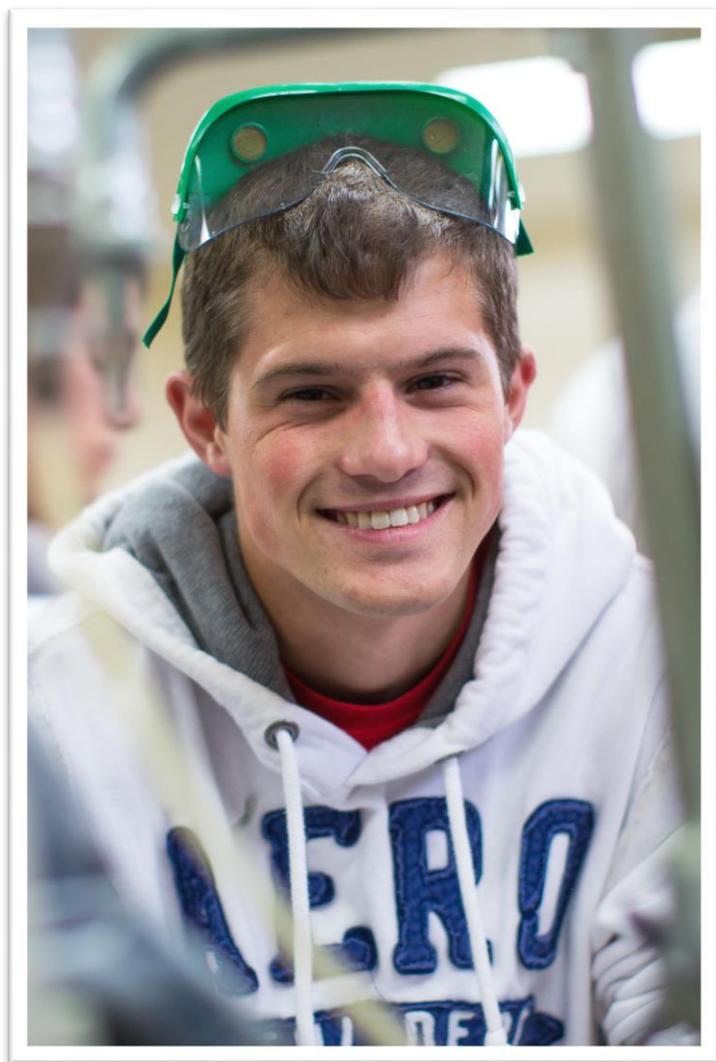


## Science and Mathematics Department



### Faculty

Chad A. Snyder, Ph.D.  
Department Chair  
Director of Chemical Research  
Physical Sciences Program Director

Nathan S. Bosch, Ph.D.  
Director, Lilly Center for Lakes & Streams  
Environmental Science Program Director

Kristin E. Farwell, Ph.D.  
Mathematics Program Director

Richard C. Roberts, Ph.D.  
Biology & Health Professions Program Director

Christina L. Walters, M.S.  
Exercise Science Program Director

Donald B. DeYoung, Ph.D.

Ryan T. Johnson, Ph.D.

Marcia V. Lee, D.V.M.

#### Part-time Faculty

Richard A. Dilling, Ph.D.

John Leopold, M.A.

Scott Moore, M.S.

Megan Neuhart, B.S.

Lisa Orn, D. O.

Lori Roberts, M.S.

Nicole Shipley, M.S.

## Science and Mathematics Department

Purpose Statement: This Department prepares majors for careers in the life/physical sciences and mathematics, equipping them for education, service, and research in technical fields. Both majors and non-majors are encouraged in their understanding, enjoyment, and stewardship of God's creation.

### Department Goals:

1. Character - Students value a positive, respectful attitude toward science and mathematics.
2. Competence - Students respect confident, unpretentious knowledge of their chosen major field.
3. Service - Students appreciate a heart of sharing.

The Science and Mathematics Department offers coursework and programs in the biological, environmental, mathematical, and physical sciences.

