all the natural sciences. Second, it provides an opportunity for students to develop problem solving skills.

The laws and concepts introduced in this course are the foundation of our scientific view of the world. Ideas about force, motion, energy and momentum arise again and again in all the sciences and in daily life. Understanding them is essential to the education of a scientist or an engineer. In every physics, chemistry, geology and even biology course at college and university, concepts such as energy and momentum, first learned in mechanics, will be generalized, broadened, deepened and applied.

For detailed information regarding the objectives of this course and the specific performance criteria see the Science Program folder on FirstClass.

Course competencies

This course will allow the student to fully achieve the competency:
OOUR: To analyze different physical situations and phenomena in terms of the fundamental principles of classical mechanics.

1. To describe the translational and rotational motion of objects.
2. To apply the concepts and laws of dynamics to the analysis of the motion of objects.
3. To carry out calculations of work, power and energy in simple situations.
4. To apply the conservation principles of mechanics.
5. To verify experimentally some of the laws and principles of mechanics.

This course also contributes to the partial achievement the competency:
OOUU: To apply what the students have learned to one or more subjects in the sciences.

1. To identify the scientific aspects of a given topic from an interdisciplinary perspective
2. To transfer what they have learned to situations requiring the contribution of more than one discipline
3. To apply systematically an experimental method
4. To solve problems
5. To use data processing technologies
6. To reason with rigor
7. To communicate clearly and precisely
8. To show evidence of independent learning in the choice of documentation or laboratory instruments
9. To work as members of a team
10. To make connections between science, technology and the evolution of society
11. To identify the underlying values underlying their treatment of a topic
12. To place scientific concepts used in a historical context
13. To show attitudes appropriate for scientific work
14. To apply acquired knowledge and skills to new situations

Evaluation

The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website.

There are two marking schemes. **Your final mark will be the higher of the two schemes.**

Assignments, quizzes and class tests	50	30
Laboratory activities	20	20
Final examination	30	50

Your teacher will provide a tentative test schedule during the first week of class. To help you prepare for the final exam, old exam questions and solutions will be made available.

Students must show a basic understanding of the course material at the level covered in the lectures and laboratory in order to pass the course. This is achieved by attaining at least an average grade of 60%, calculated according to the evaluation scheme above. **Course work not submitted by the due date may be penalized at the teachers discretion.**

Reference materials

1. **University Physics (with Mastering Physics) by Young & Freedman, 13th edition – NYA** or **Physics for Scientists and Engineers (with Mastering Physics), 3rd edition – NYA**. These textbooks are available in the bookstore, online, and you may be able to buy it used. It is important to note that you will also need a Mastering Physics access code for online homework (it is included in new books).
2. **Ebook version:** Students may purchase an electronic version of the textbook instead of a printed book. The price is lower but, unlike the printed book, it has a limited lifetime (2 years) and it cannot be sold used. To purchased the ebook, you must first buy a MasteringPhysics access code which you can do in the bookstore (separately from the hard-copy text) or online at: `www.masteringphysics.com` (online version is about $5 more). When you access MasteringPhysics you can buy the ebook.
3. **Used book:** If you buy a used book make sure it has a MasteringPhysics access code. You may need a valid code for any of your physics courses (NYA, NYC, NYB and BZE).
4. **Library copies:** Copies of the textbook are available on reserve in the Dawson Library (as are similar textbooks by Serway & Jewitt, *etc.*)

Teaching methods

The material will be presented using a mix of active learning activities, lectures, in-class problem solving, laboratory experiments and demonstrations. Laboratory periods will be used for experiments as well as class tests and lectures.

Attendance & participation

Although class attendance is not compulsory, students should make every effort to attend all classes. In the event that a class is missed, the student is responsible for all material covered or assigned during that class. **Attendance at laboratory experiments and tests is compulsory.** Students must write the tests at the scheduled times except for unforeseen emergencies confirmed by proper documents. For additional information students should refer to the Institutional Student Evaluation Policy (ISEP section III-C) regarding attendance.

Literacy standards

It is expected that students will be able to comprehend the course material and express themselves appropriately as a normal part of their academic performance in the course. Marks may be deducted for inadequate communication skills.

