PHYSICS
Science
Mechanics
203-NYA-05 (all sections)
Fall 2018

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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.

Detailed information regarding the objectives and standards for this course and the specific performance criteria is available at `https://www.dawsoncollege.qc.ca/physics/program-documents/science/`.

Course competencies

This course will allow the student to fully achieve the competency:
OOUR: Analyze various situations and phenomena in physics using the basic principles of classical mechanics.
1. Describe the translational and rotational motion of bodies.
2. Apply the concepts and laws of dynamics to the analysis of the motion of bodies.
3. Measure the amount of work and energy involved in simple situations.
4. Apply the principles of conservation in mechanics.
5. Verify experimentally a number of laws and principles in mechanics.

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 grading schemes. **Your final grade will be the higher of the two schemes.**

Assignments, quizzes and class tests[†]	40%	25%
Laboratory activities	20%	20%
Final examination	40%	55%

[†]Your teacher will provide a detailed breakdown of these components and a tentative test schedule during the first week of class.

In order to pass the course, students must show a basic understanding of the course material at the level covered in the lectures and in the lab. This is achieved by attaining a final grade of at least 60%, calculated according to the evaluation scheme above. **Note: course work not submitted by the due date may be penalized at the teacher's discretion.**

Reference materials	1. **Physics for Scientists and Engineers (with Enhanced WebAssign) by Serway & Jewett, 9th edition** or **Physics for Scientists and Engineers (with Mastering Physics) by Knight, 4th edition**. Custom packages for Dawson College NYA are available at the bookstore which include an access code for the online homework system. Your teacher will tell you which textbook will be used in your section. 2. **Library copies:** Copies of the textbook are available on reserve in the Dawson Library.
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 during laboratory experiments and for class tests is however compulsory.** In the rare event that a student for valid reason (*e.g.* due to an intensive course, illness, *etc.*) is or anticipates to be absent during a laboratory experiment or for a class test, the student **must**, where possible, inform the teacher and provide the necessary documents before the absence or, at the latest, on the day of their return. If the absence is excused, students will have the opportunity to complete the assessment. All other assessments (readings, quizzes, lab activities, *etc.*) missed due to absence are: • assigned a grade of zero where the absence is not excused; • given zero weight in the calculation of the final grade where the absence is excused. For additional information regarding attendance, students should refer to the Institutional Student Evaluation Policy (ISEP section IV-C).
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). **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 student's grade (ISEP section V-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 else's 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, within the first two weeks of the semester as prescribed in the ISEP Policy on Religious Observances. (ISEP, Section IV D). This includes any religious holidays that occur during the final exam period. Please refer to the academic calendar for the exact dates. 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 **Physics for Scientists and Engineers by Knight, 4th edition**.

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

The material to be covered is contained in the following chapters and sections of **Physics for Scientists and Engineers by Serway & Jewett, 9th edition**.

Weeks	Topics	Chapter & Section
1	Physics and measurements	Ch.1: 1, 3, 4, 6 (2 and 5 optional)
2	Motion in one dimension	Ch.2: 1–7
3	Vectors	Ch.3: 1–4
4–5	Motion in two dimensions	Ch.4: 1–5
6–7	The laws of motion	Ch.5: 1–8
8	Circular motion	Ch.6: 1, 2
9–10	Energy of a system	Ch.7: 1–9
11	Conservation of energy	Ch.8: 1–5
12–13	Linear momentum and collisions	Ch.9: 1–7 (8, 9 optional)
14	Rotation of a rigid body about a fixed axis	Ch.10: 1–5
15	Angular momentum	Ch.11: 1–4 (5 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.