

Department of LIFE SCIENCES

Faculty:

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Majors:

Biology
Cell & Molecular Biology

Ecology & Environmental Biology
Pre-medicine

MISSION STATEMENT

The Mission of the Department of Life Sciences is to educate and train Christians for positions of leadership within the scientific community by providing programs that offer diverse learning and research experiences for students who desire to work in the biological, health, and ecological sciences, as well as science education.

VISION

In order to fulfill this mission, our vision is to develop scientists who actively follow Christ in their careers as biologists, medical professionals, and educators who work to build the Kingdom of God by bringing Jesus' sovereignty and authority to bear in all areas of life sciences. To this end, we desire to instill in our students the belief that we are uniquely called by God to be stewards of His creation and to glorify Him through performing with excellence in all aspects of our work, acting ethically within the discipline, and using our knowledge and skills to solve problems in the global community.

Consistent with the Bethel College mission and vision statement, we believe that it is our duty to provide our students with the analytical and professional skills necessary to succeed in their chosen career.

GOALS

At the completion of our program students should:

1. know biological principals and research techniques,
2. know how to think critically and analytically within their discipline;
3. be able to communicate concepts and ideas within their discipline effectively through both verbal and written communication skills;
4. be able to use knowledge and skills in a variety of settings, including employment situations and/or graduate or professional school;
5. understand how to apply a Christian worldview to science, including acting ethically in their profession.

Biology Major – Bachelor of Science

This major offers flexibility in course selection in Life Sciences and provides students with a broad education in several disciplines within biology. Students interested in medical, dental, optometry, or veterinary school should major in Cell and Molecular Biology. Students have the option of taking a Chemistry minor with this degree.

General Education			HOURS
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	182	General Psychology	3
SOC	151	Principles of Sociology	3
BIBL	215	Old Testament Literature	3
BIBL	216	New Testament Literature	3
		Foreign Language, Two Semesters	6
		History Elective	3
		Art/Drama/Music	3
		Literature	3
PHIL	150	Logic & Critical Thinking	2
PHIL	250	Introduction to Philosophy	3
THEO	110	Exploring the Christian Faith	3
PHIL	452	Senior Experience	1
KINE	252	Fitness/Wellness	1
KINE	117	On the Ball Training, or	1
KINE	124	Aerobics, or	(1)
KINE	128	Physical Fitness, or	(1)
KINE	135	Weight Training	<u>(1)</u>
			47
Major			
BIOL	125	General Biology	4
BIOL	210	Zoology	4
BIOL	211	Botany	(4)
BIOL	308	Molecular Cell Biology	4
BIOL	309	Genetics	4
BIOL	313	Ecology	4
BIOL	337	Vertebrate Physiology or	4
BIOL	214	Human Anatomy & Physiology I and	
BIOL	215	Human Anatomy & Physiology II	(8)
Choose one of the following:			
BIOL	312	Microbiology	(4)
BIOL	317	Ecological Research Techniques	(4)
		Au Sable Institute Course	(4)
Choose one of the following:			
BIOL	415	Quantitative Methods in Biology	(4)
CHEM/BIOL	460	Biochemistry	(4)
BIOL	480	Molecular Laboratory Research Experience	<u>(4)</u>
			32-36
Option 1: Math and Physical Science Support Courses			
CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4

			HOURS
CHEM	261	Organic Chemistry I	4
CHEM	262	Organic Chemistry II	4
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	<u>(3)</u>
			26-27

Electives needed to complete degree 14-19

Option 2: Math & Physical Science Support Courses with a Chemistry Minor

MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	(3)
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3

Chemistry Minor

CHEM	163	General Chemistry	4
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4
CHEM	262	Organic Chemistry II	4
CHEM	280	Analytical Chemistry	4
*CHEM/BIOL	460	Biochemistry	<u>4</u>

***Required if not taken as part of the major courses** **33-38**

Electives needed to complete the degree 0-8

Biology Minor

BIOL	125	General Biology	4
CHEM	163	General Chemistry I	4

Choose two of the following:

