PHYSICS AND ASTRONOMY, B.SC. HONOURS

Degree Requirements

Honours: Astronomy and Astrophysics (Including Co-operative Option if Selected)

Note[1]

Course	Title	Hours
Year 1		
One of: [2]		3
PHYS 1050	Physics 1: Mechanics	
PHYS 1020	General Physics 1	
One of: [2]		3
PHYS 1070	Physics 2: Waves and Modern Physics (B)	
PHYS 1030	General Physics 2 (B+)	
MATH 1300	Vector Geometry and Linear Algebra (C+) [2]	3
MATH 1500	Introduction to Calculus [2]	3
MATH 1700	Calculus 2 [2]	3
ASTR 1810	Introduction to Astronomy: The Magnificent Universe	3
COMP 1012	Computer Programming for Scientists and Engineers [3]	3
6 credit hours from the Faculty of Arts including the "W" requirement		6
3 credit hours of electives [4, 5]		3
	Hours	**30**
Year 2		
PHYS 2600	Electromagnetic Field Theory	3
PHYS 2650	Classical Mechanics 1	3
PHYS 2386	Introduction to Quantum Mechanics and Special Relativity	3
PHYS 2496	Mathematical Physics 1	3
PHYS 2260 or PHYS 2610	Optics or Circuit Theory and Introductory Electronics	3
ASTR 2000	Foundations of Astrophysics	3
ASTR 2070	Observational Astronomy Techniques	3
MATH 2090	Linear Algebra 2	3
MATH 2720 or MATH 2150	Multivariable Calculus or Multivariable Calculus	3
3 credit hours of electives [5, 6]		3
	Hours	**30**
Year 3		
PHYS 3386	Quantum Mechanics 2	3
PHYS 3430	Honours Physics Laboratory	6
PHYS 3496	Mathematical Physics 2	3
PHYS 3630	Electro - and Magnetostatic Theory	3
PHYS 3650	Classical Mechanics 2	3
PHYS 3670	Classical Thermodynamics	3
ASTR 3180	Stars	3
ASTR 3230	The Phenomenology of Galaxies	3
3 credit hours of electives [5, 6, 7]		3
	Hours	**30**
Years 3-4		
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
SCI 4980	Co-operative Education Work Term 3	0
SCI 4990	Co-operative Education Work Term 4 (if a 4th work term is selected)	0
	Hours	**0**
Year 4		
PHYS 4386	Quantum Mechanics 3	3
PHYS 4646	Electro - and Magnetodynamics and Special Relativity	3
PHYS 4676	Honours Thesis - Proposal and Preparation	3
PHYS 4678	Honours Thesis - Dissertation	3
PHYS 4680	Statistical Mechanics	3
One of:		3
PHYS 4010	General Relativity and Gravitation	
PHYS 4250	Computational Physics	
PHYS 4516	Introduction to Nuclear and Particle Physics	
Two of:		6
ASTR 4020	Cosmology and Black Holes	
ASTR 4100	High-Energy Astrophysics	
ASTR 4200	Radio Astronomy	
ASTR 4400	Magnetohydrodynamics, Astrophysical Plasmas, and the Interstellar Medium	
6 credit hours of electives [5, 6]		6
	Hours	**30**
	Total Hours	**120**

1 Students must achieve a minimum grade of "C" in all courses contributing to the Honours program.

2
- PHYS 1050 and PHYS 1070 are recommended.
- MATH 1210 (B), or MATH 1220 (C) may be taken in place of MATH 1300;
- MATH 1230, MATH 1510, the former MATH 1520, or MATH 1524 may be taken in place of MATH 1500;
- MATH 1232 or MATH 1710 may be taken in place of MATH 1700.

3 Students who have already taken COMP 1010 before joining the program may count COMP 1010 in lieu of COMP 1012. However, students who have not taken COMP 1010 before entering the program must then take COMP 1012.

