



DIVISION *of* NATURAL SCIENCES

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Biology
Chemistry
Computational Physics
Engineering

Environmental Biology
Physics
Pre-Medicine
Science Education

The goals of this division are that students shall possess:

- ① Knowledge of basic scientific concepts.
 - ② Skill in the use of problem-solving techniques in natural science.
 - ③ Skill in the use of resource materials and equipment in natural science.
 - ④ A broadened appreciation of life, based on an increased awareness of God's creation and man's scientific achievements.
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NATURAL SCIENCES

Biology Major

This major is designed to prepare students for further studies in medicine, cellular and molecular biology, biological laboratory sciences, physical therapy, veterinary medicine and occupational therapy. Students interested in these programs typically complete a baccalaureate degree prior to admittance into a professional school or graduate school.

			HOURS
General Studies			
BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	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
PHED	112-136	Physical Education Activities	1.5
MATH	131	Calculus I, or	3
MATH	124	Applied Calculus	(3)
CHEM	163	General Chemistry I	4
			<u>55</u>
Major			
NS	110	Environmental Science	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	214	Anatomy & Physiology I	4
BIOL	215	Anatomy & Physiology II	4
BIOL	308	Cell Biology	4
BIOL	309	Genetics	4
BIOL	312	Microbiology	4
BIOL	410	Molecular Biology	4
			<u>36</u>
Required Cognates			
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4
CHEM	262	Organic Chemistry II	4
PHYS	121	General Physics I	4
MATH	111	Basic Probability & Statistics	3
NS	333	Scientific Research Methods	3
			<u>22</u>
Electives needed to complete the degree			11

Biology Minor

NS	110	Environmental Science	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	308	Cell Biology	4
BIOL	309	Genetics	4
CHEM	163	General Chemistry I	4
			<u>24</u>

Biology Education Minor

			HOURS
NS	110	Environmental Science	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	308	Cell Biology	4
BIOL	309	Genetics	4
CHEM	163	General Chemistry I	4
SCED	443	Methods in Science	<u>2</u>
			26

Environmental Biology Major

This program is designed to educate biologists in the area of the environmental sciences especially as related to organismal or field biology. This should prepare them for careers in wildlife ecology, environmental consulting, land use planning, government agencies, missionary fieldwork as related to sustainable development and general environmental stewardship. The program emphasizes hands-on fieldwork, biodiversity approaches to environmental concerns and integration of a biblical basis for creation with sound scientific principles. The Environmental Biology major operates in partnership with Au Sable Institute in Michigan. It requires that the student take at least 2 courses during the summer semester at one of the Au Sable campuses.

General Studies

BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	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
PHED	112-136	Physical Education Activities	1.5
MATH	131	Calculus I, or	3
MATH	124	Applied Calculus	(3)
CHEM	163	General Chemistry I	<u>4</u>
			55

Major

NS	110	Environmental Science	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	411	Comparative Vertebrate Anatomy	4
BIOL	330	Biodiversity	3
BIOL	313	Ecology	4
BIOL	309	Genetics	4
BIOL	420	Mammalogy	4
Au Sable		Ornithology	4
Au Sable		Field Botany	<u>4</u>
			39

Required Cognates

CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4

NATURAL SCIENCES

			HOURS
NS	291	Physical World, or	4
PHYS	121	General Physics I	(4)
MATH	111	Basic Probability & Statistics	3
NS	333	Scientific Research Methods	<u>3</u>
			18
		Electives needed to complete the degree	12

Environmental Biology Minor

BIOL	313	Ecology	4
BIOL	330	Biodiversity	3
NS	110	Environmental Science	4
BIOL	210	Zoology	4
BIOL	211	Botany	<u>4</u>
			19

Environmental Biology Education Minor

Completion of the 19 hours required for the Environmental Biology minor, plus:
 SCED 443 Methods in Science 2

Chemistry Major A.A. Degree

General Studies

THEO	110	Exploring the Christian Faith	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	3
BIBL	216	New Testament Literature, or	3
BIBL	215	Old Testament Literature	(3)
		Mathematics/Science with Lab	3
		Music/Art/Literature/Drama	3
PHED	112-136	Physical Education Activities	0.5
PHIL	150	Logic & Critical Thinking	<u>2</u>
			28

Major

CHEM	163-164	General Chemistry I & II	8
CHEM	261-262	Organic Chemistry I & II	8
CHEM	280	Analytical Chemistry	4
CHEM	362	General Biochemistry	4
PHYS	121-122	General Physics I & II	8
MATH	131	Calculus I	<u>3</u>
			35

Chemistry Major

This major is designed to prepare students for further studies or for careers in the field. The B.A. in chemistry is the common "working degree," and graduates are ready for employment in the chemical industry, both locally and nationally. Students going on for additional study would be able to pursue medicine, dentistry or research or academic work in chemistry or biochemistry.

