CHEMISTRY

Department Website: https://www.smu.ca/chemistry/
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The program offerings of the Department of Chemistry are designed to meet two main objectives:

1. to provide a rigorous core education in the theory and practice of chemistry for students pursuing a Bachelor of Science degree with Honours, Major, Minor, or Concentration in Chemistry;
2. to provide students in other disciplines an introduction to the principles and practices of this central science, contributing to their fundamental understanding and appreciation of the physical world.

Our Bachelor of Science with Major in Chemistry and Bachelor of Science with Honours in Chemistry degrees are **nationally accredited programs by the Canadian Society for Chemistry (CSC) governing board,** ensuring that the program has the potential to prepare graduates to practice their profession in a competent scientific manner. Honours graduates from the program are well prepared to continue their education at the graduate level in related fields of study. Majors graduates are also well equipped to further their education or to enter into the scientific work force, contributing to such areas as research, education, government, and industry at various levels of responsibility.

In addition to having a strong commitment to teaching, the Chemistry Department Faculty members are committed to engaging undergraduate students in their research activities. Opportunities exist for motivated and capable students to enrich their program by contributing to the research work and dissemination of research results through employment as research assistants and participation in research conferences.

Programs

The Bachelor of Science (B.Sc.) is a well-established, foundational degree. Its specific requirements are listed below alongside general graduation requirements (https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science/).

Major in Chemistry

The requirements for the degree of Bachelor of Science with Major apply as listed in this Academic Calendar under the heading of *Faculty of Science, Bachelor of Science – Major*. The specific list of forty-five (45) credit hours of CHEM courses required to satisfy 6 (d) is contained in the following list of Science courses required for the program:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
CHEM 2312	Physical Chemistry I	3
CHEM 2313	Physical Chemistry II	3
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	3
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	3
CHEM 2344	Organic Chemistry I	3
CHEM 2345	Organic Chemistry II	3
CHEM 3322	Inorganic Chemistry I	3
CHEM 3424	Inorganic Chemistry II	3
CHEM 3451	Introductory Biochemistry	3
Select 12 credit hours in CHEM at the 3400-level or above		12
MATH 1210 & MATH 1211	Introductory Calculus I and Introductory Calculus II	6
3 credit hours in MATH or CSCI at the 2000 level or higher or MATH 1216		3
PHYS 1210	University Physics I	3
PHYS 1211	University Physics II	3
Total Credit Hours		**60**

Note: Students should consult the Faculty of Science Program Requirement Tables (https://smu.ca/academics/science-program-requirement-tables.html) available online for recommended Science Electives, and a suggested sequence of courses for years 1 and 2; and students should consult with the Chemistry Chairperson or a Science Advisor to determine the best sequence of courses for years 3 and 4.

Double Major in Chemistry and Other Science

The requirements for the degree of Bachelor of Science with Double Major apply as listed in this Academic Calendar under the heading of *Faculty of Science, Bachelor of Science – Double Major*. The specific list of thirty-six (**36**) credit hours of CHEM required to satisfy 7(a) are contained in the following list of required Science courses for the program:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
CHEM 2312	Physical Chemistry I	3
CHEM 2313	Physical Chemistry II	3
CHEM 2344	Organic Chemistry I	3
CHEM 2345	Organic Chemistry II	3
Select six credits of the following:		6
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	
CHEM 3322	Inorganic Chemistry I	
CHEM 3424	Inorganic Chemistry II	
CHEM 3451	Introductory Biochemistry	3
Select nine credit hours in CHEM at the 3400-level or above		9
MATH 1210 & MATH 1211	Introductory Calculus I and Introductory Calculus II	6
3 credit hours in MATH or CSCI at the 2000 level or higher or MATH 1216		3
PHYS 1210	University Physics I	3