The following majors and minors are offered.

### Majors

Actuarial Sciences (B.S. or B.A.)  
Applied Physics (B.S.; dual degree with Engineering Program)  
Biology (B.S. or B.A.)  
Environmental Biology (B.S. or B.A.)  
Environmental Science (B.S. or B.A.)  
Environmental Studies (B.S. or B.A.)  
Exercise Science (B.S.)  
General Science (B.S. or B.A.)  
Health Science (B.S. or B.A.)  
Life Science Education (B.S. or B.A.)  
Mathematics (B.S. or B.A.)  
Mathematics Education—Secondary (B.S. or B.A.)  
Math and Computing (B.S. or B.A.)

### Minors

Applied Mathematics  
Biology  
Chemistry  
Environmental Science  
General Science  
Mathematics

These programs are designed to be a part of a liberal arts education at Grace College. Information on general education courses, applied learning, and cross cultural education requirements are described in the general Grace College catalog.

## STRENGTHS WITHIN THE SCIENCE AND MATHEMATICS DEPARTMENT

### Pre-professional preparation

The Biology and Health Professions program has considerable strength in biology and chemistry to prepare students for post-baccalaureate studies in science and medicine. This program includes pre-medicine, pre-dentistry, pre-pharmacy, pre-physical therapy, pre-physician assistant, pre-veterinary and others areas of medicine.

### Environmental Science

The Environmental Science program at Grace is committed to equipping future professionals in environmental fields with the skills, competence, experience, and stewardship ethic to excel in caring for God's creation. This program has been designed to emphasize hands-on, field-based learning in addition to classroom instruction.

### **Life Science Education**

The life science education major is designed for students who desire to teach science, particularly biology, at the high school level. This program prepares students in the mainstream areas of modern life science in preparation for a career in either public or private schools.

### **Mathematics Education**

The mathematics education major provides preparation for careers in high school and middle school mathematics teaching. The program begins with a series of required courses, after which students take electives depending on personal interests.

### **Mathematics**

The mathematics major equips students for technology, and graduate studies.

## **BIOLOGY AND HEALTH PROFESSIONS PROGRAM**

Biology is the study of the science of living organisms from the smallest bacterium to the largest of the great whales. The mission of the biology and health professions program at Grace College is to study and teach biology as a science from the perspective of individuals who believe that all life and life processes are a result of God's creation. We believe that the details of biological structure and function from the molecular to the grand anatomical level display the magnificent design of God the Creator. The key phrases of strengthening character, developing competence and preparing for service from the mission statement of Grace College drive the mission of the biology and health professions program. While the curriculum for the biology and health science majors is designed to give the student a strong background in the traditional areas of biology, there is parallel emphasis on molecular aspects since modern biology involves extensive study of the molecular and cellular level.

There are currently six degrees offered within the biology and health professions program: the Bachelor of Arts and Bachelor of Science in Biology, the Bachelor of Arts and Bachelor of Science in Health Science, and the Bachelor of Arts and the Bachelor of Science in Life Science Education. There is also a minor in biology for those students in other majors desiring biology to accompany their chosen major. Biology majors are required to minor in chemistry and to take supporting physics and math courses. The focus of the biology major at Grace is to prepare students for graduate work in many areas of biology including anatomy, biochemistry, botany, genetics, microbiology, physiology and zoology. This major also prepares students for a general career in an area of biological science, including laboratory work in medicine or chemistry, environmental careers, technical writing, pharmaceutical sales, or food science. Ecology and environmental biology have their own program of preparation at Grace.

The health science major is designed for the pre-professional preparation of students preparing credentials for admission into the professional programs of dentistry, medicine, optometry, pharmacy, physician assistant, physical therapy, veterinary medicine, and other health-related fields. (The biology major also meets the preparation requirements for many of these programs, although generally the biology major requires additional courses.) Students should meet with the health professions advisor as early as possible in their studies at Grace to increase the probability of effective and accurate course selection and to understand other facets of preparing to be a successful applicant to their chosen graduate health professions program.