General Studies

BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3

NATURAL SCIENCES

			HOURS
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	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
PHED	112-136	Physical Education Activities	<u>1.5</u>
			48

Major

CHEM	163	General Chemistry I	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	461	Physical Chemistry I	4
NS	333	Scientific Research Methods	3
PHYS	121	General Physics I	4
PHYS	122	General Physics II	4
MATH	131	Calculus I	3
MATH	132	Calculus II	4

Choose two from the following: 8

CHEM	360	Intermediate Inorganic Chemistry	(4)
CHEM	362	General Biochemistry	(4)
PHYS	301	Quantum Physics	(4)

Choose six hours from the following: 6

BADM	122	Business Ethics	(3)
BADM	321	Principles of Management	(3)
BADM	322	Principles of Marketing	(4)
CAPP	227	Introduction to Spreadsheet & Database	(3)
MATH	231 or 252	Calculus III or Statistics	(3)
CHEM	360 or 362 or PHYS 301—whichever was not taken to fulfill major requirements above		(4)

56

Electives needed to complete the degree 20

Chemistry Minor

CHEM	163-164	General Chemistry I & II	8
CHEM	261	Organic Chemistry I	4

Choose two from the following:

CHEM	280	Analytical Chemistry	4
CHEM	262	Organic Chemistry II	4
CHEM	362	General Biochemistry	(4)
CHEM	461	Physical Chemistry I	(4)

20

Chemistry Education Minor

CHEM	163-164	General Chemistry I & II	8
CHEM	261-262	Organic Chemistry	4

Choose two from the following:

CHEM	280	Analytical Chemistry	4
CHEM	262	Organic Chemistry II	4

NATURAL SCIENCES

			HOURS
CHEM	362	General Biochemistry	(4)
CHEM	461	Physical Chemistry I	(4)
			<u>20</u>
SCED	443	Methods in Science	<u>2</u>
			<u>22</u>

Computational Physics

This major is run cooperatively with the Division of Mathematics and Computer Sciences and is cross-listed under both divisions.

General Studies

BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	3
BIBL	216	New Testament Literature	3
		Foreign Language (two semesters)	6
		History	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
PHED	112-136	Activity Courses (3)	<u>1.5</u>
			48

Major

PHYS	121	General Physics I	4
PHYS	122	General Physics II	4
PHYS	211	Electronics	4
PHYS	225	Statics	3
PHYS	226	Dynamics	3
PHYS	301	Quantum Physics	4
PHYS	332	Waves & Optics	4
PHYS	344	Electricity & Magnetism	4
CPSC	121	Computer Programming I	3
CPSC	122	Computer Programming II	3
MATH	131	Calculus I	4
MATH	132	Calculus II	4
MATH	231	Calculus III	4
MATH	232	Differential Equations	3

* MATH/CS/PHYSICS Electives:
(at the level of 200 or above): 6
57

Electives needed to complete the degree 19
124

* Upper level physics courses in digital electronics, statistical mechanics, analytical mechanics, quantum mechanics and astrophysics are available through the NICE consortium at nearby colleges.

Engineering Major Combination Program—B.S. in Math/Physics

This program is run cooperatively with the Division of Mathematics and Computer Sciences and is cross-listed under both divisions. Please see page 123 for the complete curriculum requirements.