BIOL	210	Zoology	(4)
BIOL	211	Botany	(4)
BIOL	214	Human Anatomy & Physiology I	(4)
BIOL	215	Human Anatomy & Physiology II	(4)
BIOL	312	Microbiology	(4)
BIOL	313	Ecology	(4)
BIOL	337	Vertebrate Physiology	(4)

Choose one of the following:

BIOL	308	Molecular Cell Biology	(4)
BIOL	309	Genetics	(4)
BIOL	415	Quantitative Methods in Biology	(4)
BIOL/CHEM	460	Biochemistry	(4)
BIOL	480	Molecular Biology Research Experience	(4)
		Au Sable Institute course	<u>(4)</u>

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Cell and Molecular Biology Major

This major is designed for students interested in biochemistry, molecular biology, cell biology, biotechnology, and biomedical and clinical sciences. This major also is appropriate for pre-professional school students. Students have the option of taking a Chemistry minor with this degree.

General Education			HOURS
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	182	General Psychology	3
SOC	151	Principles of Sociology	3
BIBL	215	Old Testament Literature	3
BIBL	216	New Testament Literature	3
		Foreign Language (two semesters)	6
		History Elective	3
		Art/Drama/Music	3
		Literature	3
PHIL	150	Logic & Critical Thinking	2
PHIL	250	Introduction to Philosophy	3
THEO	110	Exploring the Christian Faith	3
PHIL	452	Senior Experience	1
KINE	252	Fitness/Wellness	1
KINE	117	On the Ball Training, or	1
KINE	124	Aerobics, or	(1)
KINE	128	Physical Fitness, or	(1)
KINE	135	Weight Training	(1)
			47
Major			
BIOL	125	General Biology	4
BIOL	308	Molecular Cell Biology	4
BIOL	309	Genetics	4
BIOL	312	Microbiology	4
BIOL	337	Vertebrate Physiology or	4
BIOL	214	Human Anatomy & Physiology I and	
BIOL	215	Human Anatomy & Physiology II	(8)
BIOL/CHEM	460	Biochemistry	4
Choose three of the following:			12
BIOL	210	Zoology	(4)
BIOL	211	Botany	(4)
BIOL	313	Ecology	(4)
BIOL	415	Quantitative Methods in Biology	(4)
BIOL	480	Molecular Laboratory Research Experience	(4)
			36-40
 Option I: Math and Physical Science Support Courses			
CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4
CHEM	262	Organic Chemistry II	4
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3

			HOURS
MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	<u>(3)</u>
			29-30

Electives needed to complete the degree 7-12

Option 2: Math & Physical Science Support Courses with a Chemistry Minor

MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	(3)
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3

Chemistry Minor

CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry	4
CHEM	262	Organic Chemistry II	4
CHEM	280	Analytical Chemistry	<u>4</u>
			33-34

Electives needed to complete the degree 3-8

Ecology & Environmental Biology – Bachelor of Science

This program is designed for students intending to pursue a graduate degree in ecology, botany, zoology, wildlife management, or other ecological fields after graduation or for those who seek employment in zoos, conservation organizations, state and federal agencies, or environmental consulting firms upon graduation.

General Education

COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	182	General Psychology	3
SOC	151	Principles of Sociology	3
BIBL	215	Old Testament Literature	3
BIBL	216	New Testament Literature	3
		Foreign Language (two semesters)	6
		History Elective	3
		Art/Drama/Music	3
		Literature	3
PHIL	150	Logic & Critical Thinking	2
PHIL	250	Introduction to Philosophy	3
THEO	110	Exploring the Christian Faith	3
PHIL	452	Senior Experience	1
KINE	252	Fitness/Wellness	1
KINE	117	On the Ball Training, or	1
KINE	124	Aerobics, or	(1)
KINE	128	Physical Fitness, or	(1)
KINE	135	Weight Training	<u>(1)</u>
			47

