DEPARTMENT OF BIOLOGY

The Department of Biology offers the following undergraduate degree programs:

BS in Biology

BS in Biology with an emphasis in genetics

The course requirements for each of these degree programs are on the respective program requirements worksheets (see pages 239-242).

The biology department's webpage (http://www.lander.edu/biology) contains information about individual programs of study, a list of departmental scholarships available for students majoring in biology, a downloadable application for those scholarships, a link to applications for these scholarships, and links to the home pages of biology faculty.

Students majoring in biology will gain a solid foundation in the discipline while having the flexibility to tailor the degree to their interests and career goals. Curriculum plans are available for students pursuing an emphasis in genetics as well as for those who wish to focus on cell and molecular biology or ecology and organismal biology. Additional curriculum plans are available for students interested in attending graduate school (to obtain an MS or Ph.D. degree) or one of the many professional schools (to obtain a DDS, DVM, MD, OD, OT, PA, or PT degree) after graduation. In addition to specifying particular biology courses, most biology curriculum plans include recommended courses in chemistry, physics, and psychology to properly prepare students for immediate entry into the workforce or admission to graduate and professional schools. The various curriculum plans are presented as four-year registration guides on the registrar's office webpage (https://www.lander.edu/academics/registrars-office/resources/major-guides).

The department also offers an honors program for outstanding biology majors as well as a minor for students majoring in other areas.

Biology Major

Lander's degree program in biology provides comprehensive training in the life sciences. The curriculum is based on the Core Concepts and Core Competencies put forth in AAAS' *Vision and Change in Undergraduate Biology Education.* Students complete coursework geared toward mastering the five core concepts of biology: 1) evolution; 2) structure and function; 3) information flow, exchange, and storage; 4) pathways and transformations of energy and matter; and 5) systems. Through laboratory, research, and classroom experiences, students also accrue six core competencies that demonstrate their ability to 1) apply the process of science; 2) use quantitative reasoning; 3) use modeling and simulation; 4) tap into the interdisciplinary nature of science; 5) communicate and collaborate within and outside the discipline; and 6) understand the relationship between science and society.

The core concepts will be addressed in the required courses and reinforced in the elective courses. To ensure thorough exposure to all of the core concepts, students enroll in a suite of courses mapped to each of the core concepts by choosing from course groups based on the core concepts. Group 1 courses emphasize structure and function; Group 2 courses emphasize information flow, exchange, and storage; and Group 3 courses emphasize systems and the pathways and transformations of energy and matter. All courses taught in each of these groups include coverage of relevant evolutionary concepts and help students gain experience toward mastery of the core competencies described above.

The core requirements for a Bachelor of Science degree in biology are BIOL 111, BIOL 112, BIOL 299, BIOL 303, BIOL 312, BIOL 399, and BIOL 499. Further additional requirements include BIOL 213 or BIOL 214, one course from each of three concept groups (Group 1 – BIOL 308, BIOL 313, or BIOL 401; Group 2 – BIOL 307, BIOL 403, or BIOL 422; Group 3 – BIOL 306, BIOL 311, BIOL 415, or BIOL 421), and 8 hours of elective biology courses. At least 4 hours of the elective biology coursework must be at the 300-level or above. All biology majors must successfully complete CHEM 111, CHEM 112, and CHEM 221. For the emphasis in genetics, additional requirements are more specific and include BIOL 307, BIOL 403, BIOL 412, and BIOL 498; CHEM 301; and PHYS 201 and PHYS 202 or PHYS 211 and PHYS 212.

For students anticipating secondary school teaching or seeking admission to professional or graduate school, CHEM 222 and CHEM 301 and PHYS 201 and PHYS 202 or PHYS 211 and PHYS 212 are strongly recommended and may be required.

A minimum grade of "C" must be earned in all biology courses counted toward the degree in Biology. In addition, a minimum cumulative GPA of 2.0 must be earned for all major program requirements (including CHEM and PHYS courses).

