PHYSICS (PHYS)

Department of Physics, College of Engineering and Physical Sciences

Major Requirements (Honours)

This is a major within the degree: Bachelor of Science (calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-science-bsc/)**.**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. Since some of the required courses are not offered every semester, students entering the Major in Honours Physics should plan their program in consultation with the Department of Physics Faculty Advisor.

This major requires the completion of 20.00 credits. At least 1.00 credits must be from Arts and/or Social Science courses.

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS/.

Code	Title	Credits
Semester 1 [1]		
CHEM*1040	General Chemistry I	0.50
CIS*1300	Programming	0.50
IPS*1500	Integrated Mathematics and Physics I	1.00
Select 0.50 credits from the following:		
BIOL*1070	Discovering Biodiversity	0.50
BIOL*1080	Biological Concepts of Health	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
Semester 2 [1]		
CHEM*1050	General Chemistry II	0.50
IPS*1510	Integrated Mathematics and Physics II	1.00
MATH*1160	Linear Algebra I	0.50
Select 0.50 credits from the following:		
BIOL*1070	Discovering Biodiversity	0.50
BIOL*1080	Biological Concepts of Health	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
Semester 3		
MATH*2200	Advanced Calculus I	0.50
MATH*2270	Applied Differential Equations	0.50
PHYS*2240	Thermal Physics	0.50
PHYS*2330	Electricity and Magnetism I	0.50
0.50 Liberal Education electives		0.50
Semester 4		
PHYS*2180	Experimental Techniques in Physics	0.50
PHYS*2310	Mechanics	0.50
PHYS*2340	Electricity and Magnetism II	0.50
1.00 electives		1.00
Semester 5		
IPS*3000	Science Communication	0.50
PHYS*3130	Mathematical Physics	0.50
PHYS*3230	Quantum Mechanics I	0.50
PHYS*3400	Advanced Mechanics	0.50
0.50 electives		0.50
Semester 6		
NANO*3600	Computational Methods in Materials Science	0.50
PHYS*3000	Optics: Fundamentals and Applications	0.50
PHYS*3510	Intermediate Laboratory	0.50
PHYS*4040	Quantum Mechanics II	0.50
MATH*3260	Complex Analysis (or 0.50 electives)	0.50
Semester 7 [2]		
PHYS*4500	Advanced Physics Laboratory	0.50
PHYS*4180	Advanced Electromagnetic Theory	0.50
PHYS*4240	Statistical Physics II (or 0.50 electives)	0.50
PHYS*4001	Research in Physics (or 0.50 electives)	0.50
0.50 electives [3]		0.50
Semester 8 [2]		
PHYS*4002	Research in Physics (or 0.50 electives) [3]	0.50
2.00 electives [3]		2.00

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Students who have taken physics courses other than IPS*1500 Integrated Mathematics and Physics I or PHYS*1080 Physics for Life Sciences in Semester 1 and IPS*1510 Integrated Mathematics and Physics II or PHYS*1010 Introductory Electricity and Magnetism in Semester 2, may proceed to semester 3 with the permission of the Department of Physics (https://www.physics.uoguelph.ca/)

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Students going on to graduate school in physics should take PHYS*4002 Research in Physics, PHYS*4120 Atomic and Molecular Physics, PHYS*4130 Subatomic Physics, PHYS*4150 Solid State Physics, PHYS*4240 Statistical Physics II

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At least 1.00 credits must be from the restricted electives listed below.

Restricted Electives

Code	Title	Credits
PHYS*4120	Atomic and Molecular Physics	0.50
PHYS*4130	Subatomic Physics	0.50
PHYS*4150	Solid State Physics	0.50

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
First year science credits		5.00
Required science courses semesters 3 – 8		8.50
Restricted Electives		1.00
Approved Science Electives		1.50
Liberal Education Electives		1.00
Free Electives - any approved elective for B.Sc. students		3.00
Total Credits		**20**

Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Co-op Requirements (Honours)

This is a major within the degree: Bachelor of Science (calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-science-bsc/)**.**

The Co-op program in Physics is a five year program, including five work terms. Students must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.ca/cecs/).

Academic and Co-op Work Term Schedule

Year	Fall	Winter	Summer
1	Academic Semester 1	Academic Semester 2	Off
2	Academic Semester 3 COOP*1100	Academic Semester 4	COOP*1000 Work Term I
3	Academic Semester 5	COOP*2000 Work Term II	COOP*3000 Work Term III
4	Academic Semester 6	Academic Semester 7	COOP*4000 Work Term IV
5	COOP*5000 Work Term V	Academic Semester 8	N/A

Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary

(22.50 Total Credits)

Code	Title	Credits
First year science credits		5.00
Required science courses semesters 3 – 8		8.50
Restricted Electives		1.00
Approved Science Electives		1.50
Liberal Education Electives		1.00
Free Electives - any approved elective for B.Sc. students		3.00
Co-op Work Terms		2.50
Total Credits		**22.5**

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Recommended Program Sequence

Students who are lacking one 4U /grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS/.

