CHEMISTRY (CHEM)

Department of Chemistry, College of Engineering and Physical Sciences

Major Requirements (Honours)

This is a major within the degree: Bachelor of Science.

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. The major will require the completion of 20.00 credits as indicated below:

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		
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
CHEM*1040	General Chemistry I	0.50
IPS*1500	Integrated Mathematics and Physics I	1.00
0.50 Liberal Education electives		0.50
Semester 2		
CHEM*1050	General Chemistry II	0.50
IPS*1510	Integrated Mathematics and Physics II	1.00
MATH*1160	Linear Algebra I	0.50
BIOL*1070 or BIOL*1080	Discovering Biodiversity Biological Concepts of Health	0.50
Semester 3		
BIOC*2580	Introduction to Biochemistry	0.50
CHEM*2060	Structure and Bonding	0.50
CHEM*2400	Analytical Chemistry I: Chemical Analysis	0.75
MATH*2270	Applied Differential Equations	0.50
Electives or restricted electives to a maximum of 2.75 credits this semester.		0.50
Semester 4		
CHEM*2070	Structure and Spectroscopy	0.50
CHEM*2700	Organic Chemistry I: Fundamentals	0.50
CHEM*3430	Analytical Chemistry II: Instrumental Analysis	0.50
STAT*2040	Statistics I	0.50
0.50 electives or restricted electives		0.50
Semester 5		
CHEM*2820	Thermodynamics and Kinetics	0.50
CHEM*3640	Main Group Chemistry	0.50
CHEM*3750	Organic Chemistry II: Structure and Synthesis	0.50
CHEM*3860	Quantum and Computational Chemistry	0.50
0.50 electives or restricted electives		0.50
Semester 6		
CHEM*3650	Transition Metal Chemistry	0.50
CHEM*4020	Chemical Discovery	0.50
1.50 electives or restricted electives		1.50
Semester 7 and 8		
5.00 electives or restricted electives		5.00

Note:

1. Some of these courses may have to be taken in Semester 6.
2. Some of these courses are offered only in alternate years, and some have additional prerequisites for which the student must plan ahead, with the assistance of the faculty advisor or program counsellor.

Electives

Selection of electives is subject to the following:

- At least 1.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc/
- 3.50 credits of restricted electives as follows:

Code	Title	Credits
Select 2.00 credits (minimum of 1.50 credits at the 4000 level) from the following:		
CHEM*3440	Chemical Instrumentation	0.50
CHEM*4010	Chemical Industry, Safety and Sustainability	0.50
CHEM*4400	Electrochemistry and Sensors	0.50
CHEM*4620	Materials and Solid State Chemistry	0.50
CHEM*4630	Bioinorganic Chemistry	0.50
CHEM*4720	Organic Reactivity	0.50
CHEM*4730	Advanced Organic Synthesis	0.50
CHEM*4740	Bioorganic Chemistry	0.50
CHEM*4880	Advanced Physical Chemistry	0.50
Select 1.50 credits from the following:		
BIOC*3560	Structure and Function in Biochemistry	0.50
BIOC*4050	Protein and Nucleic Acid Structure	0.50
BIOC*4520	Metabolic Processes	0.50
BIOC*4580	Membrane Biochemistry	0.50
CHEM*3360	Environmental Chemistry and Toxicology	0.50
CHEM*3440	Chemical Instrumentation	0.50
CHEM*4010	Chemical Industry, Safety and Sustainability	0.50
CHEM*4400	Electrochemistry and Sensors	0.50
CHEM*4620	Materials and Solid State Chemistry	0.50
CHEM*4630	Bioinorganic Chemistry	0.50
CHEM*4720	Organic Reactivity	0.50
CHEM*4730	Advanced Organic Synthesis	0.50
CHEM*4740	Bioorganic Chemistry	0.50
CHEM*4880	Advanced Physical Chemistry	0.50
CHEM*4900	Chemistry Research Project I	1.00
CHEM*4910	Chemistry Research Project II	1.00
TOX*4200	Topics in Toxicology	0.50
TOX*4590	Biochemical Toxicology	0.50

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
First year science credits		4.50
Required science courses semesters 3 – 8		7.25
Restricted electives (1 and 2 in restricted electives list)		3.50
Approved science electives		0.75
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.

The Co-op program in Chemistry is a four and a half year program including four 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 COOP*1100	Off
2	Academic Semester 3	COOP*1000 Work Term I	Academic Semester 4
3	Academic Semester 5	Academic Semester 6	COOP*2000 Work Term II
4	COOP*3000 Work Term III	Academic Semester 7	COOP*4000 Work Term IV
5	Academic Semester 8	N/A	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.

