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LaGrange College

Course Catalog - Biochemistry

B.A. in Biochemistry - B.A. in Biochemistry

Type: Major

Learning Objectives: Bachelor of Arts Degree in Biochemistry

Students who earn the B.A. degree with a major in Biochemistry will be appropriately competent in: core topics in chemistry, the language of chemistry, advanced studies in biochemistry and laboratory skills. :

Core Topics:

- atomic and molecular structure and chemical bonding
- equilibrium 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
- techniques in biotechnology
- synthesis and characterization of organic compounds by physical and instrumental methods

Advanced Studies:

- biochemistry: biological molecules and metabolism

Assessment of Learning Objectives

Students who earn the B.A. with a major in Biochemistry will have demonstrated the attainment of the specific objectives by appropriate scores on the current American Chemical Society (ACS) Exams for (1) General Chemistry, (2) Organic Chemistry and/or (3) 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 Arts Degree in Biochemistry

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

CHEM 1101, 1102 General Chemistry	8 semester hours
CHEM 3201, 3202 Organic Chemistry	8 semester hours
CHEM 3311 Elements of Physical Chemistry	3 semester hours
CHEM 3371 Junior Seminar	1 semester hour
CHEM 4421, 4422 Biochemistry	8 semester hours
CHEM 4471 Senior Seminar	2 semester hours
MATH 1221 Pre-Calculus	4 semester hours
PHYS 1101, 1102	8 semester hours

Suggested but not required BIOL 1107, 1107L, 1108, 1108L Principles of Biology I and II	8 semester hours

Total: 42-50 semester hours

Students are urged to seek advisement from a faculty member in the chemistry program prior to or early in their first semester. The scheduling for the B.A. degree in Biochemistry is flexible. The following is a proposed schedule to meet the requirements for the degree. This degree provides a flexible yet strong program for the pre-health professional requirements.

	Fall	**Spring**
First Year		MATH 1221
	CHEM 1101	CHEM 1102
Second Year	CHEM 3201	CHEM 3202
Third Year	PHYS 1101	PHYS 1102
		CHEM 3311
		CHEM 3371
Fourth Year	CHEM 4421	CHEM 4422
		CHEM 3311
		CHEM 4471

Note that CHEM 3311 is listed twice as it may be offered only in alternating years.

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.

For students not planning to attend graduate or professional school, the Biochemistry Major may be started in the sophomore year.

	Fall	**Spring**
First Year		MATH 1221
Second Year	CHEM 1101	CHEM 1102
Third Year	CHEM 3201	CHEM 3202
	PHYS 1101	PHYS 1102
		CHEM 3311
		CHEM 3371
Fourth Year	CHEM 4421	CHEM 4422
		CHEM 3311
		CHEM 4471

B.S. in Biochemistry - B.S. in Biochemistry

Type: Major

Learning Objectives: Bachelor of Science Degree in Biochemistry

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

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
- techniques in biotechnology
- synthesis and characterization of organic compounds by physical and instrumental methods

Advanced Studies:

- biochemistry: biological molecules and metabolism
- elective advanced studies in allied fields of Biology and Psychology

Assessment of Learning Objectives

Students who earn the B.S. with a major in Biochemistry will have demonstrated the attainment of the specific objectives by appropriate scores on the current American Chemical Society (ACS) Exams for (1) General Chemistry or Organic Chemistry and (2) Biochemistry. The passing score will be at or above the 40^{th} 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 Biochemistry

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

BIOL 1107, 1107L, 1108, 1108L Principles of Biology and laboratory	8 semester hours
CHEM 1101, 1102 General Chemistry	8 semester hours
CHEM 3201, 3202 Organic Chemistry	8 semester hours
CHEM 3311 Elements of Physical Chemistry	3 semester hours
CHEM 3371 Junior Seminar	1 semester hour
CHEM 4421, 4422 Biochemistry	8 semester hours
CHEM 4471 Senior Seminar	2 semester hours
MATH 1221 Pre-Calculus	4 semester hours
PHYS 1101, 1102	8 semester hours

In addition, Bachelor of Science Biochemistry majors must take two classes from the following list:

BIOL 3321 Microbiology	BIOL 3322 Immunology
BIOL 3372 Molecular Biology	BIOL 3373 Genetics
BIOL 3374 Cell Physiology	BIOL 3376 Virology
CHEM 4201 Advanced Organic Chemistry	CHEM 4451 Instrumental Analysis
PSYC 4465 Biological Psychology	

Research in Chemistry CHEM 4900 may be substituted for one elective with advisor permission.

Total: 57-58 semester hours

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 Elements of Physical Chemistry (CHEM 3311) is offered alternate years. To be prepared to take Elements of Physical Chemistry sequence, students must complete the mathematics requirements and PHYS 1101 prior to the term in their Junior or Senior year that CHEM 3311 will be offered. The following is a typical sequence of courses for the B.S. Biochemistry degree:

	Fall	**Spring**
First Year	General Chemistry I (CHEM 1101) Pre-Calculus (MATH 1221)	General Chemistry II (CHEM 1102)
Second Year		

	Organic Chemistry I (CHEM 3201)	Organic Chemistry II (CHEM 3202)
	Principles of Biology I (BIOL 1107, BIOL 1107L)	Principles of Biology II (BIOL 1108 BIO 1108L)
Third Year		
	Intro. Physics I (PHYS 1101)	Intro. Physics II (PHYS 1102)
	Upper level Elective	El. Physical Chemistry (CHEM 3311) Junior Seminar (CHEM 3371)
Fourth Year		
	Biochemistry I (CHEM 4421)	Biochemistry II (CHEM 4422)
	Upper Level elective	El. Physical Chemistry (CHEM 3311) Senior Seminar (CHEM 4471)

Note that Elements of Physical Chemistry (CHEM 3311) is listed twice as it is offered in alternating years. PHYS 1101 must be completed prior to taking CHEM 3311.

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