Code	Title	Credits
Semester 1 - Fall		
CHEM*1040	General Chemistry I	0.50
CIS*1300	Programming	0.50
IPS*1500	Integrated Mathematics and Physics I	1.00
Select 0.50 credits from the following:		
BIOL*1070	Discovering Biodiversity	0.50
BIOL*1080	Biological Concepts of Health	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
Semester 2 - Winter		
CHEM*1050	General Chemistry II	0.50
IPS*1510	Integrated Mathematics and Physics II	1.00
MATH*1160	Linear Algebra I	0.50
Select 0.50 credits from the following:		
BIOL*1070	Discovering Biodiversity	0.50
BIOL*1080	Biological Concepts of Health	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
Summer Semester		
No academic semester or work term		
Semester 3 - Fall		
COOP*1100	Introduction to Co-operative Education	0.00
MATH*2200	Advanced Calculus I	0.50
MATH*2270	Applied Differential Equations	0.50
PHYS*2240	Thermal Physics	0.50
PHYS*2330	Electricity and Magnetism I	0.50
0.50 Liberal Education electives		0.50
Semester 4 - Winter		
PHYS*2180	Experimental Techniques in Physics	0.50
PHYS*2310	Mechanics	0.50
PHYS*2340	Electricity and Magnetism II	0.50
CIS*2500	Intermediate Programming (or 0.50 electives)	0.50
0.50 electives		0.50
Summer Semester		
COOP*1000	Co-op Work Term I	0.50
Semester 5 - Fall		
IPS*3000	Science Communication	0.50
PHYS*3130	Mathematical Physics	0.50
PHYS*3230	Quantum Mechanics I	0.50
PHYS*3400	Advanced Mechanics	0.50
0.50 electives		0.50
Winter Semester		
COOP*2000	Co-op Work Term II	0.50
Summer Semester		
COOP*3000	Co-op Work Term III	0.50
Semester 6 - Fall [3]		
PHYS*4180	Advanced Electromagnetic Theory	0.50
CIS*2520	Data Structures (or 0.50 electives) [5]	0.50

PHYS*4240	Statistical Physics II (or 0.50 electives) [5]	0.50
1.00 electives [5]		1.00
Semester 7 - Winter [3]		
NANO*3600	Computational Methods in Materials Science	0.50
PHYS*3000	Optics: Fundamentals and Applications	0.50
PHYS*3510	Intermediate Laboratory	0.50
PHYS*4040	Quantum Mechanics II	0.50
MATH*3260	Complex Analysis (or 0.50 electives) [4]	0.50
Summer Semester		
COOP*4000	Co-op Work Term IV	0.50
Fall Semester		
COOP*5000	Co-op Work Term V	0.50
Semester 8 - Winter [3]		
PHYS*4500	Advanced Physics Laboratory	0.50
PHYS*4130	Subatomic Physics (or 0.50 electives) [4]	0.50
PHYS*4150	Solid State Physics (or 0.50 electives) [4]	0.50
1.00 electives [4]		1.00

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Students going on to graduate school in physics should take PHYS*4130 Subatomic Physics, PHYS*4150 Solid State Physics, and PHYS*4240 Statistical Physics II

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At least 1.00 credits must be from the restricted electives listed below.

Restricted Electives

Code	Title	Credits
PHYS*4130	Subatomic Physics	0.50
PHYS*4150	Solid State Physics	0.50
PHYS*4240	Statistical Physics II	0.50

Minor Requirements (Honours)

This minor cannot be combined with a major in Physics.

A minor in Physics requires 5.00 credits in interdisciplinary physical science or physics courses including:

Code	Title	Credits
PHYS*2180	Experimental Techniques in Physics	0.50
PHYS*2310	Mechanics	0.50
PHYS*2330	Electricity and Magnetism I	0.50
PHYS*2340	Electricity and Magnetism II	0.50
A maximum of 1.00 credits from the following courses may be used towards the minor:		
PHYS*1010	Introductory Electricity and Magnetism	0.50
PHYS*1070	Physics for Life Sciences II	0.50
PHYS*1080	Physics for Life Sciences	0.50
PHYS*1130	Physics with Applications	0.50
IPS*1510	Integrated Mathematics and Physics II	1.00

A minimum of 1.00 credits are required at the 3000 or 4000 level.

Note: PHYS*1300 Fundamentals of Physics, PHYS*1600 Contemporary Astronomy and PHYS*1810 Physics of Music may not be taken for credit toward this minor.