

# HONOURS BSC 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-specialties, 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.

Requirements for this program have been modified. Please consult the 2022-2023 calendars (<http://catalogue.uottawa.ca/en/archives/>) for the previous requirements.

### Compulsory Courses at the 1000 level

MAT 1320	Calculus I	3 Units
MAT 1341	Introduction to Linear Algebra	3 Units
PHY 1112	Introduction to Computational Physics	3 Units
PHY 1121	Fundamentals of Physics I	3 Units
PHY 1122	Fundamentals of Physics II	3 Units

### Compulsory Courses at the 2000 level

PHY 2104	Introduction to Circuit Theory and Electronics	3 Units
PHY 2311	Waves and Optics	3 Units
PHY 2323	Electricity and Magnetism	3 Units
PHY 2333	Mechanics	3 Units
PHY 2361	Modern Physics	3 Units

### Compulsory Courses at the 3000 level

PHY 3310	Photonics Measurement Techniques	3 Units
PHY 3320	Electromagnetic Theory	3 Units
PHY 3341	Theoretical Physics	3 Units
PHY 3350	Thermodynamics	3 Units
PHY 3355	Statistical Thermodynamics	3 Units
PHY 3370	Introductory Quantum Mechanics	3 Units
PHY 3902	Physics and Applied Physics Laboratory I	3 Units

### Compulsory Courses at the 4000 level

ELG 4178	Optical Communications and Networking	3 Units
PHY 4311	Introduction to Photonics - Lasers	3 Units
PHY 4320	Introduction to Quantum Optics	3 Units
PHY 4370	Quantum Mechanics	3 Units
PHY 4375	Atomic, Molecular and Optical Physics	3 Units
PHY 4382	Introduction to Solid State Physics	3 Units

### Optional Courses

3 course units from: 3 Units

MAT 1322 Calculus II <sup>1</sup>

MAT 1325 Calculus II and an Introduction to Analysis

3 course units from: 3 Units

MAT 2122 Multivariable Calculus

MAT 2322 Calculus III for Engineers

3 course units from: 3 Units

MAT 2324 Ordinary Differential Equations and the Laplace Transform

MAT 2384 Ordinary Differential Equations and Numerical Methods

One option from the following: 6 Units

#### 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

### Elective Courses

*This is a copy of the 2024-2025 catalog.*

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	12 Units
24 elective course units <sup>2, 3</sup>	24 Units
<b>Total:</b>	<b>120 Units</b>

Note(s)

1

MAT 1322 is recommended.

2

(MAT 2141 or MAT 2342) or (MAT 2371 or MAT 2377) is recommended.

3

Of the 24 elective course units, some breadth in other sciences is recommended, particularly CHM 1311.