

HONOURS BSC IN PHYSICS - PHOTONICS OPTION

Why is our world the way it is? How can we understand and explain what we observe around us, from the smallest sub-atomic particles to the largest galaxies? How can we apply this understanding to manipulate our world? Studying physics gives insight into the fundamental laws of nature.

But an education in physics gives so much more. The rigorous training our students receive in analyzing and understanding complex problems is valuable in many future careers. While many of our graduates have established careers in universities and in the high tech sector as research and development scientists, others have used their physics degrees as a springboard to careers in finance, administration, medicine, management or education. The range of career opportunities is perhaps wider than for any other students with a science education.

Physicists have revolutionized the way we live our lives, with groundbreaking discoveries and new technologies, transferable to other fields such as biology or finance. Our professors and graduates are an important part of this chain. Many of our professors have also been recognized for their teaching and are seen as world-class researchers in their fields of expertise.

The research conducted by the professors in the Department of Physics is concentrated in several sub-specialities, including the physics of biological and complex systems, condensed matter physics, photonics and the physics of geomaterials. Depending upon your choice of program, you have the opportunity to take courses and participate in research projects in these specialized areas.

In addition to the Honours BSc in Physics, we offer three other Honours BSc programs. The first is in physics-mathematics, which provides enriched mathematics training within a physics program. The second is the option in photonics, which gives students a solid training in physics and a more applied and industry-related training in photonics. The third is the option in biological physics, which teaches students to apply a rigorous education in physics to various areas of life sciences. We also offer a Major in Physics that can form the core of an Honours BSc when combined with a major or a minor in another discipline in the Faculty of Science, or in another faculty. Finally, starting in fall 2016, we will offer a five-year integrated program in physics (BSc) and electrical engineering (BAsc), jointly with the School of Electrical Engineering and Computer Science (SEECS). This unique program will offer a full education in physics and electrical engineering. Graduates will be sought after by industry and academia, as they will have the capacity to develop technology from a basic physics idea to the final product.

The Department of Physics also has strong graduate programs, leading to an MSc or PhD. They give students the opportunity to work on cutting edge science in a research group led by one or more department professors.

This program is offered in English and in French.

Program Requirements

Co-operative education is available with this program.

The French immersion stream is available with this program.

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1. 3 course units from:
   - GNG 1106 Fundamentals of Engineering Computation
   - ITI 1120 Introduction to Computing I

2. 3 course units from:
   - MAT 1320 Calculus I

3. 3 course units from:
   - MAT 1322 Calculus II
   - MAT 1325 Calculus II and an Introduction to Analysis

4. 3 course units from:
   - MAT 1341 Introduction to Linear Algebra
   - PHY 1121 Fundamentals of Physics I
   - PHY 1122 Fundamentals of Physics II

5. 3 course units from:
   - MAT 2122 Multivariable Calculus
   - MAT 2322 Calculus III for Engineers

6. 3 course units from:
   - MAT 2324 Ordinary Differential Equations and the Laplace Transform

7. 3 course units from:
   - PHY 2104 Introduction to Circuit Theory and Electronics
   - PHY 2311 Waves and Optics
   - PHY 2323 Electricity and Magnetism

8. 3 course units from:
   - PHY 2333 Mechanics
   - PHY 2361 Modern Physics
   - PHY 3310 Photonics Measurement Techniques

9. 3 course units from:
   - PHY 3320 Electromagnetic Theory
   - PHY 3341 Theoretical Physics
   - PHY 3350 Thermodynamics

10. 3 course units from:
     - PHY 3355 Statistical Thermodynamics
     - PHY 3370 Introductory Quantum Mechanics
     - PHY 3902 Introduction to Solid State Physics

11. 3 course units from:
     - PHY 3902 Physics and Applied Physics Laboratory I
     - ELG 4178 Optical Communications and Networking
     - PHY 4311 Introduction to Photonics - Lasers

12. 3 course units from:
     - PHY 4320 Introduction to Quantum Optics
     - PHY 4370 Quantum Mechanics
     - PHY 4375 Atomic, Molecular and Optical Physics

13. 3 course units from:
     - PHY 4382 Introduction to Solid State Physics
     - PHY 4384 Ordinary Differential Equations and Numerical Methods

14. 3 course units from:
     - PHY 4006 Physics Research Project

Option 1:

- PHY 4006 Physics Research Project

Option 2:

- PHY 4906 Physics Project

- and 3 optional course units at the 2000, 3000 or 4000 level from the Faculty of Science or the Faculty of Engineering

12 elective course units from the Faculty of Arts, the Faculty of Education, the Faculty of Law, the Faculty of Social Sciences or the Telfer School of Management

24 elective course units

Total: 120 Units

Note(s)
ITI 1120 is a prerequisite for most further computer science (CSI) courses. GNG 1106 is recommended for students not taking further computer science courses (CSI).

Of the 24 elective course units, some breadth in other sciences is recommended. In particular, the following courses are recommended: CHM 1311, (MAT 2141 or MAT 2342), (MAT 2371 or MAT 2377).

Please note that all programs in the Faculty of Science require a minimum of 12 elective course units from the Faculty of Arts, the Faculty of Education, the Faculty of Law, the Faculty of Social Sciences or the Telfer School of Management. Once you have decided on the replacement courses, please inform the Office of Undergraduate Programs of the Faculty of Science by email at infosci@uOttawa.ca so that we may amend your Academic Advisement accordingly.