4 ASTR 1830 is recommended.

5 PHYS 1018 may not count towards the 120 credit hours required for this degree.

6 Although they are not required courses in the Physics programs, MATH 2080, MATH 2180, and MATH 3340 are recommended electives for the Physics Honours and Four Year Major degrees.

7 ASTR 3070 is recommended.

IMPORTANT: The Honours program need not be completed in the manner prescribed in the grid above. The grid indicates the recommended

arrangement of the required courses and is meant to be a guide around which students can plan their program.

(Letters in brackets refer to minimum prerequisite standing required for further study.)

Honours: Physics (Including Co-operative Option if Selected)

Note[1]

Course	Title	Hours
Year 1		
One of: [2]		3
PHYS 1050	Physics 1: Mechanics	
PHYS 1020	General Physics 1	
One of: [2]		3
PHYS 1070	Physics 2: Waves and Modern Physics (B)	
PHYS 1030	General Physics 2 (B+)	
MATH 1300	Vector Geometry and Linear Algebra (C+) [2]	3
MATH 1500	Introduction to Calculus [2]	3
MATH 1700	Calculus 2 [2]	3
COMP 1012	Computer Programming for Scientists and Engineers [3]	3
6 credit hours from the Faculty of Arts including the "W" requirement		6
6 credit hours of electives [4]		6
	Hours	**30**
Year 2		
PHYS 2260 or PHYS 2610	Optics or Circuit Theory and Introductory Electronics	3
PHYS 2386	Introduction to Quantum Mechanics and Special Relativity	3
PHYS 2496	Mathematical Physics 1	3
PHYS 2600	Electromagnetic Field Theory	3
PHYS 2650	Classical Mechanics 1	3
MATH 2090	Linear Algebra 2	3
MATH 2720 or MATH 2150	Multivariable Calculus or Multivariable Calculus	3
9 credit hours of electives [4, 5]		9
	Hours	**30**
Year 3		
PHYS 3386	Quantum Mechanics 2	3
PHYS 3430	Honours Physics Laboratory	6
PHYS 3650	Classical Mechanics 2	3
PHYS 3670	Classical Thermodynamics	3
PHYS 3496	Mathematical Physics 2	3
PHYS 3630	Electro - and Magnetostatic Theory	3
9 credit hours of electives [4, 5]		9
	Hours	**30**
Years 3-4		
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
SCI 4980	Co-operative Education Work Term 3	0
SCI 4990	Co-operative Education Work Term 4 (if a 4th work term is selected)	0
	Hours	**0**
Year 4		
PHYS 4676	Honours Thesis - Proposal and Preparation	3
PHYS 4678	Honours Thesis - Dissertation	3
PHYS 4386	Quantum Mechanics 3	3
PHYS 4646	Electro - and Magnetodynamics and Special Relativity	3
PHYS 4680	Statistical Mechanics	3
6 credit hours of 4000-level Physics		6
9 credit hours of electives [4, 5]		9
	Hours	**30**
	Total Hours	**120**

1 Students must achieve a minimum grade of "C" in all courses contributing to the Honours program.

2
- PHYS 1050 and PHYS 1070 are recommended.
- MATH 1210 (B), or MATH 1220 (C) may be taken in place of MATH 1300;
- MATH 1230, MATH 1510, the former MATH 1520, or MATH 1524 may be taken in place of MATH 1500;
- MATH 1232 or MATH 1710 may be taken in place of MATH 1700.

3 Students who have already taken COMP 1010 before joining the program may count COMP 1010 in lieu of COMP 1012. However, students who have not taken COMP 1010 before entering the program must then take COMP 1012.

4 PHYS 1018 may not count towards the 120 credit hours required for this degree.

5 Although they are not required courses in the Physics programs, MATH 2080, MATH 2180, and MATH 3340 are recommended electives for the Physics Honours and Four Year Major degrees.