Recommended Program Sequence

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 - Fall		
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
CHEM*1040	General Chemistry I	0.50
IPS*1500	Integrated Mathematics and Physics I	1.00
0.50 Liberal Education electives		0.50
Semester 2 - Winter		
CHEM*1050	General Chemistry II	0.50
COOP*1100	Introduction to Co-operative Education	0.00
IPS*1510	Integrated Mathematics and Physics II	1.00
MATH*1160	Linear Algebra I	0.50
BIOL*1070	Discovering Biodiversity	0.50
or BIOL*1080	Biological Concepts of Health	
Summer Semester		
No academic semester or work term		
Semester 3 - Fall		
CHEM*2060	Structure and Bonding	0.50
CHEM*2400	Analytical Chemistry I: Chemical Analysis	0.75
MATH*2270	Applied Differential Equations	0.50
STAT*2040	Statistics I	0.50
Electives to a maximum of 2.75 total credits in this semester		0.50
Winter Semester		
COOP*1000	Co-op Work Term I	0.50
Semester 4 - Summer		
CHEM*2070	Structure and Spectroscopy	0.50
CHEM*2700	Organic Chemistry I: Fundamentals	0.50
CHEM*3430	Analytical Chemistry II: Instrumental Analysis	0.50
1.00 electives		1.00
Semester 5 - Fall		
CHEM*2820	Thermodynamics and Kinetics	0.50
CHEM*3640	Main Group Chemistry	0.50
CHEM*3750	Organic Chemistry II: Structure and Synthesis	0.50
CHEM*3860	Quantum and Computational Chemistry	0.50
0.50 electives		0.50
Semester 6 - Winter		
BIOC*2580	Introduction to Biochemistry	0.50
CHEM*3650	Transition Metal Chemistry	0.50
CHEM*4020	Chemical Discovery	0.50
1.00 electives or restricted electives		1.00
Summer Semester		
COOP*2000	Co-op Work Term II	0.50
Fall Semester		
COOP*3000	Co-op Work Term III	0.50
Semester 7 - Winter		
2.50 electives or restricted electives		2.50
Summer Semester		
COOP*4000	Co-op Work Term IV	0.50
Semester 8 - Fall		
2.50 electives or restricted electives		2.50

Note: Some of these courses are offered only in alternate years, and some have additional prerequisites for which the student must plan ahead, with the assistance of the faculty advisor or program counsellor.

Electives

Selection of electives is subject to the following:

- At least 1.00 credits of Liberal Education electives are required. The list of Liberal Education electives for B.Sc. students can be found at: https://www.uoguelph.ca/bsc/
- 3.50 credits of restricted electives as follows:

Code	Title	Credits
Select 2.00 credits (minimum of 1.50 credits at the 4000 level) from the following:		
CHEM*3440	Chemical Instrumentation	0.50
CHEM*4010	Chemical Industry, Safety and Sustainability	0.50
CHEM*4400	Electrochemistry and Sensors	0.50
CHEM*4620	Materials and Solid State Chemistry	0.50
CHEM*4630	Bioinorganic Chemistry	0.50
CHEM*4720	Organic Reactivity	0.50
CHEM*4730	Advanced Organic Synthesis	0.50
CHEM*4740	Bioorganic Chemistry	0.50
CHEM*4880	Advanced Physical Chemistry	0.50
Select 1.50 credits from the following:		
BIOC*3560	Structure and Function in Biochemistry	0.50
BIOC*4050	Protein and Nucleic Acid Structure	0.50
BIOC*4520	Metabolic Processes	0.50
CHEM*3360	Environmental Chemistry and Toxicology	0.50
CHEM*3440	Chemical Instrumentation	0.50
CHEM*4010	Chemical Industry, Safety and Sustainability	0.50
CHEM*4400	Electrochemistry and Sensors	0.50
CHEM*4620	Materials and Solid State Chemistry	0.50
CHEM*4630	Bioinorganic Chemistry	0.50
CHEM*4720	Organic Reactivity	0.50
CHEM*4730	Advanced Organic Synthesis	0.50
CHEM*4740	Bioorganic Chemistry	0.50
CHEM*4880	Advanced Physical Chemistry	0.50
CHEM*4900	Chemistry Research Project I	1.00
CHEM*4910	Chemistry Research Project II	1.00
TOX*4200	Topics in Toxicology	0.50
TOX*4590	Biochemical Toxicology	0.50

Credit Summary

(22.00 Total Credits)

Code	Title	Credits
First year science credits		4.50
Required science courses semesters 3 – 8		7.25
Restricted electives (1 and 2 in restricted electives list)		3.50
Approved science electives		0.75
Liberal Education electives		1.00
Free electives - any approved elective for B.Sc. students.		3.00
Co-op Work Terms		2.00
Total Credits		**22**

Minor Requirements (Honours)

This minor cannot be combined with a major in Chemistry.

A minor in Chemistry consists of at least 5.00 credits including the following courses:

Code	Title	Credits
CHEM*1040	General Chemistry I	0.50
CHEM*1050	General Chemistry II	0.50
4.00 additional credits [1]		4.00

[1] Students will select Chemistry courses (CHEM) at the 2000 level or above including a minimum of 1.00 credits at the 3000 or 4000 level. BIOC*2580 Introduction to Biochemistry can be counted towards this specialization