

LaGrange College Course Catalog - Chemistry

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LaGrange College

Course Catalog - Chemistry

B.A. in Chemistry - B.A. in Chemistry

Type:Major

Learning Objectives: Bachelor of Arts Degree in Chemistry

Students who earn the Bachelor of Arts degree with a major in Chemistry will be appropriately competent in: core topics in chemistry, the language of chemistry, and an appropriate selection of the following laboratory skills and advanced studies.

Core Topics:

- atomic and molecular structure and chemical bonding
- equilibria and stoichiometry
- thermochemistry
- periodic relationships
- thermodynamics
- chemical dynamics
- quantum mechanics and spectroscopy
- recognition, structure, and reactivity of the major organic functional groups

Language of Chemistry:

- verbal, written, numerical and graphical communication of chemical concepts
- use of the chemical literature
- knowledge of the research process

Laboratory Skills:

- data organization and analysis
- use of analytical instrumentation
- volumetric and gravimetric analytical theory and practice
- techniques in biotechnology
- synthesis and characterization of organic compounds by physical and instrumental methods

Advanced Studies:

- analytical instrumentation theory and application
- advanced inorganic chemistry,
- advanced organic chemistry
- biochemistry: biological molecules and metabolism

Assessment of Learning Objectives

Students who earn the B.A. degree will have demonstrated their attainment of the specific objectives by appropriate scores on the current American Chemical Society (ACS) Exams for (1) General Chemistry and (2) Organic Chemistry. The passing score will be at or above the 40th percentile of the national norms for these exams or at an appropriate level, as determined by the Department of Chemistry, based on the accumulated data of the performance of LaGrange College students on these exams. The results that are in the best interest of the students will be used. These exams will be given at the end of the appropriate courses and will be offered to students up to three (3) additional times prior to the time of the student's scheduled graduation. The student must attempt a retest at least once a semester until successful completion of the exam. In the event that a student needs to repeat an exam for the

second, third, or final time, evidence of preparation must be presented. Reexamination cannot be scheduled earlier than two (2) weeks following a previous examination.

Requirements for the Bachelor of Arts Degree in Chemistry

Students earn these competencies by pursuing the following Bachelor of Arts curriculum in Chemistry:

CHEM 1101, 1102	General Chemistry	8 semester hours
CHEM 3201, 3202	Organic Chemistry	8 semester hours
CHEM 2251	Analytical Chemistry	4 semester hours
CHEM 3311	Elements of Physical Chemistry	3 semester hours
CHEM 3371	Junior Seminar	1 semester hour
CHEM 4471	Senior Seminar	2 semester hours
Chemistry electives		6-8 semester hours

Chemistry electives are normally 3000 or 4000 level classes in chemistry, but coursework outside of the chemistry may be substituted with approval of the major's chemistry advisor.

Required supporting courses include the following:

PHYS 1101, 1102 or 2121, 2122	8 semester hours
MATH 2105	4 semester hours

Total: 44-46 semester hours

The **scheduling** of the courses for the B.A. in Chemistry can be somewhat flexible. Students are urged to seek advisement from a faculty member in the chemistry program prior to or early in their first semester. The following are possible sequences to fulfill the requirements for the major:

	Fall	Spring
First Year	CHEM 1101 MATH 2221	CHEM 1102
Second Year	CHEM 3201 PHYS 1101 or 2121	CHEM 3202 PHYS 1102 or 2122

Junior- and senior-year sequence depends on which years Analytical Chemistry (CHEM2251) and Elements of Physical Chemistry (CHEM3311) are being offered.

Third Year	CHEM elective	CHEM 3311 CHEM 3371
Fourth Year	CHEM 2251	CHEM elective CHEM 4471
OR:		
Third Year	CHEM 2251	CHEM elective CHEM 3371
Fourth Year	CHEM elective	CHEM 3311 CHEM 4471

Students may substitute CHEM3301 and CHEM3302 (Physical Chemistry) for CHEM3311 (Elements of Physical Chemistry) and one upper level elective.

Pre-Professional Students should meet with the appropriate Pre-Professional Advisor as well as a faculty member of the Chemistry Program to plan their schedules.

B.S. in Chemistry - B.S. in Chemistry

Type:Major

Learning Objectives: Bachelor of Science Degree in Chemistry

Students who earn the B.S. degree with a major in Chemistry will be appropriately competent in: core topics in chemistry, the language of chemistry, and an appropriate selection of the following laboratory skills and advanced studies.