PHYS 1211	University Physics II	3
Total Credit Hours		**51**

Concentration in Chemistry

The requirements for the degree of Bachelor of Science General with Concentration in Chemistry apply as listed in this Academic Calendar under the heading of *Faculty of Science, Bachelor of Science – General (with a Concentration)* . The specific list of thirty (**30**) credit hours in CHEM courses required to satisfy 9 (b) is as follows:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
Select 12 credits of the following:		12
CHEM 2312	Physical Chemistry I	
CHEM 2313	Physical Chemistry II	
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	
CHEM 2344	Organic Chemistry I	
CHEM 2345	Organic Chemistry II	
CHEM 3322	Inorganic Chemistry I	
CHEM 3424	Inorganic Chemistry II	
Select 12 credit hours in CHEM at the 3400 level or above		12
Total Credit Hours		**30**

Honours in Chemistry

The requirements for the degree of Bachelor of Science with Honours apply as listed in this *Academic Calendar* under the heading of *Faculty of Science, Bachelor of Science – Honours and Double Honours*. Students must secure a supervisor for the Honours thesis (Research Thesis (CHEM 4500)) before applying to the Honours program. The specific list of sixty (**60**) credit hours of CHEM courses required to satisfy the honours requirements 11 (a) is contained in the following list of required Science courses for the program:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
CHEM 2312	Physical Chemistry I	3
CHEM 2313	Physical Chemistry II	3
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	3
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	3
CHEM 2344	Organic Chemistry I	3
CHEM 2345	Organic Chemistry II	3
CHEM 3322	Inorganic Chemistry I	3
CHEM 3424	Inorganic Chemistry II	3
CHEM 3432	Instrumental Analysis I: Separations	3
or CHEM 4433	Instrumental Analysis II: Materials Analysis	
CHEM 3443	Organic Reaction Mechanisms	3
or CHEM 4444	Synthesis in Organic Chemistry	
Select three credits of the following:		3
CHEM 3445	Organic Spectroscopy	
CHEM 4421	Organometallic Chemistry	
CHEM 4422	Advanced Topics in Inorganic Chemistry	
Select three credits of the following:		3
CHEM 3412	Introductory Computational Chemistry	
CHEM 3415	Polymers	
CHEM 4412	Quantum Chemistry	
CHEM 4413	Physical Chemistry III	
CHEM 4414	Symmetry and Chemical Applications of Group Theory	
CHEM 4433	Instrumental Analysis II: Materials Analysis [1]	
CHEM 3451	Introductory Biochemistry	3
CHEM 4499	Selected Research Topics in Chemistry	3
CHEM 4500	Research Thesis	6
Select six additional credit hours in CHEM at the 3400-level or above		6
MATH 1210	Introductory Calculus I	3
MATH 1211	Introductory Calculus II	3
Select six credits of the following:		6
MATH 2301	Applied Linear Algebra	
MATH 2303	Differential Equations I	
MATH 2311	Intermediate Calculus [2]	
MATH 2315	Introduction to Probability Theory	
PHYS 1210	University Physics I	3
PHYS 1211	University Physics II	3
Total Credit Hours		**78**

[1] Students can pursue Instrumental Analysis II: Materials Analysis (CHEM 4433) as a three credit advanced physical chemistry course only if Instrumental Analysis I: Separations (CHEM 3432) is taken as their advanced analytical chemistry course.

[2] Intermediate Calculus (MATH 2311) is recommended as one of the two math courses; it is a prerequisite for Quantum Chemistry (CHEM 4412) and Physical Chemistry III (CHEM 4413).

