

Department of **BIOLOGY & BIOCHEMISTRY**

Mission Statement

The mission of the Department of Biology and Biochemistry is to teach students the foundational concepts and skills of the sciences through a Christian worldview. Students are trained to apply the scientific method, to analyze observations quantitatively and qualitatively, and to integrate knowledge between scientific disciplines. Students learn to value scientific inquiry as a means of exploring God's general revelation in the natural world.

The Department of Biology & Biochemistry prepares students for careers in science and for a wide variety of professional schools, including graduate programs in biology, biochemistry, and health professions such as medical school, nursing, physician assistant, dental, chiropractic, pharmacy, and physical therapy. Biology and biochemistry exert more influence in our society than ever before, and the department strives to be in the vanguard of an approach to education based on inquiry and critical thinking within the framework of a Christian worldview.

NOTE: WHEN A STUDENT RECEIVES A "U" GRADE FOR THE LAB PORTION OF A SCIENCE COURSE, HE/SHE RECEIVES CREDIT FOR THE COURSE, BUT THE COURSE DOES NOT COUNT FOR LABORATORY SCIENCE CREDIT IN CORE CURRICULUM.

Biochemistry Major Bachelor of Science

Biochemistry is the study of carbohydrates, proteins, lipids, nucleic acids, and the processes of these molecules in the body. A rapidly developing and relatively new discipline within the sciences, biochemistry intersects with physiology, medicine, cell biology, genetics, etc. In recent years the pace of biochemical discovery has accelerated due to the profound transformation wrought by recombinant DNA technology. Biochemistry majors will be well prepared to enter the work force or pursue graduate degrees, medical school, or other professional training. The degree is granted upon completion of credits specified on pages 46–47 (40 credits must be in 3000- or 4000-level courses).

- **Natural World** courses in core curriculum: MAT2121; PHY1101/1101L or 1201/1201L.
- **Biochemistry majors** must receive a C- or better in all prerequisite courses. In addition, biochemistry majors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biochemistry Core	48 cr	Biochemistry Electives	4 cr
BIO1011 Principles of Biology I	4	Selected from courses with BIO (excludes BIO1009), CHE	
BIO1012 Principles of Biology II	4	(excludes CHE1006), or MAT prefixes	
BIO3231 Biochemistry I	5		
BIO3232 Biochemistry II	4		
BIO3835 Career Competencies Seminar	1		
BIO4359 Biotechnology Lab	2		
BIO4835 Senior Seminar [OCE, WCE]	2		
CHE1021 Principles of Chemistry I	4		
CHE1022 Principles of Chemistry II	4		
CHE3101 Organic Chemistry I	5		
CHE3102 Organic Chemistry II	5		
CHE3321 Physical Chemistry	4		
PHY1102 Fundamentals of Physics II	4		

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BIOLOGY & BIOCHEMISTRY

Biology Major Bachelor of Science

Through a sequence of core courses, the biology major provides students with a comprehensive study of the various sub-disciplines of biology including cell and molecular biology, organismal biology, genetics, and ecology. Opportunities for research, independent study, and practical internships further strengthen each student's degree and résumé. The major is a flexible program that contains four unique tracks: Cellular and Molecular Biology, Environmental Biology, General Biology, and Pre-Medical/Pre-Professional Biology. After completing the biology core requirements, students are able to select from a wide variety of science electives to prepare for any profession in the biological sciences: **Clinical Health Sciences**, including medical, dental, veterinary, physician assistant, doctor of nurse practitioner, public health, physical therapy, chiropractic, etc.; **Research Sciences**, including biomedical industry, M.S. and Ph.D. programs in cellular and molecular biology, plant and environmental science, forensic science, genetics, etc. The degree is granted upon completion of credits specified on pages 46–47 (40 credits must be in 3000- or 4000-level courses).