It is the student's responsibility to be knowledgeable of the schedule of offerings and to plan carefully so that all requirements for the degree can be fulfilled by the desired graduation date. Required courses for the biology degree are normally offered according to the following schedule:

Each Fall	**Each Spring**
BIOL 111	BIOL 112
BIOL 202	BIOL 203
BIOL 204	BIOL 204
BIOL 213	BIOL 214
BIOL 303	BIOL 299
BIOL 307	BIOL 303
BIOL 311	BIOL 306
BIOL 312	BIOL 308
BIOL 399	BIOL 313
BIOL 415	BIOL 401
BIOL 421	BIOL 403
	BIOL 422
	BIOL 499

Biology Degree with Emphasis in Genetics

The genetics emphasis is designed for students interested in careers in genetics or biomedical science. Beginning with the solid foundation in biological sciences provided by the standard Bachelor of Science in biology, this program includes additional coursework and experiences in biochemistry, animal development, and genetics. All students in the emphasis will complete a laboratory research project in genetics, the results of which will be presented in a public seminar.

Graduation with Honors in Biology

Students majoring in biology will qualify for a BS with Honors in Biology if the following requirements are met:

1. Completion and submission to the department chair of an Application for Graduation with Honors in Biology with at least three semesters remaining before graduation.
2. Successful completion of the program for the BS in Biology or the BS in Biology with an emphasis in genetics;
3. Completion of an additional 5 hours of biology coursework at the 300 level or above that includes at least one four-hour course (BIOL 407-BIOL 412 are not applicable);
4. Cumulative grade point average of 3.5 in all biology courses;
5. Cumulative overall grade point average of 3.5 or better; and
6. Completion of a laboratory or field research project in which:
    a) The research proposal is approved by a majority of the biology faculty. (*This would normally occur in the fall semester of the junior year*.)
    b) The research is of sufficient quality to justify four credit hours (BIOL 407, BIOL 408, BIOL 409, BIOL 410, or BIOL 412) which are required.
    c) The research results are presented as follows:
        1) by public seminar at Lander University and
        2) at a scientific meeting and/or by submission of a paper for publication in an appropriate scientific journal.

Transfer students may graduate with Honors in Biology if they fulfill the above requirements and have a 3.5 GPA overall and in biology from their former institution(s) and complete their last 60 hours, including at least 20 hours of biology, at Lander University

Biology Minor

A minor in biology includes BIOL 111 and BIOL 112, and either BIOL 213 or BIOL 214, and at least 7 hours of 300- or 400-level biology courses. Advisors and prospective minors should note that most biology courses have

prerequisites and/or co-requisites that must be met. A grade of "C" or better is required in all biology courses taken for the minor.

Pre-Professional Curricula

Lander's biology department offers curriculum plans in the following areas: pre-medicine, pre-dentistry, pre-optometry, pre-veterinary medicine, pre-pharmacy, pre-physical therapy, pre-occupational therapy, and pre-physician assistant.

The goals of these curriculum plans are to:

1. provide a well-respected and rigorous core curriculum that will make students who are applying to professional schools highly competitive;
2. offer the full variety of courses that are required or recommended for acceptance into most professional schools; and
3. help students navigate the application procedures and timelines specific to their professional-school goals.

These curriculum plans are presented as four-year registration guides available on the registrar's office webpage (https://www.lander.edu/academics/registrars-office/resources/major-guides).

2021-2022 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: BIOLOGY

Credit Hours

UNIVERSITY REQUIREMENT

FALS 101: Fine Arts and Lecture Series 0

GENERAL EDUCATION REQUIREMENTS
(For approved courses, see the General Education: www.lander.edu/gen-ed.)

A. Core Skills (9 hours)
ENGL 101: Writing and Inquiry I 3
ENGL 102: Writing and Inquiry II 3
MATH 121: Mathematical Applications or 3
MATH 123: Calculus and Its Applications or 3
MATH 141: Single Variable Calculus I 4

B. Humanities and Fine Arts 6
(6 hours selected from 2 different disciplines)

C. Behavioral and Social Perspectives 6
(6 hours selected from 2 different disciplines)

D. Scientific and Mathematical Reasoning
CHEM 111: General Chemistry 4
MATH 211: Statistical Methods I 3

E. Founding Documents of the United States 3
HIST 111: United States History to 1877 or
POLS 101: American National Government

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

BIOL 111: Principles of Biology I 4
BIOL 112: Principles of Biology II 4
BIOL 299: Sophomore Seminar in Biology 1
BIOL 303: Evolution 3
BIOL 312: Genetics 4
BIOL 399: Junior Seminar in Biology 1
BIOL 499: Senior Seminar in Biology 1

