Chemistry

The Chemistry concentration offers courses and research opportunities that range from fundamental studies involving the characterization and preparation of synthetic and naturally occurring molecules, to interdisciplinary studies at the interfaces of chemistry with biology, medicine, physics, engineering, and nanoscience. As early as their first year, undergraduates are able to work with faculty members on cutting edge research projects. The Sc.B. degree provides a thorough foundation for further graduate study or for entry-level technical positions in the molecular sciences. Students seeking the Sc.B. may either pursue the standard Chemistry concentration or one of two possible tracks: Chemical Biology or Materials Chemistry. Students may also pursue the A.B. degree in Chemistry, which provides a core education in the discipline.

Standard program for the A.B. degree

CHEM 0330	Equilibrium, Rate, and Structure	1
CHEM 0350	Organic Chemistry I	1
CHEM 0360	Organic Chemistry II	1
CHEM 0500	Inorganic Chemistry	1
CHEM 0600	Preparative Chemistry Lab	.5
CHEM 1140	Physical Chemistry: Quantum Chemistry [1]	1
CHEM 1150	Physical Chemistry: Thermodynamics and Statistical Mechanics [1]	1
CHEM 1160	Physical Chemistry Laboratory [1]	1
One upper level CHEM elective. [2]		1
Total Credits		**8.5**

[1] Note that the physical chemistry courses (CHEM 1140, CHEM 1150, CHEM 1160) have mathematics and physics prerequisites.

[2] Upper level chemistry course are any 1000- and 2000- CHEM course. BIOL 0280 is credited as an upper level chemistry elective for chemistry concentration purposes. You should discuss your elective choices with your Concentration Advisor to craft a course of study that is appropriate for your interests.

Honors Requirements for Chemistry

All Chemistry concentrators who have grades of A or S with distinction in a majority of their concentration courses after their seventh semester are eligible for Honors; no separate application is necessary.

The requirements for Honors in Chemistry are:

* Grades of A or S with distinction in a majority of courses taken for the concentration.

* Two semesters of Undergraduate Research CHEM 0980, CHEM 0981 or equivalent. Guidelines and requirements associated with Undergraduate Research are in the Undergraduate Concentration Handbook which can be found at the department website (http://www.brown.edu/academics/chemistry/undergraduate).

* A Senior Thesis in a form approved and recommended by the research advisor. Additional information about thesis guidelines will be provided to seniors by the Director of Undergraduate Studies.

* A Senior Poster presentation at the chemistry department's spring undergraduate poster session.

Standard program for the Sc.B. degree

The Chemistry concentration offers courses and research opportunities that range from fundamental studies involving the characterization and preparation of synthetic and naturally occurring molecules, to interdisciplinary studies at the interfaces of chemistry with biology, medicine, physics, engineering, and nanoscience. As early as their first year, undergraduates are able to work with faculty members on cutting edge research projects. The Sc.B. degree provides a thorough foundation for further graduate study or for entry-level technical positions in the molecular sciences. Students seeking the Sc.B. may either pursue the standard Chemistry concentration or one of two possible tracks: Chemical Biology or Materials Chemistry. Students may also pursue the A.B. degree in Chemistry, which provides a core education in the discipline.

The Chemistry Department offers three options for the Sc.B. Chemistry Concentration – a straight Chemistry option, a Chemical Biology track and a Materials Chemistry track. These tracks are not separate concentrations – your degree will still be an Sc.B. in Chemistry. The Chemical Biology track is designed for students who have a strong interest in the interface of chemistry with biology. The Materials Chemistry track is designed for students who have a strong interest in the interface of chemistry with nanoscience and materials science. It is recommended that courses in the concentration be taken for a letter grade, and any decision to take a concentration course S/NC should be made after consultation with a concentration advisor.

Concentrating in Chemistry – Three tracks

The required/recommended courses for the three tracks are given below.

ScB Chemistry:

CHEM 0330	Equilibrium, Rate, and Structure	1
CHEM 0350	Organic Chemistry I	1
CHEM 0360	Organic Chemistry II	1
CHEM 0370	Organic Chemistry Laboratory	.5
CHEM 0500	Inorganic Chemistry	1
CHEM 0600	Preparative Chemistry Lab	.5
Two semesters of independent study:		2
CHEM 0980	Undergraduate Research [1]	
or CHEM 0981	Undergraduate Research - Writing Designated	
CHEM 1140	Physical Chemistry: Quantum Chemistry	1
CHEM 1150	Physical Chemistry: Thermodynamics and Statistical Mechanics	1
CHEM 1160	Physical Chemistry Laboratory	1
MATH 0180 or equivalent [2]		1
Two Physics courses, typically 0030/0040 or 0050/0060		2
Six electives (at least three must be upper level CHEM courses) [3]		6
Total Credits		**19**

[1] **Two** semesters of undergraduate research are required for the concentration. Chem0980 and 0981 are courses which may be repeated for credit.

[2] NOTE: MATH 0180 (https://bulletin.brown.edu/search/?P=MATH%200180) has additional prerequisites.