Cellular and Molecular Biology Track (55 cr)

- **Natural World** courses in core curriculum: MAT2055 or higher and CHE1021.
- **For all natural science courses**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core	20 cr
BIO1011 Principles of Biology I	4
BIO1012 Principles of Biology II	4
BIO2113 Principles of Biology III	4
BIO3835 Career Competencies Seminar	1
BIO4835 Senior Seminar [OCE, WCE]	2
CHE3101 Organic Chemistry I	5

Required Courses	27 cr
BIO3145 Microbiology	4
BIO3246 Genetics	5
BIO3348 Cell Biology	5
CHE1022 Principles of Chemistry II	4
CHE3102 Organic Chemistry II	5
PHY1101 Fundamentals of Physics I or	
PHY1201 Engineering Physics I	4

Selectives	8 cr
BIO3157 Human Anatomy	4
BIO3158 Human Physiology	4
BIO3231 Biochemistry I	5
BIO3232 Biochemistry II	4
BIO3236 Immunology	4
BIO4355 Developmental Biology	4
BIO4359 Biotechnology Lab	2
BIO4841/CHE4841 Research/Chemistry Research	1–4
BIO4995 Biology Internship	1–4
MAT courses numbered 2122 or higher	
CHE courses numbered 3321 or higher	
PHY courses numbered 1102 or higher	
Approved Au Sable Institute* courses	

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* SEE RELATED INFORMATION ON PAGES 21–22 AND 38–39

Environmental Biology Track (56 cr)

- **Social Science** requirement in core curriculum recommended to include 4 credits from the following: GEO1005, ECO-prefix courses.
- **Natural World** courses in core curriculum: MAT2055 or higher and CHE1021.
- **For all natural science courses**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.
- **Theological Philosophy Selectives** course in core curriculum: PHI2016.

Biology Core	20 cr
BIO1011 Principles of Biology I	4
BIO1012 Principles of Biology II	4
BIO2113 Principles of Biology III	4
BIO3835 Career Competencies Seminar	1
BIO4835 Senior Seminar [OCE, WCE]	2
CHE3101 Organic Chemistry I	5

Required Courses	16 cr
ASI3620 Environmental Applications for GIS	4
BIO3175 Ecology	4
BIO3277 Conservation Biology	4
CHE1022 Principles of Chemistry II or	
ASI3320 Environmental Chemistry*	4

Selectives	20 cr
BIO2015 Sustainable Urban Agriculture	4
BIO2116 Animal Biology	4
BIO2805 Our Changing Climate	4
BIO3015 Field Ornithology	4
BIO3145 Microbiology	4
BIO3215 Plant Biology	4
BIO3246 Genetics	5
BIO3276 Field Biology	4
BIO4841/CHE4841 Research/Chemistry Research	1–4
BIO4995 Biology Internship	1–4
PHY1101 Fundamentals of Physics I or	
PHY1201 Engineering Physics I	4
PHY1102 Fundamentals of Physics II or	
PHY1202 Engineering Physics II	4
CHE3102 Organic Chemistry II	5
Approved Au Sable Institute* courses	4–12

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General Biology Track (52 cr)

- **Natural World** courses in core curriculum: MAT2055 or higher and CHE1021.
- **For all natural science courses**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core	20 cr
BIO1011 Principles of Biology I	4
BIO1012 Principles of Biology II	4
BIO2113 Principles of Biology III	4
BIO3835 Career Competencies Seminar	1
BIO4835 Senior Seminar [OCE, WCE]	2
CHE3101 Organic Chemistry I	5

Required Courses	9 cr
BIO3246 Genetics	5
PHY1101 Fundamentals of Physics I or	
PHY1201 Engineering Physics I	4

Foundational Biology Selectives	3–5 cr
BIO3145 Microbiology	4
BIO3157 Human Anatomy	4
BIO3158 Human Physiology	4
BIO3159 Pathophysiology	3
BIO3175 Ecology	4
BIO3215 Plant Biology	4
BIO3231 Biochemistry I	5

Specialized Biology Selectives	4–5 cr
BIO2116 Animal Biology	4
BIO3015 Field Ornithology	4
BIO3232 Biochemistry II	4
BIO3236 Immunology	4
BIO3276 Field Biology	4
BIO3277 Conservation Biology	4
BIO3348 Cell Biology	5
BIO4355 Developmental Biology	4

Biology Electives	13–16 cr
BIO1025 Medical Terminology	2
BIO2825 Honors Topics in Biology	4
BIOX805 Topics in Biology	2–4
BIO4359 Biotechnology Lab	2
BIO4841/CHE4841 Research/Chemistry Research	1–4
CHE1022 Principles of Chemistry II	4
CHE3102 Organic Chemistry II	5
PHY1102 Fundamentals of Physics II or	
PHY1202 Engineering Physics II	4
SCI1010 Environmental Science	4
Approved Au Sable Institute* courses	4–8
Additional BIO-prefix courses numbered 2116 or higher	
MAT-prefix courses numbered higher than MAT2055	

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Pre-Medical/Pre-Professional Biology Track (61–62 cr)

To be eligible for the pre-medical/pre-professional track, students must demonstrate a minimum overall 3.5 GPA after at least 24 credits taken at UNW, 16 of which must be from STEM courses. Students must maintain the minimum 3.5 GPA to remain in this track.