MAJOR PROGRAM ADDITIONAL REQUIREMENTS

A. Organismal Diversity 4
(Choose 4 credit hours from the following)
BIOL 213: Botany
BIOL 214: Zoology

B. Biology Group I: Structure and Function	4
(Choose 4 credit hours from the following)	
BIOL 308: Comparative Vertebrate Anatomy	
BIOL 313: Plant Anatomy	
BIOL 401: Cell Biology	
C. Biology Group II: Biological Information Flow	4
(Choose 4 credit hours from the following)	
BIOL 307: Animal Development	
BIOL 403: Molecular Genetics	
BIOL 422: Immunology	
D. Biology Group III: Systems Biology	4
(Choose 4 credit hours from the following)	
BIOL 306: Ecology	
BIOL 311: Animal Physiology	
BIOL 415: Limnology	
BIOL 421: General Microbiology	
E. Other Requirements	
CHEM 112: General Chemistry	4
CHEM 221: Organic Chemistry	4
MAJOR PROGRAM ELECTIVES	
BIOL 200-level or above (except BIOL 490 and BIOL 498)	4
BIOL 300-level or above (except BIOL 490 and BIOL 498)	4
TOTAL MAJOR PROGRAM REQUIREMENTS	50
ADDITIONAL ELECTIVES	35
TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses
https://www.lander.edu/academics/registrars-office/resources/major-guides

2021-2022 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: BIOLOGY
EMPHASIS: GENETICS

	Credit Hours
UNIVERSITY REQUIREMENT	
FALS 101: Fine Arts and Lecture Series	0
GENERAL EDUCATION REQUIREMENTS	
(For approved courses, see the General Education: www.lander.edu/gen-ed.)	
A. Core Skills (9 hours)	
ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 121: Mathematical Applications or	3
MATH 123: Calculus and Its Applications or	3
MATH 141: Single Variable Calculus I	4
B. Humanities and Fine Arts (6 hours selected from 2 different disciplines)	6
C. Behavioral and Social Perspectives (6 hours selected from 2 different disciplines)	6
D. Scientific and Mathematical Reasoning	
CHEM 111: General Chemistry	4
MATH 211: Statistical Methods I	3
E. Founding Documents of the United States	3
HIST 111: United States History to 1877 or	
POLS 101: American National Government	
F. World Cultures	3
G. LINK 101: Leadership, Involvement, Networking and Knowledge	1
LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.	
TOTAL GENERAL EDUCATION REQUIREMENTS	35
If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.	
MAJOR PROGRAM CORE REQUIREMENTS	
BIOL 111: Principles of Biology I	4
BIOL 112: Principles of Biology II	4
BIOL 299: Sophomore Seminar in Biology	1
BIOL 303: Evolution	3
BIOL 312: Genetics	4
BIOL 399: Junior Seminar in Biology	1
BIOL 499: Senior Seminar in Biology	1
MAJOR PROGRAM ADDITIONAL REQUIREMENTS	
A. Organismal Diversity (Choose 4 credit hours from the following)	4

	BIOL 213: Botany BIOL 214: Zoology	
B.	**Biology Group I: Structure and Function** (Choose 4 credit hours from the following) BIOL 308: Comparative Vertebrate Anatomy BIOL 313: Plant Anatomy BIOL 401: Cell Biology	4
C.	**Biology Group II: Biological Information Flow** BIOL 307: Animal Development	4
D.	**Biology Group III: Systems Biology** (Choose 4 credit hours from the following) BIOL 306: Ecology BIOL 311: Animal Physiology BIOL 415: Limnology BIOL 421: General Microbiology	4
E.	**Other Requirements**	
	BIOL 403: Molecular Genetics	4
	BIOL 412: Genetics Research	4
	BIOL 498: Genetics Seminar	1
	CHEM 112: General Chemistry	4
	CHEM 221: Organic Chemistry	4
	CHEM 301: Biochemistry	3
	PHYS 201-202: Introductory Physics or PHYS 211-212: General Physics	8
	TOTAL MAJOR PROGRAM REQUIREMENTS	62
ADDITIONAL ELECTIVES		23
	TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses
https://www.lander.edu/academics/registrars-office/resources/major-guides