[3] Upper level chemistry courses are any 1000- and 2000-level CHEM course. BIOL 0280 is credited as an upper level chemistry elective for the chemistry concentration. Non CHEM electives are typically foundational courses or upper level science/math courses with a significant molecular focus or those that cover tools/techniques that are of utility to a chemist. You should discuss your elective choices with your Concentration Advisor to craft a course of study that is appropriate for your interests.

CHEM 0980/CHEM 0981should be carried out with a faculty member with an appointment in the Chemistry Department. Research with faculty advisors outside the Chemistry Department is also possible after consultation with a Concentration Advisor.

ScB Chemistry - Chemical Biology Track:

CHEM 0330	Equilibrium, Rate, and Structure	1
CHEM 0350	Organic Chemistry I	1
CHEM 0360	Organic Chemistry II	1
CHEM 0400	Biophysical and Bioinorganic Chemistry	1
or CHEM 0500	Inorganic Chemistry	
CHEM 0600	Preparative Chemistry Lab	.5
Two semesters of independent study:		2

CHEM 0980	Undergraduate Research [1]	
or CHEM 0981	Undergraduate Research - Writing Designated	
CHEM 1140	Physical Chemistry: Quantum Chemistry	1
CHEM 1230	Chemical Biology	1
CHEM 1240	Biochemistry	1
BIOL 0280	Biochemistry	1
MATH 0180 or equivalent [2]		1
Two Physics courses, typically 0030/0040 or 0050/0060		2
Select three of the following: [3]		3
BIOL 0470	Genetics	
BIOL 0500	Cell and Molecular Biology	
BIOL 0510	Introductory Microbiology	
BIOL 0530	Principles of Immunology	
BIOL 0800	Principles of Physiology	
NEUR 1020	Principles of Neurobiology	
Two other electives [4]		2
Total Credits		**18.5**

1 **Two** semesters of undergraduate research are required for the concentration. Chem0980 and 0981 are courses which may be repeated for credit.

2 NOTE: MATH 0180 (https://bulletin.brown.edu/search/?P=MATH%200180) has additional prerequisites.

3 NOTE: Many of the BIOL courses have BIOL 0200 (https://bulletin.brown.edu/search/?P=BIOL%200200) as a prerequisite.

4 Upper level chemistry courses are any 1000- and 2000-level CHEM course. BIOL 0280 is credited as an upper level chemistry elective for the chemistry concentration. Non CHEM electives are typically foundational courses or upper level science/math courses with a significant molecular focus or those that cover tools/techniques that are of utility to a chemist. You should discuss your elective choices with your Concentration Advisor to craft a course of study that is appropriate for your interests.

CHEM 0980 / CHEM 0981should be carried out with a faculty member with an appointment in the Chemistry Department. Research with faculty advisors outside the Chemistry Department is also possible after consultation with a Concentration Advisor.

ScB Chemistry - Materials Chemistry Track:

CHEM 0330	Equilibrium, Rate, and Structure	1
CHEM 0350	Organic Chemistry I	1
CHEM 0360	Organic Chemistry II	1
CHEM 0500	Inorganic Chemistry	1
CHEM 0600	Preparative Chemistry Lab	.5
Two semesters of independent study:		2
CHEM 0980	Undergraduate Research [1]	
or CHEM 0981	Undergraduate Research - Writing Designated	
CHEM 1060	Advanced Inorganic Chemistry [2]	1
CHEM 1140	Physical Chemistry: Quantum Chemistry	1
CHEM 1150	Physical Chemistry: Thermodynamics and Statistical Mechanics [2]	1
CHEM 1700	Nanoscale Materials: Synthesis and Applications	1
MATH 0180 or equivalent [3]		1
Two Physics courses, typically 0030/0040 or 0050/0060 [5]		2
One of the following courses		1
CHEM 1560S	The Chemistry of Polymeric Organic Materials	
BIOL 1090	Polymer Science for Biomaterials (or)	
BIOL 1120/	Biomaterials (or)	
BIOL 1140	Tissue Engineering (or)	
ENGN 1470	Composite Materials (or)	
ENGN 1200	Biomaterials	
Four electives, at least two must be upper level CHEM courses. [4]		4
Total Credits		**18.5**

1 **Two** semesters of undergraduate research are required for the concentration. Chem0980 and 0981 are courses which may be repeated for credit.

2 For students with a more Engineering bent, the following substitutions can be made - ENGN 0040 can be substituted for PHYS 0030; ENGN 0410 can be substituted for CHEM 1060; ENGN 0720 for CHEM 1150

3 NOTE: MATH 0180 has additional prerequisites.

4 Upper level chemistry courses are any 1000- and 2000-level CHEM course. BIOL 0280 is credited as an upper level chemistry elective for the chemistry concentration. Non CHEM electives are typically foundational courses or upper level science/math courses with a significant molecular focus or those that cover tools/techniques that are of utility to a chemist. You should discuss your elective choices with your Concentration Advisor to craft a course of study that is appropriate for your interests.

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