Double Honours in Chemistry and Other Science

The requirements for the degree of Bachelor of Science with Double Honours apply as listed in this *Academic Calendar* under the heading of Faculty of Science, Bachelor of Science – Honours and Double Honours (https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---honours-double-honours/) . The specific list of Chemistry courses which satisfies the required minimum forty-eight (**48**) credit hours in Chemistry (if thesis completed in Chemistry) or the required minimum of forty-two (42) credit hours in Chemistry (if thesis completed in another science) is as follows:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
CHEM 2312	Physical Chemistry I	3
CHEM 2313	Physical Chemistry II	3
CHEM 2344	Organic Chemistry I	3
CHEM 2345	Organic Chemistry II	3
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	3
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	3
CHEM 3322	Inorganic Chemistry I	3
CHEM 3424	Inorganic Chemistry II	3
Select nine credits in CHEM of three of the following 5 groupings:		9
Group 1		
CHEM 3432	Instrumental Analysis I: Separations	
CHEM 4433	Instrumental Analysis II: Materials Analysis [1]	
Group 2		
CHEM 3443	Organic Reaction Mechanisms	
CHEM 4444	Synthesis in Organic Chemistry	
Group 3		
CHEM 3445	Organic Spectroscopy	
CHEM 4421	Organometallic Chemistry	
CHEM 4422	Advanced Topics in Inorganic Chemistry	
Group 4		
CHEM 3412	Introductory Computational Chemistry	
CHEM 3415	Polymers	
CHEM 4412	Quantum Chemistry	
CHEM 4413	Physical Chemistry III	
CHEM 4414	Symmetry and Chemical Applications of Group Theory	
CHEM 4433	Instrumental Analysis II: Materials Analysis [1]	
Group 5		
CHEM 3451	Introductory Biochemistry	
CHEM 4499	Selected Research Topics in Chemistry	3
CHEM 4500	Research Thesis (only if thesis is in CHEM)	6
MATH 1210	Introductory Calculus I	3
MATH 1211	Introductory Calculus II	3
Select six credits of the following:		6
MATH 2301	Applied Linear Algebra	
MATH 2303	Differential Equations I	
MATH 2311	Intermediate Calculus [2]	
MATH 2315	Introduction to Probability Theory	
PHYS 1210	University Physics I	3
PHYS 1211	University Physics II	3
Total Credit Hours		**66**

[1] Students can pursue Instrumental Analysis II: Materials Analysis (CHEM 4433) as a three credit advanced physical chemistry course only if Instrumental Analysis I: Separations (CHEM 3432) is taken as their advanced analytical chemistry course. While Instrumental Analysis II: Materials Analysis (CHEM 4433) can count either as Group 1 or Group 4, it cannot count for both.

[2] Intermediate Calculus (MATH 2311) is recommended as one of the two math courses; it is a prerequisite for Quantum Chemistry (CHEM 4412) and Physical Chemistry III (CHEM 4413).

Honours in Chemistry and Major in Other Science

The requirements for the degree of Bachelor of Science with Honours in Chemistry and Major in another science apply as listed in this Academic Calendar under the heading of Faculty of Science, Bachelor of Science – Honours (https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science--honours-double-honours/) and Major Program . The specific list of Chemistry courses which satisfies the required minimum forty-eight (**48**) credit hours in Chemistry is the same as that listed above for the Double Honours, thesis completed in Chemistry.

Minor in Chemistry

The requirements for a Minor in Chemistry apply as listed in this *Academic Calendar* in the Faculty of Science pages under the heading of *Bachelor of Science – Major and Minor* . The specific list of thirty (**30**) credit hours in CHEM courses required to satisfy 9 (b) is as follows:

Code	Title	Credit Hours
CHEM 1210	General Chemistry I	3
Select three credits of the following:		3
CHEM 1211	General Chemistry II for Physical Sciences	
CHEM 1212	General Chemistry II for Life Sciences	
CHEM 1213	General Chemistry II for Engineering	
Select 24 credits of the following:		24
CHEM 2100	Green Chemistry	
CHEM 2312	Physical Chemistry I	
CHEM 2313	Physical Chemistry II	
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	
CHEM 2344	Organic Chemistry I	
CHEM 2345	Organic Chemistry II	
CHEM 2346	Organic Chemistry for Life Sciences	
CHEM 3322	Inorganic Chemistry I	
CHEM 3424	Inorganic Chemistry II	
CHEM 3473	Environmental Chemistry I	
Total Credit Hours		**30**

Special Note

Students must achieve a passing grade in the lab component of a chemistry course in order to be eligible to receive credit for the course. All of the Chemistry courses have a 3-hour per week lab period except the following courses:

Code	Title	Credit Hours
CHEM 1190	Fundamental Chemistry	3
CHEM 1221	Chemicals	3
CHEM 2100	Green Chemistry	3
CHEM 3473	Environmental Chemistry I	3
CHEM 4499	Selected Research Topics in Chemistry	3
CHEM 4500	Research Thesis	6

Graduate-Level Courses

The Department offers instruction in Chemistry at the graduate level. For details on graduate courses, see the Graduate Academic Calendar (https://smu-ca-public.courseleaf.com/graduate/).