- **Social Science** requirement in core curriculum: PSY1005, 2108*, or SOC1035*.
- **Natural World** courses in core curriculum: MAT2055 or higher and CHE1021*.
- **Theological Philosophy Selectives** course in core curriculum: PHI2016.
- **For all natural science courses**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core	20 cr
BIO1011 Principles of Biology I*	4
BIO1012 Principles of Biology II	4
BIO2113 Principles of Biology III	4
BIO3835 Career Competencies Seminar	1
BIO4835 Senior Seminar [OCE, WCE]	2
CHE3101 Organic Chemistry I*	5

Required Courses	37 cr
BIO1025 Medical Terminology	2
BIO3157 Human Anatomy*	4
BIO3158 Human Physiology*	4
BIO3231 Biochemistry I*	5
BIO3246 Genetics	5
CHE1022 Principles of Chemistry II*	4
CHE3102 Organic Chemistry II*	5
PHY1101 Fundamentals of Physics I* or	
PHY1201 Engineering Physics I*	4
PHY1102 Fundamentals of Physics II* or	
PHY1202 Engineering Physics II*	4

Selectives	4–5 cr
BIO3145 Microbiology	4
BIO3159 Pathophysiology	3
BIO3236 Immunology	4
BIO3348 Cell Biology	5
BIO4355 Developmental Biology	4
BIO4841/CHE4841 Research*/Chemistry Research*	1–4
BIO4995 Biology Internship	1–4
Approved Au Sable Institute** courses	4

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* COURSES TYPICALLY NEEDED FOR THE MCAT OR MEDICAL SCHOOL RÉSUMÉ
 ** SEE RELATED INFORMATION ON PAGES 21–22 AND 38–39

BIOLOGY & BIOCHEMISTRY

Biology Minor 16 cr

Required Courses: BIO1011, BIO1012; BIO2113; 4 credits selected from courses with BIO prefix numbered 3000 or higher.

Chemistry Minor 17–18 cr

Required Courses: CHE1021, 1022, 3101; one course selected from CHE3102, 3321, BIO3231, 3232.

Environmental Science Minor 16 cr

Required Courses: BIO2113, 3175, SCI1010; 4 credits selected from BIO2015, 2116, 3215, 3276, 3277, approved topics courses, or faculty-approved courses from Au Sable Institute.*

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Science Minor 16 cr

- **16 credits** in courses with BIO, CHE, or PHY prefixes (must include courses from at least two disciplines)

Science and Theology Minor 20 cr

- **Two courses (8 credits)** with BIO, CHE, PHY, or SCI prefix
- **8 credits selected from** BIA/BIB prefix (2–4 credits); BIO4841 (2–4 cr); BIO4995 (2–4 credits); PHI3035; PHI3805 (Topics); SCI1008; one additional BIO-, CHE-, PHY-, or SCI-prefix course (4 credits)
- **SCI3037**

Environmental Science and Business Major Bachelor of Science

The Environmental Science and Business major is designed to prepare students for a career in environmental resource management in an organization that is focused on this industry or in a business that wants to apply environmental concerns to its business practices. The program combines the application of economics and business to issues associated with the environment and the use of natural resources. Graduates can pursue jobs in management, advocacy, marketing, and consulting. Students have the choice of a General Business track or a Marketing track. The degree is granted upon completion of credits specified on pages 46–47 (40 credits must be in 3000- or 4000-level courses).

- **Social Science** courses in core curriculum: ECO2211 and 2212.
- **Natural World** course in core curriculum: MAT2035 or 2055 and CHE1021.
- **Spiritual Formation and Integration Selectives** requirement in core curriculum: BUS4435.

