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## LaGrange College

### Course Catalog - Biochemistry

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#### **B.A. in Biochemistry - B.A. in Biochemistry**

**Type:**Major

#### **Learning Objectives: Bachelor of Arts Degree in Biochemistry**

In addition to the general education requirements, 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 40<sup>th</sup> 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:

<a href="#">CHEM 1101</a> , <a href="#">CHEM 1102</a> General Chemistry	8 semester hours
<a href="#">CHEM 3201</a> , <a href="#">3202</a> Organic Chemistry	8 semester hours
<a href="#">CHEM 3311</a> Elements of Physical Chemistry	3 semester hours
<a href="#">CHEM 3371</a> Junior Seminar	1 semester hour
<a href="#">CHEM 4421</a> , <a href="#">4422</a> Biochemistry	8 semester hours
<a href="#">CHEM 4471</a> Senior Seminar	2 semester hours
<a href="#">MATH 1221</a> Pre-Calculus	4 semester hours
<a href="#">PHYS 1101</a> , <a href="#">1102</a>	8 semester hours
Suggested but not required <a href="#">BIOL 1107</a> , <a href="#">1107L</a> , <a href="#">1108</a> , <a href="#">1108L</a> 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.

	<b>Fall</b>	<b>Spring</b>
First Year		<a href="#">MATH 1221</a>
	<a href="#">CHEM 1101</a>	<a href="#">CHEM 1102</a>
Second Year	<a href="#">CHEM 3201</a>	<a href="#">CHEM 3202</a>
Third Year	<a href="#">PHYS 1101</a>	<a href="#">PHYS 1102</a>
		<a href="#">CHEM 3311</a>
		<a href="#">CHEM 3371</a>
Fourth Year	<a href="#">CHEM 4421</a>	<a href="#">CHEM 4422</a>
		<a href="#">CHEM 3311</a>
		<a href="#">CHEM 4471</a>

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.

	<b>Fall</b>	<b>Spring</b>
First Year		<a href="#">MATH 1221</a>
Second Year	<a href="#">CHEM 1101</a>	<a href="#">CHEM 1102</a>
Third Year	<a href="#">CHEM 3201</a>	<a href="#">CHEM 3202</a>
	<a href="#">PHYS 1101</a>	<a href="#">PHYS 1102</a>
		<a href="#">CHEM 3311</a>
		<a href="#">CHEM 3371</a>
Fourth Year	<a href="#">CHEM 4421</a>	<a href="#">CHEM 4422</a>
		<a href="#">CHEM 3311</a>
		<a href="#">CHEM 4471</a>

## **B.S. in Biochemistry - B.S. in Biochemistry**

**Type:**Major

### **Learning Objectives: Bachelor of Science Degree in Biochemistry**

In addition to the general education requirements, 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<sup>th</sup> 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:

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

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

<a href="#">BIOL 3321</a> Microbiology	<a href="#">BIOL 3322</a> Immunology
<a href="#">BIOL 3372</a> Molecular Biology	<a href="#">BIOL 3373</a> Genetics
<a href="#">BIOL 3374</a> Cell Physiology	<a href="#">BIOL 3376</a> Virology
<a href="#">CHEM 4201</a> Advanced Organic Chemistry	<a href="#">CHEM 4451</a> Instrumental Analysis
<a href="#">PSYC 4465</a> 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
<b>First Year</b>	General Chemistry I ( <a href="#">CHEM 1101</a> ) Pre-Calculus ( <a href="#">MATH 1221</a> )	General Chemistry II ( <a href="#">CHEM 1102</a> )
<b>Second Year</b>	Organic Chemistry I ( <a href="#">CHEM 3201</a> ) Principles of Biology I ( <a href="#">BIOL 1107</a> , <a href="#">BIOL 1107L</a> )	Organic Chemistry II ( <a href="#">CHEM 3202</a> ) Principles of Biology II ( <a href="#">BIOL 1108</a> <a href="#">BIOL 1108L</a> )
<b>Third Year</b>	Intro. Physics I ( <a href="#">PHYS 1101</a> )	Intro. Physics II ( <a href="#">PHYS 1102</a> )

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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**LaGrange College**

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