## **MAJORS AND MINORS IN THE BIOLOGY AND HEALTH PROFESSIONS PROGRAM**

### **BIOLOGY MAJOR**

#### **Bachelor of Science and Bachelor of Arts**

The requirement for a degree in biology is 65-66 hours in biology and designated biology-related supporting courses, and includes a required minor in chemistry.

Required Science Courses (40 hours):

- BIO 1610/1620 General Biology I and Lab
- BIO 1710/1720 General Biology II and Lab
- BIO 2110/2120 General Ecology and Lab
- BIO 2310 Biochemistry
- BIO 3110 Cellular & Molecular Biology
- BIO 4210 Genetics
- BIO 4010 Senior Seminar
- CHM 1610/1620 General Chemistry I and Lab
- CHM 1710/1720 General Chemistry II and Lab
- CHM 2610/2620 Organic Chemistry I and Lab
- CHM 2710/2720 Organic Chemistry II and Lab

Students will also choose courses from among the following (15-16 hours):

- BIO 2410/2420 Plant Biology and Lab
- BIO 2510/2520 Animal Biology and Lab
- BIO 3210/3220 Advanced Anatomy & Physiology I and Lab
- BIO 3310/3320 Advanced Anatomy & Physiology II and Lab
- BIO 4110/4120 Microbiology and Lab
- PHY 2510/2520 General Physics I and Lab
- PHY 2610/2620 General Physics II and Lab
- MAT 1230/1240 Calculus I and Lab
- MAT 3200 Probability and Statistics

Other Electives (10 hours):

Choose 10 credits from approved BIO/ENV/SCI/EXS courses, at least one of which must include a lab.

### **HEALTH SCIENCE MAJOR**

#### **Bachelor of Science and Bachelor of Arts**

The requirement for a degree in health science varies, with the core major requiring 48-49 credits, and the concentrations adding 8-18 credits. A minor is not required, but many concentrations include a minor in chemistry.

Required Science Courses (33 hours):

- BIO 1610/1620 General Biology I and Lab
- BIO 1710/1720 General Biology II and Lab
- BIO 2100 Health Sciences Seminar
- CHM 1610/1620 General Chemistry I and Lab
- CHM 1710/1720 General Chemistry II and Lab
- BIO 2110/2120 General Ecology and Lab
- BIO 2310 Biochemistry

BIO 3110 Cellular & Molecular Biology  
BIO 4210 Genetics  
BIO 4010 Senior Seminar

Students will also select courses from among the following (29-30 hours):

Choose two courses:

CHM 2610/2620 Organic Chemistry I and Lab  
CHM 2710/2720 Organic Chemistry II and Lab  
PHY 2510/2520 General Physics I and Lab  
PHY 2610/2620 General Physics II and Lab

Choose one course:

BIO 3210/3220 Advanced Anatomy & Physiology I and Lab  
BIO 3310/3320 Advanced Anatomy & Physiology II and Lab  
BIO 4110/4120 Microbiology and Lab

Choose one course:

MAT 1230/1240 Calculus I and Lab  
MAT 3200 Probability and Statistics

In addition, a health science major must also declare a concentration, which defines optional course choices and lists additional courses required for professional health science schools in that concentration, or are covered on the entrance examination for that field. Available concentrations include pre-medicine, pre-podiatry, pre-optometry, pre-dental, pre-veterinary, pre-chiropractic, pre-physician's assistant, pre-physical therapy, pre-pharmacy, and pre-occupational therapy.

## **LIFE SCIENCE EDUCATION MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The major in life science education is designed for students desiring to teach biology at the secondary level.

The requirement for a degree in life science education is a minimum of 39 hours in the sciences including a minimum of 21 hours of designated biology courses and four hours of general ecology. The major also requires a minimum of 36 hours of designated professional education courses. Students desiring this major must register their intent with the School of Education during their first year of study at Grace to ensure they receive the most recent communications from the School of Education in this ever-changing discipline.