Required Courses26 cr

BIO2113	Principles of Biology III	4
BIO4835	Senior Seminar [OCE, WCE]	2
SCI1010	Environmental Science	4
Au Sable Institute* course:		
ASI3040	International Development and Environmental Sustainability	4
Select 4–8 credits from the following:		
BIO3175	Ecology	4
BIO3277	Conservation Biology	4
Select 4–8 credits from the following:		
BIO2015	Sustainable Urban Agriculture	4
BIO3276	Field Biology	4
Approved BIO/SCI topics courses 4		
Au Sable Institute* courses:		
ASI3010	Land Resources	4
ASI3030	Ecological Agriculture	4
ASI3430	Sustainability, Tropical Agriculture and Missions	4
ASI4710	Conservation Biology	4
ASI4820	Restoration Ecology	4

Track21–24 cr

Select from General Business or Marketing. Requirements are listed below.

General Business Track (22–24 cr)

ACC2101	Principles of Financial Accounting	4
BUS1115	Introduction to Spreadsheets	2
BUS3835	Professional Experience Seminar	2
BUS4435	Business Ethics (SEE SPIRITUAL FORMATION AND INTEGRATION SELECTIVES REQUIREMENT ABOVE)	
ECO2211	Introduction to Economics (SEE SOCIAL SCIENCE REQUIREMENT ABOVE)	
ECO2212	Principles of Macroeconomics (SEE SOCIAL SCIENCE REQUIREMENT ABOVE)	
FIN2221	Finance I	2
MGT2271	Management	4
MGT3075	Entrepreneurship	2
MKT1085	Principles of Marketing	4
Select one of the following:		
BUS3235	International Business	4
BUS3331	Business Law - Contract and Agency	3
MGT3276	Operations Management	2
MGT4267	Project Management	2
MKT3186	Consumer Behavior and Research	4
MKT3188	Advertising and Promotion	4

Marketing Track (21 cr)

BUS3331	Business Law - Contract and Agency	3
BUS3835	Professional Experience Seminar	2
BUS4435	Business Ethics (SEE SPIRITUAL FORMATION AND INTEGRATION SELECTIVES REQUIREMENT ABOVE)	
ECO2211	Introduction to Economics (SEE SOCIAL SCIENCE REQUIREMENT ABOVE)	
ECO2212	Principles of Macroeconomics (SEE SOCIAL SCIENCE REQUIREMENT ABOVE)	
MKT1085	Principles of Marketing	4
MKT3165	Digital Marketing	4
MKT3186	Consumer Behavior and Research	4
MKT3188	Advertising and Promotion	4

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BIOLOGY & BIOCHEMISTRY

Health Sciences Major Bachelor of Science

The Health Sciences major is primarily intended for students who intend to pursue the Masters in Nursing, Masters in Physician Assistant, Doctor of Physical Therapy, Masters in Nutrition, Masters in Public Health, etc. The degree is granted upon completion of credits specified on pages 46–47 (40 credits must be in 3000- or 4000-level courses).

- **Social Science** course in core curriculum: SOC1035.
- **Natural World** courses in core curriculum: BIO1011 and MAT1085 or 2055.
- **Theological Philosophy Selectives or Spiritual Formation and Integration Selectives** course in core curriculum: PHI2016 (TRANSFER STUDENTS UNABLE TO COUNT PHI2016 FOR SPIRITUAL FORMATION AND INTEGRATION SELECTIVES MUST TAKE IT AS AN ADDED COURSE.)
- **Health Sciences majors** must receive a C- or better in all prerequisite courses. In addition, Health Sciences majors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, HPE, and HSC prefixes in order to graduate.

Required Courses 45–46 cr

BIO1025	Medical Terminology	2
BIO3145	Microbiology	4
BIO3157	Human Anatomy	4
BIO3158	Human Physiology	4
BIO3159	Pathophysiology	3
CHE1021	Principles of Chemistry I	4
CHE1022	Principles of Chemistry II or	
CHE3101	Organic Chemistry I	4–5
HPE3006	Human Nutrition	4
HSC4835	Senior Seminar for the Health Sciences [OCE, WCE]	2
HSC4995	Health Sciences Internship	2
PSY1005	Introduction to Psychology	4
PSY2108	Lifespan Psychology	4
PSY3207	Abnormal Psychology	4

Work experience as a Certified Nursing Assistant is highly recommended.

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Beta Beta Beta Biological Society

This prestigious National Biology Honors Society exists to provide educational and service opportunities to biology students. Membership is based upon sophomore class standing and earned GPA. Members plan and participate in society-sponsored activities such as guest speakers, career round-table discussions, field trips, research presentations, community service, and social gatherings.