Physics Minor

			HOURS
PHYS	121	General Physics I	4
PHYS	122	General Physics II	4
PHYS	211	Electronics	4
PHYS	301	Quantum Physics	4
PHYS		Elective in Physics	<u>4</u>
			20

Physics Education Minor

PHYS	121	General Physics I	4
PHYS	122	General Physics II	4
PHYS	211	Electronics	4
PHYS	301	Quantum Physics	4
PHYS		Elective in Physics	4
SCED	443	Methods in Science	<u>2</u>
			22

Pre-Medicine Major

This program is designed to meet the entrance requirements for professional schools such as medical, dental, physical therapy and veterinary schools. The courses in this major are specifically chosen to prepare students for the MCAT (Medical Colleges Admissions Test), to allow flexibility in additional training in the sciences, and to allow students to take helpful courses in non-science disciplines. Students are advised to include anatomy—either Comparative Vertebrate Anatomy or Human Anatomy & Physiology I & II.

It should be noted that only a small percentage of students going to medical schools take a “pre-med” major. With this in mind, students are encouraged to also consider majors such as Biology or Chemistry (or a number of other fields), as there are more common ways to train for entrance into these types of professional programs. [Minimal requirements for most medical schools are 1 year of Biology, 1 year of General Chemistry, 1 year of Organic Chemistry and 1 year of Physics (some also require a year of calculus)].

General Studies

BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	3
BIBL	216	New Testament Literature	3
		Foreign Language	6
		History Elective	3
		Art/Drama/Music	3
MATH	111	Basic Probability & Statistics	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

NATURAL SCIENCES

			HOURS
PHED	112-136	Physical Education Activities	<u>1.5</u>
			51
Major			
BIOL	210	Zoology	4
BIOL	308	Cell Biology	4
CHEM	163, 164	General Chemistry I & II	8
CHEM	261, 262	Organic Chemistry I & II	8
MATH	131	Calculus I	3
PHYS	121, 122	General Physics I & II	8
Electives chosen from:			24
BIOL courses – 200 level or above,			
CHEM courses – 200 level or above,			
PHYS courses – 200 level or above,			
NS 333, MATH 132			
			<u>59</u>
Electives needed to complete the degree			14

Science Education (with Life Sciences and Physical Sciences Options)

General Studies			
BIBL	215	Old Testament Literature	3
COMM	171	Speech Communication	3
ENGL	101	Written Communication II	3
ENGL	102	Written Communication III	3
PSYC	180	College Orientation	1
PSYC	182	General Psychology	3
PHED	100	Lifelong Physical Awareness	0.5
SOC	151	Principles of Sociology	3
BIBL	216	New Testament Literature	3
		Foreign Language (two semesters)	6
HIST	246	Introduction to World Civilization	3
LIT		Literature	3
FA	170	Perspectives in Fine Arts	3
MATH	111	Basic Probability & Statistics	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
PHED	112-136	Physical Education Activities	<u>1.5</u>
			51
Science Core			
NS	251	Astronomy	4
CHEM	163	General Chemistry I	4
PHYS	121	General Physics I	4
MATH	131/124	Calculus I or Applied Calculus	3
NS	110	Environmental Science	4
BIOL	214	Human Anatomy & Physiology I, or	4
BIOL	308	Cell Biology	<u>(4)</u>
			23
Select either Physical or Life Sciences Option			
Physical Sciences Option			
CHEM	164	General Chemistry II	4
MATH	132	Calculus II	4
PHYS	122	General Physics II	4
CHEM	261	Organic Chemistry I	4
CHEM	280	Analytical Chemistry	4
PHYS	301	Quantum Physics	4
Elective		CHEM/PHYS 200+	<u>4</u>
			28

			HOURS
Life Sciences Option			
CHEM	164	General Chemistry II	4
CHEM	261	Organic Chemistry I	4
BIOL	210	Zoology	4
BIOL	211	Botany	4
BIOL	309	Genetics	4
BIOL	214 or 308	A&P I or Cell Biology (beyond Core)	4
Elective		BIOL 200+	<u>4</u>
			28
Professional Education			
EDUC	102	Foundations of Education	3
EDUC	204	Diversity in the Classroom	3
EDUC	205	Educational Pedagogy I	3
EDUC	305	Educational Pedagogy II	3
PSYC	285	Adolescent Growth & Development	2
SCED	443	Specific Methods in Science	2
SCED	448	Developmental Reading	3
SCED	449	Secondary Student Teaching	<u>8</u>
			27
Total hours in major			129

Note: See Teacher Education (page 56) for program admission and other information.

Note: All prerequisites listed for Natural Science courses must be completed at a level of C- or better.