Required Science Courses (39 hours):

SCI 1140 Physical Science Survey  
SCI 1160 Theories of Origins  
BIO 1610/1620 General Biology I and Lab  
BIO 1710/1720 General Biology II and Lab  
CHM 1610/1620 General Chemistry I and Lab  
CHM 1710/1720 General Chemistry II and Lab  
ENV 2110/2120 General Ecology and Lab  
BIO 2310 Biochemistry  
BIO 2510/2520 Animal Biology and Lab  
BIO 3110 Cellular & Molecular Biology  
BIO 4210 Genetics

Professional Education Requirements (36 hours):

SED 1000 Teaching School in America  
SED 2200 The School Age Child  
SED 2210 Responsive and Differentiated Instruction

SED 2400 Teaching Exceptional Learners  
SED 2500 Teaching in a Pluralistic Society  
SED 2600 Teaching and Learning  
SED 3600 Teaching in the Middle and High School Setting  
SED 4660 Methods of Teaching Secondary Science  
SED 4700 The Moral Practitioner  
SED 4900 Student Teaching and Seminar

A minor is not required for this major.

NOTE: Course descriptions for SED can be found in the School of Education course listings.

## **BIOLOGY MINOR**

The requirement for a minor in biology is 20 hours in science.

Required Courses (12 hours):

BIO 1610/1620 General Biology I and Lab  
BIO 1710/1720 General Biology II and Lab  
CHM 1610/1620 General Chemistry I and Lab

Biology Electives (8-9 hours):

BIO 2110/2120 General Ecology and Lab  
BIO 2210 Nutrition  
BIO 2310 Biochemistry  
BIO 2410/2420 Plant Biology and Lab  
BIO 2510/2520 Animal Biology and Lab  
BIO 3110 Cellular & Molecular Biology  
BIO 3210/3220 Advanced Anatomy & Physiology I and Lab  
BIO 3310/3320 Advanced Anatomy & Physiology II and Lab  
BIO 4110/4120 Microbiology and Lab  
BIO 4210 Genetics

## **ENVIRONMENTAL SCIENCE PROGRAM**

The environmental science program at Grace is committed to equipping future professionals in environmental fields with the skills, competence, experience, and stewardship ethic to excel in caring for God's creation. Requirements for the environmental biology, environmental science, and environmental studies majors as well as individual courses have been designed to emphasize hands-on, field-based learning in addition to classroom instruction. The majors have been intentionally constructed to prepare students desiring immediate employment in an environmental career following their undergraduate graduation from Grace as well as those who plan to go on to graduate school to further their formal education.

### **Majors and Minors in the Environmental Science Program**

#### **ENVIRONMENTAL BIOLOGY MAJOR**

##### **Bachelor of Science and Bachelor of Arts**

The requirement to complete a degree in environmental biology is 37 hours in ecology and biology, a minor in chemistry, and supporting math courses. The environmental biology major will prepare those students focused on a career in teaching or cutting-edge research with the academic platform necessary to succeed in graduate school.

Required Courses (43 hours):

BIO 1610/1620 General Biology I and Lab  
ENV 2110/2120 General Ecology and Lab  
ENV 2410/2420 Plant Biology and Lab  
ENV 2510/2520 Animal Biology and Lab  
ENV 3210/3220 Aquatic Ecology and Lab  
ENV 3410 Environmental Ethics  
ENV 4010 Senior Seminar  
ENV 4210 Genetics  
ENV 4820 Field Education  
MAT 1230/1240 Calculus I and Lab  
PHY 2510/2520 General Physics I and Lab  
PHY 2610/2520 General Physics II and Lab

Electives (6-8 hours):

ENV 4110/4120 Microbiology and Lab  
ENV 4810 Field Education  
ENV 4820 Field Education  
ENV 4830 Field Education  
ENV 3950 Various Au Sable Institute courses  
MAT 3200 Probability and Statistics  
SCI 1160 Theories on Origins  
SCI 2240 Physical Geology

A chemistry minor is required (19 hours):

CHM 1610/1620 General Chemistry I and Lab  
CHM 1710/1720 General Chemistry II and Lab  
CHM 2610/2620 Organic Chemistry I and Lab  
CHM 2710/2720 Organic Chemistry II and Lab  
CHM 3210 Environmental Chemistry

## **ENVIRONMENTAL SCIENCE MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The requirement to complete a degree in environmental science is 45 hours in a variety of scientific disciplines. A minor is also required. The environmental science major is designed for those students who want a solid science foundation in order to hit the ground running in an environmental career immediately after college.

