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 48–49 (40 credits must be successfully completed in 3000- or 4000-level courses).

Cellular and Molecular Biology Track (49–51 cr)

- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L; mathematics course MAT2055 or higher.
- **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 . . . . . 19 cr

BIO1011/1011L	Principles of Biology I	4
BIO1012	Principles of Biology II	4
BIO2113/2113L	Principles of Biology III	4
BIO4835	Senior Seminar **[OCE, WCE]**	2
CHE3101/3101L	Organic Chemistry I	5

Required Courses . . . . . 26–27 cr

BIO3145/3145L	Microbiology	4
BIO3246/3246L	Genetics	5
BIO3347	Cell Physiology **or**	
BIO3348/3348L	Cell Biology	4–5
CHE1022/1022L	Principles of Chemistry II	4
CHE3102/3102L	Organic Chemistry II	5
PHY1101/1101L	Fundamentals of Physics I **or**	
PHY1201/1201L	Engineering Physics I	4

Selectives . . . . . 4–5 cr

BIO3157/3157L	Human Anatomy	4
BIO3158/3158L	Human Physiology	4
BIO3231/3231L	Biochemistry I	5
BIO3232	Biochemistry II	4
BIO3236	Immunology	4
BIO4355	Developmental Biology	4
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
Au Sable Institute* courses

Students are strongly encouraged to take additional BIO, MAT, PHY, or CHE courses to count towards the general elective requirements and gain experience through research or internship opportunities.

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SEE PAGE 50 FOR EXPLANATION AND PREREQUISITES.

* SEE RELATED INFORMATION ON PAGES 20, 37–38

Environmental Biology Track (49 cr)

- **Theological Philosophy** course in core curriculum: PHI2016.
- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L; mathematics course MAT2055 or higher.
- **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 . . . . . 19 cr

BIO1011/1011L	Principles of Biology I	4
BIO1012	Principles of Biology II	4
BIO2113/2113L	Principles of Biology III	4
BIO4835	Senior Seminar **[OCE, WCE]**	2
CHE3101/3101L	Organic Chemistry I	5

Required Courses . . . . . 20 cr

ASI3300	Geographic Information Systems **or**	
ASI3620	Environmental Applications for Geographic Information Systems	4
BIO2016	Our Changing Climate	2
BIO3017	Analysis of Vegetative Communities Lab.	2
BIO3175/3175L	Ecology	4
BIO3277/3277L	Conservation Biology	4
CHE1022/1022L	Principles of Chemistry II **or**	
ASI3320	Environmental Chemistry*	4

Selectives . . . . . 10 cr

BIO2015	Sustainable Urban Agriculture	2
BIO2116/2116L	Animal Biology	4
BIO3015/3015L	Field Ornithology	4
BIO3145/3145L	Microbiology	4
BIO3215/3215L	Plant Biology	4
BIO3246/3246L	Genetics	5
BIO4841/CHE4841	Research/Chemistry Research	1–4
BIO4995	Biology Internship	1–4
Au Sable Institute* courses		4–12

Students are strongly encouraged to take additional BIO, MAT, PHY or CHE courses to count towards the general elective requirements and gain experience through research or internship opportunities.

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General Biology Track (50 cr)

- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L; mathematics course MAT2055 or higher.
- **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 . . . . . 19 cr

BIO1011/1011L	Principles of Biology I 4
BIO1012	Principles of Biology II 4
BIO2113/2113L	Principles of Biology III 4
BIO4835	Senior Seminar **[OCE, WCE]** 2
CHE3101/3101L	Organic Chemistry I 5

Required Courses . . . . . 9 cr

BIO3246/3246L	Genetics 5
PHY1101/1101L	Fundamentals of Physics I **or**
PHY1201/1201L	Engineering Physics I 4

