

PHYSICS
Science
Engineering Physics
203-BZE-05 (all sections)
Winter 2014

| | |
|----------------------------|--|
| Teacher | Jean-François Brière 7A.14, local 1756, jfbriere@place.dawsoncollege.qc.ca Hélène Nadeau 7A.22, local 1752, hnadeau@place.dawsoncollege.qc.ca Jonathon Sumner 7A.24, local 1751, jsumner@place.dawsoncollege.qc.ca |
| Pre-requisites | Mechanics (203-NYA-05) |
| Co-requisites | Calculus II (201-NYB-05) |
| Ponderation | 3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class per week) |
| Course objectives | <p>The objectives are to analyze different physical situations and phenomena of interest to engineers and scientists using the fundamental laws of mechanics and to use computers to model various phenomena and to gather data in pertinent experiments. This course is designed to provide students with an enhanced background in mechanics.</p> <p>For detailed information regarding the objectives of this course and the specific performance criteria see the Science Program Description folder on FirstClass.</p> |
| Course competencies | <p>This course will allow the student to fully achieve the competency:</p> <p>OOUV: To analyze different physical situations and phenomena of interest to engineers and scientists using the fundamental laws of mechanics and to use computers to model various phenomena and to gather data in pertinent experiments.</p> <ol style="list-style-type: none"> 1. To analyze a wide variety of rotational phenomena using the concepts of dynamics and energy 2. To analyze problems in fluid statics and dynamics 3. To analyze problems in static equilibrium in two- and three-dimensions. 4. To analyze the behavior of materials under tensile and compressive loads. 5. To analyze and solve problems involving beams under a variety of loading conditions 6. To analyze the internal stresses and strains in beams under a variety of loading conditions. 7. To gain enhanced proficiency in the use of computers in a scientific context. <p>This course also contributes to the partial achievement the competency:</p> <p>OOUU: To apply what the students have learned to one or more subjects in the sciences.</p> <ol style="list-style-type: none"> 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 | <p>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.</p> |

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

| | | |
|--|-----|------|
| Reading assignments (weekly) | 5% | 2.5% |
| Quizzes (weekly) | 15% | 7.5% |
| Class tests [†] | 30% | 15% |
| Lab activities, experiments & spreadsheets | 25% | 25% |
| Final examination | 25% | 50% |

[†]Your teacher will provide 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.**

Additionally, a minimum overall grade of 60% on lab activities, experiments and spreadsheets is required to pass the course.

In the event that a student is or anticipates to be absent during a laboratory experiment or a class test (*i.e.* due to an intensive course, illness, *etc.*), 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.

Required materials

A coursepack is available at the Bookstore.

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 student's 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 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 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 the texts.

| Weeks | Topics | Pages |
|-------|---|---------------------------|
| 1 | Properties of a system of particles; centre of mass | 4–6 |
| 2 | Conservation of angular momentum and torque; static equilibrium | 8–25 |
| 3 | Rotational dynamics of a rigid body | 28–40, 60, 61 |
| 4 | Motion under forces and torques; pure rolling | 65–67 |
| 5 | Rigid body dynamics in 3D | 41–50 |
| 6 | Intro to fluid mechanics: density, pressure, forces | 73–87 |
| 7 | Buoyancy | 93–104 |
| 8 | Fluid dynamics | 113–128 |
| 9 | Intro to structural mechanics | 156–168, 170–176, 180–183 |
| 10 | Trusses, frames and machines | 185–204 |
| 11 | Static equilibrium in 3D | 209–215, 217–222 |
| 12 | Internal loads and stresses | 225–228, 230–239 |
| 13 | Axial strain and thermal deformations | 248–253, 255–262 |
| 14 | Shear force and bending moment diagrams | 267–272, 274–281, 284–289 |
| 15 | Bending and shearing stresses in beams | 293–299, 301–304 |

Comprehensive assessment

Students can opt for an independent study project as part of their comprehensive evaluation. This would count for 10% of the student's final grade, while the usual course mark would count for 90%. Note however that only second-year students are eligible to do their comprehensive evaluation in this course and students who choose this option must notify their teachers by the due date. This option is not available in continuing education courses.

Questions outside class

- All regular day program 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.