Required Courses (34 hours):

BIO 1610/1620 General Biology I and Lab  
CHM 1610/1620 General Chemistry I and Lab  
CHM 1710/1720 General Chemistry II and Lab  
POS 2010 Intro to Political Thought  
ENV 2110/2120 General Ecology and Lab  
ENV 3210/3220 Aquatic Ecology and Lab  
CHM 3210 Environmental Chemistry  
BHS 3270 Social Psychology  
ENV 3410 Environmental Ethics  
ENV 4820 Field Education  
ENV 4020 Senior Seminar

Electives are chosen from the following (at least 8 hours):

- SCI 1160 Theories of Origins
- SOC 2140 Social Problems
- ENV 2410/2420 Plant Biology and Lab
- ENV 2510/2520 Animal Biology and Lab
- SCI 2230 Physical Geography
- SCI 2240 Physical Geology
- POS 3010 State and Local Government
- MAT 3200 Probability and Statistics
- ENV 4110/4120 Microbiology and Lab
- ENV 4210 Genetics
- ENV 4810 Field Education
- ENV 4820 Field Education
- ENV 4830 Field Education
- Various Au Sable Institute courses

A minor is required to accompany this major.

## **ENVIRONMENTAL STUDIES MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The requirement to complete a degree in environmental studies is 43 hours in a variety of scientific disciplines. A minor is also required. This major replaces some specialized science classes with courses that will provide the student with business and organizational tools. For example, the environmental studies major might be for those students wishing to focus on grass-roots advocacy or not-for-profit organizations.

Required Courses (32 hours):

- BIO 1010/1020 Biological Science Survey and Lab
- BUS 1010 Foundations of Business
- CHM 1010/1020 Introduction to Chemistry and Lab
- POS 2010 Introduction to Political Thought
- ENV 2110/2120 General Ecology and Lab
- ENV 3210/3220 Aquatic Ecology and Lab
- BHS 3270 Social Psychology
- ENV 3410 Environmental Ethics
- ENV 4820 Field Education
- ENV 4010 Senior Seminar

Electives are chosen from the following (at least 11 hours):

- SOC 2140 Social Problems
- ENV 2410/2420 Plant Biology and Lab
- ENV 2510/2520 Animal Biology and Lab
- SCI 2230 Physical Geography
- SCI 2240 Physical Geology
- POS 3010 State and Local Government
- POS 3100 International Relations
- MAT 3200 Probability and Statistics
- CHM 3210 Environmental Chemistry
- ENV 4110/4120 Microbiology and Lab
- ENV 4210 Genetics
- ENV 4810-4830 Field Education

A minor is required to accompany this major.

## **ENVIRONMENTAL SCIENCE MINOR**

The requirement for a minor in environmental science is 18 hours in science.

Required Courses (14 hours):

BIO 1010/1020 Biological Science Survey and Lab  
or BIO 1610/1620 General Biology I and Lab  
ENV 2110/2120 General Ecology and Lab  
ENV 3210/3220 Aquatic Ecology and Lab  
ENV 3410 Environmental Ethics

Electives are chosen from the following (4 hours):

ENV 2410/2420 Plant Biology and Lab  
ENV 2510/2520 Animal Biology and Lab

## **EXERCISE SCIENCE PROGRAM**

Exercise science is the study of people in motion. This program incorporates a variety of educational disciplines and proficiencies in human biological studies, assessment and management including human anatomy and physiology, kinesiology, biomechanics, fitness assessment, nutrition, strength and conditioning, exercise prescription, and injury care and prevention, which launch students into practical and effective professional careers. The emphasis of this program is on hands-on learning and skills training to prepare students for their desired professional field. Exercise science majors at Grace will be prepared students for graduate work in various fields including physical therapy, athletic training, exercise physiology, clinical rehab, and biomechanics. In addition, this major prepares students for general careers in such areas as cardiopulmonary rehab, strength and conditioning, personal training, and coaching.