IMPORTANT: The Honours program need not be completed in the manner prescribed in the grid above. The grid indicates the recommended arrangement of the required courses and is meant to be a guide around which students can plan their program.

(Letters in brackets refer to minimum prerequisite standing required for further study.)

Honours: Medical and Biological (Including Co-operative Option if Selected)

Note[1]

Course	Title	Hours
Year 1		
One of: [2]		3
PHYS 1050	Physics 1: Mechanics	
PHYS 1020	General Physics 1	
One of: [2]		3
PHYS 1070	Physics 2: Waves and Modern Physics (B)	
PHYS 1030	General Physics 2 (B+)	
MATH 1300	Vector Geometry and Linear Algebra (C+) [2]	3
MATH 1500	Introduction to Calculus [2]	3
MATH 1700	Calculus 2 [2]	3

BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions	3
COMP 1012	Computer Programming for Scientists and Engineers [3]	3
6 credit hours from the Faculty of Arts including the "W" requirement		6
	Hours	**30**
Year 2		
PHYS 2386	Introduction to Quantum Mechanics and Special Relativity	3
PHYS 2496	Mathematical Physics 1	3
PHYS 2600	Electromagnetic Field Theory	3
PHYS 2610	Circuit Theory and Introductory Electronics	3
PHYS 2650	Classical Mechanics 1	3
PHYS 2270 or PHYS 2272	Introductory Physics for Life Sciences: Fundamentals and Applications or Physics for Medicine & Biology	3
MATH 2090	Linear Algebra 2	3
MATH 2720 or MATH 2150	Multivariable Calculus or Multivariable Calculus	3
6 credit hours of electives [4]		6
	Hours	**30**
Year 3		
PHYS 3220	Medical Physics and Physiological Measurement	3
PHYS 3386	Quantum Mechanics 2	3
PHYS 3430	Honours Physics Laboratory	6
PHYS 3496	Mathematical Physics 2	3
PHYS 3630	Electro - and Magnetostatic Theory	3
PHYS 3670	Classical Thermodynamics	3
STAT 1150	Introduction to Statistics and Computing [5]	3
6 credit hours of electives [4]		6
	Hours	**30**
Years 3-4		
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
SCI 4980	Co-operative Education Work Term 3	0
SCI 4990	Co-operative Education Work Term 4 (if a 4th work term is selected)	0
	Hours	**0**
Year 4		
PHYS 4250	Computational Physics	3
PHYS 4360 or PHYS 4400	Medical Radiation Physics or Linear Systems for Imaging	3
PHYS 4516	Introduction to Nuclear and Particle Physics	3
PHYS 4646	Electro - and Magnetodynamics and Special Relativity	3
PHYS 4676	Honours Thesis - Proposal and Preparation	3
PHYS 4678	Honours Thesis - Dissertation	3
PHYS 4680	Statistical Mechanics	3
9 credit hours of electives [4]		9
	Hours	**30**
	Total Hours	**120**

1. Students must achieve a minimum grade of "C" in all courses contributing to the Honours program.
2.
   - PHYS 1050 and PHYS 1070 are recommended.
   - MATH 1210 (B), or MATH 1220 (C) may be taken in place of MATH 1300;
   - MATH 1230, MATH 1510, the former MATH 1520, or MATH 1524 may be taken in place of MATH 1500;
   - MATH 1232 or MATH 1710 may be taken in place of MATH 1700.
3. Students who have already taken COMP 1010 before joining the program may count COMP 1010 in lieu of COMP 1012. However, students who have not taken COMP 1010 before entering the program must then take COMP 1012.
4. PHYS 1018 may not count towards the 120 credit hours required for this degree.
5. Students may take STAT 1000 and STAT 2000 in lieu of STAT 1150.

IMPORTANT: The Honours program need not be completed in the manner prescribed in the grid above. The grid indicates the recommended arrangement of the required courses and is meant to be a guide around which students can plan their program.

(Letters in brackets refer to minimum prerequisite standing required for further study.)