Biology (BIOL)

Unless noted, all four-credit science classes consist of three hours of lecture and a three-hour lab each week.

115. Human Biology 4 Hours

This is a one-semester course in human anatomy and physiology prepared especially for sociology, psychology, education and general studies majors. The major functioning organ systems of the body are reviewed with full integration of physiological aspects with anatomy. Those wishing to major in Biology or the medical fields should not take this class.

210. Zoology 4 Hours

An introductory survey of all animal forms from the most primitive single-celled organisms through the most complex mammals. Laboratory exercises focus on the comparative anatomy of organisms and organ systems surveyed throughout the animal phyla. Emphasis placed on taxonomy, structure, physiology and the natural history and ecology of the animals. Animals that have important economic or health impact on humans are highlighted.

Prerequisite: A college level course in science.

211. Botany 4 Hours

An introductory survey of all plant and fungi, from the most primitive single-celled organisms, through the most complex seed plants. Laboratory exercises focus on the comparative anatomy of organisms and plant physiology as surveyed through the plant and fungi divisions. Emphasis is placed on taxonomy, structure, physiology and the natural history and ecology of plants and fungus. Plants and fungus that have important economic or health impact on humans are highlighted.

Prerequisite: A college level course in science.

214. Human Anatomy & Physiology I 4 Hours

This is the first semester of a two-semester course. This first part provides a general introduction to the human body. The chemical, cellular, tissue and organ structure and function of the

human body is followed by a more detailed exploration of the integumentary, osseous, muscular and nervous systems.

Recommended: A course in Chemistry before this class.

215. Human Anatomy & Physiology II 4 Hours

This course is the second of a two-part series which provides an introduction to the anatomy and physiology of the human body. A detailed introduction to the endocrine, cardiovascular, respiratory, digestive, nervous, urinary and reproductive systems are given.

Prerequisite: BIOL 214, or consent of the instructor.

308. Cell Biology 4 Hours

An examination of elementary chemistry and organic chemistry as it applies to cell function, structure and morphology. Laboratory emphasis will center on cell structure and function by the use of microscope slides, audiovisual aids and physiological exercises.

Prerequisites: CHEM 163, 164.

309. Genetics 4 Hours

A study of basic genetic principles including Mendelian genetics, population genetics, DNA replication and principles of inheritance.

Prerequisite: A college level course in biology or chemistry.

312. Microbiology 4 Hours

The fundamental principles of the morphology and physiology of microorganisms are studied. Laboratory studies stress sterile techniques, identification and staining methods.

Prerequisite: A college course in biology and chemistry.

313. Ecology 4 Hours

A general study of the relationship of living organisms to environment, and the structural and functional properties of nature. Topics covered include population and community ecology, ecosystem management, biodiversity, competition and predation.

Prerequisites: BIOL 210 and 211, or consent of instructor.

Recommended: MATH 111.

330. Biodiversity 3 Hours

This course focuses on the preservation and restoration of our natural environments through modern conservation

theories of biological diversity. Major topics covered are: conservation biology, species preservation and conservation, habitat fragmentation, conservation reserves, global biodiversity, the role of genetics in conservation biology, ecological restoration, ecology, politics and environment and sustainable development.

410. Molecular Biology 4 Hours

The structure and function of nucleic acids including their role in replication and protein synthesis. Laboratory work will involve techniques associated with recombinant DNA technology. Includes a lab experience.

Prerequisite: BIOL 308 and a college level course in chemistry.

411. Comparative Vertebrate Anatomy 4 Hours

A comparative study of vertebrate systems and organs, using representatives of the classes for laboratory study. The course will cover the basic organ systems as represented throughout the vertebrates and compare differences within and among major classification schemes. Laboratory work will combine comparative morphology with physiology to promote an understanding of biological aspects of development.

Prerequisite: BIOL 210.

412. Developmental Biology 4 Hours

A study of the vertebrate embryo and its morphogenesis from fertilization to the development of organ systems. Lab work will focus on identification of developmental pathways for organ systems, histological slide preparation and understanding the growth of the vertebrate from the single cell stage to the adult organism.

Prerequisite: BIOL 210.

413. Independent Study in Biology 1-2 Hours

An opportunity to engage in independent study and research. A paper is required as evidence of accomplishment. May be repeated for credit.

Prerequisite: BIOL 210 or 211.