There are two concentrations of study within the major.

The first concentration of study is health and wellness and is geared toward the fitness and allied health care professional. The second concentration of study is in pre-physical therapy.

## **EXERCISE SCIENCE MAJOR**

### **Bachelor of Science**

The requirement for the B.S. degree in exercise science with a concentration in health and wellness is 68 hours. A concentration in pre-physical therapy requires 66 hours and designated supporting courses related to behavioral science. No minor is required.

### **HEALTH & WELLNESS CONCENTRATION**

Exercise Science Foundation (24 hours):

EXS 1000 Introduction to Exercise Science  
EXS 1050 Dynamics of Fitness  
EXS 2000 Kinesiology  
EXS 2250 Care and Prevention of Injuries  
EXS 3000 Strength and Conditioning  
EXS 3600 Fitness Assessment  
EXS 4180 Exercise Physiology  
EXS 4240 Biomechanics

Science Requirements (19 hours):

BIO 1610/1620 General Biology I and Lab  
BIO 1710/1720 General Biology II and Lab

BIO 2210 Nutrition  
BIO 2010/2020 Anatomy & Physiology I and Lab  
BIO 2040/2050 Anatomy & Physiology II and Lab

Behavioral Science Electives – choose 3 from the following (9 hours):

PSY 3000 Brain and Behavior  
PSY 3300 Sport Psychology  
PSY 3550 Health Psychology  
PSY 3600 Motivation and Emotion  
SOC Substance Use and Abuse

Business Electives – choose 3 from the following (9 hours):

BUS 2430 Principles of Management  
BUS 3260 Small Business Entrepreneurship  
MKT 4030 Services Marketing  
SMT 2050 Risk Management  
SMT 2130 Principles of Coaching

Applied Learning Requirement (7 hours):

EXS 2150 Practicum in Exercise Science  
EXS 4840 Research in Exercise Science  
EXS 4930 Internship in Exercise Science

No minor is required for this major.

### **PRE-PHYSICAL THERAPY CONCENTRATION**

Exercise Science Foundation (24 hours):

EXS 1000 Introduction to Exercise Science  
EXS 1050 Dynamics of Fitness  
EXS 2000 Kinesiology  
EXS 2250 Care and Prevention of Injuries  
EXS 3000 Strength and Conditioning  
EXS 3600 Fitness Assessment  
EXS 4180 Exercise Physiology  
EXS 4240 Biomechanics

Science Requirements (35 hours):

BIO 1610/1620 General Biology I and Lab  
BIO 1710/1720 General Biology II and Lab  
BIO 2210 Nutrition  
BIO 3210/3220 Advanced Anatomy & Physiology I and Lab  
BIO 3310/3320 Advanced Anatomy & Physiology II and Lab  
CHM 1610/1620 General Chemistry I and Lab  
CHM 1710/1720 General Chemistry II and Lab  
PHY 2510/2520 General Physics I and Lab  
PHY 2610/2620 General Physics II and Lab

Applied Learning Requirement (7 hours):

EXS 2150 Practicum in Exercise Science  
EXS 4840 Research in Exercise Science  
EXS 4930 Internship in Exercise Science

Suggested electives\* - choose 2 from the following (6 hours):

PSY 2170 Abnormal Psychology  
PSY 2360 Child and Adolescent Psychology  
PSY 2280 Life Span Development  
PSY 3300 Sport Psychology  
PSY 3550 Health Psychology  
PSY 3600 Motivation and Emotion  
SOC 3230 Substance Use and Abuse  
SMT 2050 Risk Management  
SMT 2130 Principles of Coaching

No minor is required for this major.