Laboratory work

Experimentation is an essential part of science. Students will be expected to perform experiments and report on their results. Your teacher will provide you with instructions for lab experiments and activities (there is no manual to purchase). Information about lab report formats is available in the Science Student Handbook which is available on FirstClass (see folder in 'student info' conference). **Students must be present during the entire lab activity to receive credit.**

Student conduct

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students (ISEP section II-D). Disruptions or excessive noise will not be tolerated. Students who do not comply with these rules will be asked to leave the class and may be referred to Student's Services for disciplinary action. **Mutual respect is the key to a harmonious learning environment.**

Academic integrity

Cheating, copying, or any other form of academic dishonesty will not be tolerated. Students should acquaint themselves with the policy of the College on plagiarism and cheating. According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism affecting a students grade (ISEP section IV-C). The usual penalty for the first instance of cheating will be a grade of zero for the piece of work in question to all parties involved (under certain circumstances, even a first offence may be penalized by failure in the course). A second offence may result in the failure of the course. Students should note that using someone elses laboratory data without authorization from the student and the teacher is cheating.

Intensive course conflicts

If a student is attending an intensive course, the student must inform the teacher, within the first two weeks of class, of the specific dates of any anticipated absences.

Policy on religious observance

Students who intend to observe religious holidays must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance (ISEP Section III-D), within the first two weeks of the semester. Forms for this purpose are available from your teacher. Your teacher will inform you of any modifications to planned course activities resulting from the teacher's own religious commitments.

Course content

The material to be covered is contained in the following chapters and sections of **University Physics, 13th edition**.

Weeks	Topics	Chapter & Section
1	Units, physical quantities, and vectors	Ch.1: 3–5, 7–10 (1, 2 and 6 optional)
2–3	Motion along a straight line	Ch.2: 1–5
4–5	Motion in two or three dimensions (including circular motion)	Ch.3: 1–4; Ch.9: 1–3
6	Newton's laws of motion	Ch.4: 1–6
7–8	Applying Newton's laws	Ch.5: 1–4 (5 optional)
9–10	Work and kinetic energy	Ch.6: 1–4 (integrals qualitatively)
11–12	Potential energy and energy conservation	Ch.7: 1–5 (4 & 5 qualitatively)
13–14	Momentum, impulse, and collisions	Ch.8: 1–5 (integrals qualitatively)
15	Dynamics of rotational motion	Ch.10: 1, 2 (5 & 6 optional)

The material to be covered is contained in the following chapters and sections of **Physics for Engineers and Scientists, 3rd edition**.

Weeks	Topics	Chapter & Section
1	Concepts of motion	Ch.1: 1–8
2–3	Kinematics in one dimension	Ch.2: 1–7
4–5	Motion in two or three dimensions (including circular motion)	Ch.3: 1–4; Ch.4: 1–7; Ch.12: 1
6–7	Dynamics in one dimension	Ch.5: 1–7; Ch.6: 1–4 (5 optional)
8	Newton's laws	Ch.7: 1–5
9–10	Dynamics in two dimensions	Ch.8: 1–5
11	Impulse and momentum	Ch.9: 1–6
12–13	Energy	Ch.10: 1–7
14	Work	Ch.11: 1–6, 8, 9 (7 optional)
15	Rotational dynamics	Ch.12: 2–7 (8–11 optional)

Calculus

A complete understanding of the material covered in this course comes with an understanding of calculus, and in particular derivatives and integrals. Calculus I is a co-requisite course that will introduce students to the basics of calculus and derivatives. In physics NYA concepts involving derivatives will be covered qualitatively initially and become more and more quantitative as the semester progresses. Physics using integral calculus will only be covered qualitatively in this course. Students are strongly encouraged to link the learning done in Physics and Calculus.

Questions outside class

- All teachers will be available in their respective offices to their students during posted office hours. In the first week, your teacher will inform you of their schedule and will post it outside their office.
- Room 7A.1 is a physics study room. At scheduled times, a teacher or peer tutor will be on duty there to answer your questions. The schedule of teachers and peer tutors will be posted outside of 7A.1 in the 2nd or 3rd week of term.
- Many teachers in the Science Program – including those from the Physics Department – will communicate with their students via FirstClass. This software allows teachers and students to share information, use email and much more. You can download the necessary (free) software at the following website:

  `http://www.place.dawsoncollege.qc.ca`

  An instruction manual is available at this website that details how to install and use the software. Also note that a FirstClass app is available for iPhone/iPad, Android, and BlackBerry.