Biology Electives . . . . . 22 cr

BIO1025	Medical Terminology 2
BIO2015	Sustainable Urban Agriculture 2
BIO2116/2116L	Animal Biology 4
BIO2825/2825L	Honors Topics in Biology . . . . . 2 or 4
BIOX805	Topics in Biology 2–4
BIO3015/3015L	Field Ornithology 4
BIO3145/3145L	Microbiology 4
BIO3157/3157L	Human Anatomy 4
BIO3158/3158L	Human Physiology 4
BIO3159	Pathophysiology 4
BIO3175/3175L	Ecology 4
BIO3231/3231L	Biochemistry I 5
BIO3232	Biochemistry II 4
BIO3236	Immunology 4
BIO3276/3276L	Field Biology 4
BIO3277/3277L	Conservation Biology 4
BIO3347	Cell Physiology 4
BIO3348/3348L	Cell Biology 5
BIO4355	Developmental Biology 4
BIO4841/CHE4841	Research/Chemistry Research 1–4
Au Sable Institute* courses	 4–8
Additional BIO-prefix courses numbered 2116 or higher	
MAT-prefix courses numbered 2055 or higher	

Students are strongly encouraged to take additional BIO, MAT, PHY or CHE courses to count towards the general elective requirements and gain experience through research or internship opportunities.

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Pre-Medical/Pre-Professional Biology Track (56–58 cr)

- **Theological Philosophy** course in core curriculum: PHI2016.
- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L*; mathematics course MAT2055 or higher.
- **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 . . . . . 19 cr

BIO1011/1011L	Principles of Biology I* 4
BIO1012	Principles of Biology II 4
BIO2113/2113L	Principles of Biology III 4
BIO4835	Senior Seminar **[OCE, WCE]** 2
CHE3101/3101L	Organic Chemistry I* 5

Required Courses . . . . . 27 cr

BIO3231/3231L	Biochemistry I* 5
BIO3246/3246L	Genetics 5
CHE1022/1022L	Principles of Chemistry II* 4
CHE3102/3102L	Organic Chemistry II* 5
PHY1101/1101L	Fundamentals of Physics I* **or**
PHY1201/1201L	Engineering Physics I* 4
PHY1102/1102L	Fundamentals of Physics II* **or**
PHY1202/1202L	Engineering Physics II* 4

Selectives . . . . . 10–12 cr

BIO1025	Medical Terminology 2
BIO2116/2116L	Animal Biology 4
BIO3145/3145L	Microbiology 4
BIO3157/3157L	Human Anatomy* 4
BIO3158/3158L	Human Physiology* 4
BIO3159	Pathophysiology 4
BIO3236	Immunology 4
BIO3347	Cell Physiology 4
BIO3348/3348L	Cell Biology 5
BIO4355	Developmental Biology 4
BIO4841/CHE4841	Research*/Chemistry Research* 1–4
BIO4995	Biology Internship 1–4
Au Sable Institute** courses	 4

Students are strongly recommended to have a GPA of 3.5 or higher in order to be competitive for professional programs. Students are strongly encouraged to take additional BIO courses and PSY1005, 2108, and SOC1035 to count towards the 16 credits in the enhanced curriculum (free electives) needed for the total of 125 credits for the degree program. Courses should be selected based in part on material covered in entrance exams and requirements for the student's desired professional program. Additionally, students should gain experience through research or internship opportunities.

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* COURSES TYPICALLY NEEDED FOR THE MCAT OR MEDICAL SCHOOL RÉSUMÉ
** SEE RELATED INFORMATION ON PAGES 20, 37–38

Biology Minor . . . . . 16 cr

Required Courses: BIO1011/1011L, BIO1012; BIO2113/2113L; 4 credits selected from courses with BIO prefix numbered 3000 or higher.

Chemistry Minor . . . . . 17–18 cr

Required Courses: CHE1021/1021L, 1022/1022L, 3101/3101L; one course selected from CHE3102/3102L, 3321, BIO3231/3231L, 3232.

Environmental Science Minor . . . . . 16 cr

Required Courses: BIO2113/2113L, 3175/3175L, SCI1010/1010L; 4 credits selected from 2116/2116L, 3276/3276L, 3277/3277L, approved topics courses, or department chair-approved courses from Au Sable Institute.*

*SEE RELATED INFORMATION ON PAGES 20, 37–38

Science Minor . . . . . 16 cr

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

Science and Theology Minor . . . . . 20 cr

Required Courses:

- 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); SCI1008/1008L; one additional BIO-, CHE-, PHY-, or SCI-prefix course (4 credits)
- SCI3037