Core Topics:

- atomic and molecular structure and chemical bonding
- equilibria and stoichiometry
- thermochemistry
- periodic relationships
- thermodynamics
- chemical dynamics
- quantum mechanics and spectroscopy
- recognition, structure, and reactivity of the major organic functional groups

Language of Chemistry:

- verbal, written, numerical and graphical communication of chemical concepts
- use of the chemical literature
- knowledge of the research process

Laboratory Skills:

- data organization and analysis
- use of analytical instrumentation
- volumetric and gravimetric analytical theory and practice
- techniques in biotechnology
- synthesis and characterization of organic compounds by physical and instrumental methods

Advanced Studies:

- analytical instrumentation theory and application
- advanced inorganic chemistry,
- advanced organic chemistry
- biochemistry: biological molecules and metabolism

Assessment of Learning Objectives

Students who earn the B.S. degree will have demonstrated their attainment of the specific objectives by appropriate scores on the current American Chemical Society (ACS) Examinations on the following three (3) topics: General, Organic, and Physical. The students will additionally attain an appropriate score from one (1) of the following examinations: Analytical, Instrumental, Inorganic, or Biochemistry. The passing score will be at or above the 40th percentile of the national norms for these exams or at an appropriate level, as determined by the Department of Chemistry, based on the accumulated data of the performance of LaGrange College students on these exams. The results that are in the best interest of the students will be used. These exams will be given at the end of the appropriate courses and will be offered to students up to three (3) additional times prior to the time of the student's scheduled graduation. The student must attempt a retest at least once a semester until successful completion of the exam. In the event that a student needs to repeat an exam for the second, third, or final time, evidence of preparation must be presented. Reexamination cannot be scheduled earlier than two (2) weeks following a previous examination.

Requirements for the Bachelor of Science Degree in Chemistry

Students earn these competencies by pursuing the following Bachelor of Science curriculum in Chemistry:

CHEM 1101, 1102 General Chemistry	8 semester hours
CHEM 3201, 3202 Organic Chemistry	8 semester hours
CHEM 2251 Analytical Chemistry	4 semester hours
CHEM 3301, 3302 Physical Chemistry	8 semester hours
CHEM 3371 Junior Seminar	1 semester hours
CHEM 4471 Senior Seminar	2 semester hours
CHEM 4451 Instrumental Analysis	4 semester hours
CHEM elective (3000 or 4000 level)	3-4 semester hours

Additionally, a **research experience** is required. This should be taken between the junior and senior years or during the first semester or January Term of the senior year. This may be accomplished on campus, in industry, or in a research university summer program. Students may elect to earn CHEM 4900 credit for this required activity.

Supporting required courses include the following:

MATH 2221, 2222	8 semester hours
PHYS 2121, 2122	8 semester hours

Total: 56 semester hours + research experience

Students are urged to seek advisement from a faculty member in the chemistry program prior to or early in their first semester. The **scheduling** of the B.S. curriculum is important, as the Physical Chemistry sequence (CHEM 3301 and 3302) alternates years with Analytical Chemistry (CHEM 2251) and Instrumental Analysis (CHEM 4451). To be prepared to take the Physical Chemistry sequence, students should take Calculus during the first year and Physics during the sophomore year. It is highly recommended that students take General Chemistry during their first year. The following would be typical sequences of courses for the B.S. Chemistry degree:

	Fall	Spring
First year	CHEM 1101 MATH 2221	CHEM 1102 MATH 2222
Second Year	CHEM 3201 PHYS 2121	CHEM 3202 PHYS 2122
Junior- and senior-year sequence depends on which year Physical Chemistry and Instrumental Analysis are being offered.		
Third Year	CHEM 3301	CHEM 3302 CHEM 3371
Fourth Year	CHEM 2251 CHEM elective or	CHEM 4451 CHEM 4471 CHEM elective
OR:		
Third Year	CHEM 2251	CHEM 4451 CHEM 3371
Fourth Year	CHEM 3301 CHEM elective or	CHEM 3302 CHEM 4471 CHEM elective

Minor in Chemistry - Minor in Chemistry

Type: Minor

A **minor** in Chemistry shall consist of General Chemistry I & II (CHEM 1101 & 1102), Organic Chemistry I & II (CHEM 3201 & 3202) and two (2) additional Chemistry courses from the following:

Analytical Chemistry (CHEM 2251), Physical Chemistry (CHEM 3301, 3302 or 3311), Inorganic Chemistry (CHEM 3331), Advanced Organic Chemistry (CHEM 4201), Biochemistry (CHEM 4421, 4422) or Instrumental Analysis (CHEM 4451)

Pre-professional students should consider Advanced Organic Chemistry, Instrumental Analysis and Biochemistry as their options.

Total: 22-24 semester hours

Students must also demonstrate proficiency in general chemistry by passing the ACS General Chemistry Examination as stated above.

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LaGrange College

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