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Major			HOURS
BIOL	125	General Biology	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	309	Genetics	4
BIOL	313	Ecology	4
BIOL	337	Vertebrate Physiology	4
		Four elective courses at Au Sable Institute	16

Choose one of the following:

NS	113	Area Study: Natural History and Ecology	(4)
BIOL	312	Microbiology	(4)
BIOL	317	Ecological Research Techniques	4
BIOL	415	Quantitative Methods in Biology	4
CHEM	261	Organic Chemistry I	(4)
		Au Sable Institute course	<u>(4)</u>
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Math and Physical Science Support Courses

CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4
PHYS	121	General Physics I or	4
PHYS	122	General Physics II or	(4)
NS	291	Physical World	(4)
MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	(3)
NS	333	Scientific Research Methods	<u>3</u>
			21-22

Electives needed to complete the degree 11-12

Suggested courses for specific pathways in Ecology & Environmental Biology:

Graduate School (Ecology, Botany, Zoology)

Bethel electives: CHEM261 Organic Chemistry I, PHYS121 General Physics I, BIOL399 Internship in Biology

Wildlife Ecologist

Au Sable Courses: BIOL301 Land Resources, BIOL305 Ornithology, BIOL311 Field Botany, BIOL315 Woody Plants, BIOL345 Wildlife Ecology

Plant Ecologist

Au Sable Courses: BIOL301 Land Resources, BIOL311 Field Botany, BIOL315 Woody Plants, BIOL482 Restoration Ecology

Aquatic Ecologist/Water Resource Analyst

Au Sable Courses: BIOL301 Land Resources, BIOL302 Limnology, BIOL322 Aquatic Biology, BIOL332 Environmental Chemistry, BIOL355 Watershed Stewardship

Bethel electives: BIOL312, CHEM261, CHEM262, CHEM280

Field Naturalist

Au Sable Courses: BIOL301 Land Resources, BIOL305 Ornithology, BIOL311 Field Botany, BIOL315 Woody Plants, BIOL321 Animal Ecology

Ecology and Environmental Biology Minor

HOURS

BIOL	125	General Biology	4
BIOL	313	Ecology	4

Choose one of the following:

BIOL	210	Zoology	(4)
BIOL	211	Botany	(4)

Choose two of the following:

NS	113	Area Study: Ecology & Natural History	(4)
BIOL	230	Natural Resource Conservation	(3)
BIOL	312	Microbiology	(4)
BIOL	317	Ecological Research Techniques	(4)
BIOL	337	Vertebrate Physiology	(4)
BIOL	415	Quantitative Methods in Biology	(4)
		Au Sable Institute course	<u>(4)</u>

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Pre-Medicine – Bachelor of Science

This major is appropriate for pre-professional school students who need specific courses to prepare for the MCAT, DAT, VCAT and professional school admissions requirements. This major is appropriate for programs in medicine, dentistry, optometry, veterinary medicine, and forensic science. Students have the option of taking a Chemistry minor with this degree.

General Education

COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	182	General Psychology	3
SOC	151	Principles of Sociology	3
BIBL	215	Old Testament Literature	3
BIBL	216	New Testament Literature	3
		Foreign Language (two semesters)	6
		History Elective	3
		Art/Drama/Music	3
		Literature	3
PHIL	150	Logic & Critical Thinking	2
PHIL	250	Introduction to Philosophy	3
THEO	110	Exploring the Christian Faith	3
PHIL	452	Senior Experience	1
KINE	252	Fitness/Wellness	1
KINE	117	On the Ball Training, or	1
KINE	124	Aerobics, or	(1)
KINE	128	Physical Fitness, or	(1)
KINE	135	Weight Training	<u>(1)</u>

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Major

BIOL	125	General Biology	4
BIOL	308	Molecular Cell Biology	4
BIOL	309	Genetics	4
BIOL	312	Microbiology	4
BIOL	337	Vertebrate Physiology or	4