414T. Seminar 0 Hours

420. Mammalogy 4 Hours

This course will cover the ecology, natural history, systematics and classification of the orders of mammals found throughout the world. Mammals will be studied from the aspect of comparative

biology with emphasis on morphology, ecology and behavior. Special emphasis will be given to those mammals found in the Indiana-Great Lakes region.

Prerequisite: BIOL 210.

430. Histology 4 Hours

Students will be required to produce a set of plant and animal tissue slides, along with appropriate lectures concerning techniques, stains and reagents. This course will reinforce all the concepts learned in other biology courses concerning cells and cell structures and is a hands-on laboratory experience in cell preparation.

Prerequisite: BIOL 308, 309.

Chemistry (CHEM)

110. Introduction to Chemistry 3 Hours

The basic principles of chemistry, including atomic structure, the periodic table, the gas laws, bonding, solutions, equilibrium, etc., in a nonlaboratory course.

Prerequisite: MATH 100 or math proficiency.

150. Introduction to General, Organic & Biochemistry 5 Hours

A survey of general, organic and biological chemistry designed for students in the nursing and related health professions. Four lectures and one three-hour laboratory each week.

Prerequisite: High school chemistry or adequate algebra skill or permission of instructor.

163. General Chemistry I 4 Hours

An introduction to fundamental concepts and tools of chemistry, to include atomic structure, stoichiometry, mechanical behavior of bulk matter thermodynamics and chemical bonding. This course is designed for science and engineering majors. Lecture and laboratory.

164. General Chemistry II 4 Hours

A continuation of the introduction to fundamental concepts and tools of chemistry, to include equilibrium, kinetics, thermodynamics and electrochemistry. This course is designed for science and engineering majors. Lecture and laboratory.

261. Organic Chemistry I 4 Hours

A systematic study of the chemistry of carbon and compounds and their derivatives. Three lectures and one three-hour laboratory period each week.

- Prerequisite:** CHEM 163, 164.
- 262. Organic Chemistry II** **4 Hours**
A continuation of Organic Chemistry I, with some emphasis given to the place of organic compounds in living organisms. Three lectures and one three-hour laboratory period each week.
Prerequisite: CHEM 261.
- 280. Analytical Chemistry** **4 Hours**
A blend of the traditional quantitative analysis and instrumental analysis. Subjects covered include the treatment of analytical data, gravimetry, spectrophotometry, titrimetry, oxidation-reduction procedures of analysis, chromatography and others. Three lectures and one three-hour laboratory per week.
Prerequisite: CHEM 164.
- 360. Intermediate Inorganic Chemistry** **4 Hours**
A study of the structure, properties, reactions and identification of inorganic ions and molecules. Lecture and laboratory.
Prerequisite: CHEM 164. (Offered on demand)
- 362. General Biochemistry** **4 Hours**
An introduction to the major groups of biochemical molecules, the catabolic processes which derive energy from them and the anabolic processes which produce them. Special attention is given to basic metabolic cycles and pathways (glycolysis, the TCA cycle, electron transport and oxidation phosphorylation) and to carbohydrate, lipid, protein and nucleic acid biosynthesis. These processes are related to cells and cellular substructure. Three lectures and one three-hour laboratory period each week.
Prerequisite: CHEM 262.
- 461. Physical Chemistry I** **4 Hours**
A study of the fundamental laws of chemistry, emphasizing a more mathematical and thorough approach than prior courses. Topics of study include gas laws, thermodynamics, phase equilibria and kinetic theory. Three lectures and one three-hour laboratory each week.
Prerequisites: CHEM 163, 164, PHYS 122, MATH 132.
- 463. Physical Chemistry II** **4 Hours**
Same course as PHYS 301. Course description on page 143.

- 465. Independent Study in Chemistry** **1-2 Hours**
An opportunity for a chemistry major to engage in independent study and research. A research paper is required as evidence of accomplishment. May be repeated for credit.

