



**PHYSICS**  
**Science**  
**Waves, Optics & Modern Physics**  
203-NYC-05 (all sections)  
Fall 2017

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<b>Pre-requisites</b>	Mechanics (203-NYA-05), Calculus I (201-NYA-05)
<b>Co-requisites</b>	Calculus II (201-NYB-05)
<b>Ponderation</b>	3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class per week)
<b>Course objectives</b>	To analyze various situations or phenomena associated with waves, optics and modern physics using basic principles. This course is intended to introduce the student to a broad range of physical phenomena involving waves (mechanical waves, sound waves, and electromagnetic waves), geometrical and physical optics, matter waves, and quantum physics.  Detailed information regarding the objectives and standards for this course and the specific performance criteria is available at <a href="https://www.dawsoncollege.qc.ca/physics/program-documents/science/">https://www.dawsoncollege.qc.ca/physics/program-documents/science/</a> .
<b>Course competencies</b>	This course will allow the student to fully achieve the competency: OOUT: To analyze various situations or phenomena associated with waves, optics and modern physics using basic principles. <ol style="list-style-type: none"><li>1. To apply the basic principles of physics to oscillations and to waves and their propagation.</li><li>2. To apply the laws of geometrical optics.</li><li>3. To apply the characteristics of waves to light phenomena (physical optics).</li><li>4. To analyze a number of situations using concepts from modern physics: the development of quantum mechanics.</li><li>5. To analyze a number of situations using concepts from modern physics: the physics of the nucleus and radioactivity.</li><li>6. To verify experimentally some of the laws and principles associated with oscillatory motion, waves, optics and modern physics.</li></ol> 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. <ol style="list-style-type: none"><li>1. To identify the scientific aspects of a given topic from an interdisciplinary perspective</li><li>2. To transfer what they have learned to situations requiring the contribution of more than one discipline</li><li>3. To apply systematically an experimental method</li><li>4. To solve problems</li><li>5. To use data processing technologies</li><li>6. To reason with rigor</li><li>7. To communicate clearly and precisely</li><li>8. To show evidence of independent learning in the choice of documentation or laboratory instruments</li><li>9. To work as members of a team</li><li>10. To make connections between science, technology and the evolution of society</li><li>11. To identify the underlying values underlying their treatment of a topic</li><li>12. To place scientific concepts used in a historical context</li><li>13. To show attitudes appropriate for scientific work</li><li>14. To apply acquired knowledge and skills to new situations</li></ol>

**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

**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

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{2	Oscillations	Ch.15: 1{6 (physical pendulum optional), 7{8 (qualitatively)
3{4	Travelling waves	Ch.16: 1{3, 4 (optional), 5, 6 (qualitatively), 7{9
5{6	Superposition	Ch.17: 1{7
7{8	Wave optics	Ch.33: 1{7
9	Ray optics, Rayleigh's Criterion	Ch.34: 1{3 Ch.35: 5{6
10	Relativity	Ch.36: 3, 6, 7, 9 and 10 (1, 2, 4, 5, 8 optional)
11	Foundations of modern physics	Ch.37: 1, 2 (3{8 qualitatively)
11{13	Quantization	Ch.38: 1{7
14	Wave functions and uncertainty	Ch.39: 6 (optional)
14{15	Nuclear physics	Ch.42: 1{3, 5, 6 (4 and 7 optional)

**Comprehensive examination** Second-year students can opt to complete second-year Ch.42: 14{15 examination