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			HOURS
BIOL	214	Human Anatomy & Physiology I and	
BIOL	215	Human Anatomy & Physiology II	(8)
BIOL/CHEM	460	Biochemistry	4

Choose three of the following:

BIOL	210	Zoology	(4)
BIOL	211	Botany	(4)
BIOL	313	Ecology	(4)
BIOL	415	Quantitative Methods in Biology	(4)
BIOL	480	Molecular Laboratory Research Experience	(4)
			36-40

Option I: Math and Physical Science Support Courses

CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4
CHEM	262	Organic Chemistry II	4
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3
MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	(3)
			29-30

Electives needed to complete the degree 7-12

Option 2: Math & Physical Science Support Courses with a Chemistry Minor

MATH	111	Basic Probability & Statistics	3
MATH	131	Calculus I or	4
MATH	124	Applied Calculus	(3)
PHYS	121	General Physics I or	4
PHYS	122	General Physics II	(4)
NS	333	Scientific Research Methods	3

Chemistry Minor

CHEM	163	General Chemistry I	4
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry	4
CHEM	262	Organic Chemistry II	4
CHEM	280	Analytical Chemistry	4
			33-34

Electives needed to complete the degree 3-8

Additional Recommendations for Pre-professional School Students:

Pre-Medicine

Electives: PHYS122

Suggested electives: NUR 121 Medical Terminology or NUR 127 Spanish Medical Terminology; PSYC391 Biological Psychology, BIOL480

Pre-Veterinary

Electives: PHYS122, BIOL480

Suggested Electives: A course in animal nutrition.

Pre-Dentistry

Physics II is not required by all dental schools.

Electives: BIOL214, 215, BIOL480

Pre-Physician Assisting

Students should complete an internship experience.

Electives: BIOL214, 215 and 2 additional courses in Psychology; NUR 121 Medical Terminology

Suggested electives: NS 211 Nutrition ADN and BSN, or PHED282 Applied Nutrition; NUR 127 Spanish Medical Terminology.

Pre-Forensic Science

Students should take MATH131 and should consider the minor in chemistry and a minor or double major in Criminal Justice. Students should complete an internship experience in a crime lab.

Electives: MATH132, PHYS122, BIOL480

Suggested electives: A minor or double major in Criminal Justice, or the following courses in Criminal Justice: CRMJ101, CRMJ302, CRMJ304.

Pre-Physical Therapy

Electives: BIOL214, 215, and 1 additional course in Psychology.

Suggested electives: PHED463 Kinesiology, NUR 121 Medical Terminology or NUR 127 Spanish Medical Terminology; NS 211 Nutrition ADN and BSN, or PHED282 Applied Nutrition.

All majors in this division receive the Bachelor of Science (B.S.) degree.

Science Education - see Physical Science Department

Au Sable Institute of Environmental Studies Courses:			HOURS
BIOL	301	Land Resources	4
BIOL	302	Limnology	4
BIOL	303	Ecological Agriculture	4
BIOL	304	International Development & Environmental Sustainability	4
BIOL	305	Field Ecology of Birds	4
BIOL	311	Field Botany	4
BIOL	312	Insect Biology & Ecology	4
BIOL	318	Marine Biology	4
BIOL	321	Animal Ecology	4
BIOL	322	Aquatic Biology	4
BIOL	343	Tropical Agriculture & Missions	4
BIOL	345	Wildlife Ecology	4
BIOL	355	Watershed Stewardship	4
BIOL	359	Marine Mammals	4
BIOL	360	Molecular Tools for the Field Biologist	4
BIOL	361	Field Biology in Spring	4
BIOL	427	Ecology of the Indian Tropics	4
BIOL	452	Environmental Health	4
BIOL	471	Conservation Biology	4
BIOL	478	Alpine Ecology	4
BIOL	482	Restoration Ecology	4
BIOL	490	Research Methods	1
BIOL	491	Research Methods II	1
BIOL	499	Research	1-6
CHEM	332	Environmental Chemistry	4