Natural Science (NS)

- 101. Natural Science Lab** **1 Hour**
A laboratory survey of various disciplines of the natural sciences, examining topics in the areas of biology, chemistry, physics and/or astronomy.
- 110. Environmental Science** **4 Hours**
This class is a basic introduction to the biological world through the interdisciplinary focus of Environmental Science. Topics to be addressed are: ecosystem and community ecology and management, biodiversity, pollution, energy conservation, species conservation, nature reserves and population dynamics.
- 200. Science & Faith Seminar** **1 Hour**
This seminar series is a special seminar for students and faculty to interact on a regular basis on issues of faith and science. Topics may vary from semester to semester; may be organized around particular themes, or be based on short-term assessment of the professional literature. May be repeated.
- 211. Nutrition ADN & BSN** **3 Hours**
A comprehensive study of the nutrients in food and how the body utilizes these to promote growth and wellness. Normal nutrition, nutrition throughout the life cycle and diet-oriented clinical nutrition units promote the student's knowledge and understanding of appropriate food-related behaviors. This course is oriented to the nursing and health-related major.
Prerequisite: BIOL 215.
- 250. Survey of Astronomy** **3 Hours**
A survey of the characteristics, composition and structure of the extraterrestrial universe, with emphasis on the physical laws which govern its behavior. Current space projects are discussed. No lab (this course does not meet lab-based general studies requirements).
- 251. Astronomy** **4 Hours**
A study of the characteristics, composition and structure of the extraterrestrial universe, with emphasis on the physical

laws which govern its behavior. Current space projects are discussed. Three lectures and several hours of laboratory and observations each week.

291. Physical World 4 Hours

This course serves to acquaint primarily nonscientists with basic scientific principles governing our world, how new understanding is gained through the process of the scientific method, and several key contributions of outstanding scientists in the areas of motion, heat, sound, electricity, light, atoms, nuclei, chemistry, geology and of the entire universe. Basic algebra is assumed and some quantitative problem solving is included. Emphasis is placed on responsible use of physical resources and how our worldview is influenced by discoveries in physical science.

333. Scientific Research Methods 3 Hours

This course will be a combination of four main themes: (1) technical and scientific writing; (2) introduction to research methods, journals and procedures; (3) review of the recent scientific research in their major area of interest; and (4) covering strategies to be successful during college and after leaving (preparing resumes, GRE, looking for graduate schools, job hunting, etc.) The student will be expected to produce both written and oral research reports.

Prerequisite: Permission of the department faculty.

Physics (PHYS)

121. General Physics I 4 Hours

A calculus-based introductory physics course, covering Newtonian mechanics of particles, conservation laws, rigid bodies and rotation, oscillations, waves, sound, heat and thermodynamics. Three lectures and one three-hour laboratory each week.

Prerequisites: MATH 131.

122. General Physics II 4 Hours

Electrostatics, electric circuits, magnetism, induction, physical and geometrical optics. Three lectures and one three-hour laboratory each week.

Prerequisites: MATH 131, PHYS 121.

211. Electronics 4 Hours

An introduction to electricity and electronics, both from a basic theoretical viewpoint and from a practical, hands-on perspective, to include the analysis of DC and AC circuits using resistors, capacitors, inductors and semiconductor devices such as diodes, transistors and operational amplifiers. Lab exercises involve circuit modeling and electrical measurements. Three lectures and one two-hour laboratory each week.

Prerequisite: A background in algebra.

225. Statics 3 Hours

Equilibrium of coplanar and noncoplanar force systems, analysis of forces in rigid systems, friction, centroids and moments of inertia.

Prerequisites: MATH 132, PHYS 121.

226. Dynamics 3 Hours

Motion of particles; relative motion; kinetics of rotation, translation and motion in a plane; impulse-momentum; work and energy.

Prerequisites: MATH 132, PHYS 121.

301. Quantum Physics 4 Hours

Topics include special theory of relativity, introduction to quantum theory, the equation, atoms, nuclei and solid state. Three lectures and one three-hour laboratory per week.

Prerequisites: MATH 132, PHYS 122.

332. Waves & Optics 4 Hours

Geometrical optics, propagation of electromagnetic waves, physical optics, diffraction, interference, polarization, lasers and holography. Three lectures and one three-hour laboratory per week.

Prerequisites: MATH 231, PHYS 122.

344. Electricity & Magnetism 4 Hours

Electro and magnetostatics, Laplace's and Poisson's equations, boundary value problems, Maxwell's equations, radiation and multiple fields, electric and magnetic properties of matter.

Prerequisites: MATH 231, PHYS 122.

421. Independent Study in Physics 1-4 Hours