\*Suggested electives are intended to enhance the major, but are not part of the 66 credit hour requirements.

NOTE: Course descriptions for BUS and MKT can be found in the Department of Business course listings. SMT course descriptions can be found in the Department of Sport Management course listings. Course descriptions for PSY and SOC can be found in the Department of Behavioral Science course listings.

## **MATHEMATICS PROGRAM**

The mathematics program at Grace College is devoted to training students for competency in the mainstream areas of mathematics. The mathematics program is built on three areas of strength: education, pure math, and applied math. The math education—secondary major (B.A. and B.S. degree options) prepares students for a career in teaching. The mathematics major prepares students for graduate school. The math and computing major prepares students for technology related jobs. The actuarial science major prepares students for jobs as an actuary or a statistician. The mathematics program offers a variety of liberal arts and support courses to service other majors.

### **Liberal Arts Electives**

Every student at Grace College pursuing a Bachelor of Science degree is required to take a math class (certain majors have specific requirements). The mathematics program offers a variety of courses to fit the interests of each student: Mathematical Models, College Algebra, Probability and Statistics, Calculus, etc.

## **MAJORS AND MINORS IN THE MATHEMATICS PROGRAM**

### **ACTUARIAL SCIENCE MAJOR**

#### **Bachelor of Science and Bachelor of Arts**

The actuarial science major equips students for statistics based careers. A total of 44 credit hours in mathematics and information systems courses are required.

Math Requirements (23 hours):

MAT 1230/1240 Calculus I and Lab  
MAT 1250/1260 Calculus II and Lab  
MAT 2250 Calculus III  
MAT 2280 Differential Equations  
MAT 4200 Probability Theory  
MAT 4320 Mathematical Statistics  
MAT 4020 Senior Seminar in Mathematics

**Business Requirements (21 hours):**

ACC 2110 Financial Accounting  
ACC 2120 Managerial Accounting  
BUS 2230 Economics  
BUS 3050 Business Spreadsheet Applications  
FIN 3240 Corporate Finance  
FIN 4610 Advanced Financial Mathematics  
ISM 1150 Introduction to Computer Science

A minor is required for this major.

NOTE: Course descriptions for ACC, BUS, FIN, and ISM can be found in the Department of Business course listings.

## **MATHEMATICS MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The mathematics major equips students for careers such as technology and actuarial science, or for graduate studies. A total of 45 credit hours in mathematics, physics, and related courses are required.

**Degree Requirements (45 hours):**

ISM 1150 Intro to Computer Science  
MAT 1230/1240 Calculus I and Lab  
MAT 1250/1260 Calculus II and Lab  
MAT 2250 Calculus III  
MAT 2100 Introduction to Proofs  
MAT 2200 Discrete Mathematics  
MAT 2280 Differential Equations  
MAT 3130 Linear Algebra  
MAT 3200 Probability and Statistics  
MAT 4020 Senior Seminar in Mathematics  
PHY 2510/2520 General Physics I and Lab  
Choose 1 of the following:  
MAT 4140 Abstract Algebra  
MAT 4280 Real Analysis  
Choose 2 of the following:  
MAT 3260 History of Mathematics  
MAT 3280 College Geometry  
MAT 3930 Independent Study in Mathematics  
MAT 4200 Probability Theory  
MAT 4280 Real Analysis *or* 4140 Abstract Algebra  
MAT 4320 Mathematical Statistics  
MAT 4830 Research in Mathematics  
Choose 1 of the following:  
SCI 2230 Physical Geography  
SCI 2240 Physical Geology  
SCI 2360 Introduction to Astronomy  
PHY 2610/2620 General Physics II and Lab

A minor is required for this major.

NOTE: Course descriptions for ISM can be found in the Department of Business course listings.

## **MATH AND COMPUTING MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The math and computing major equips students for technology, computer programming and information systems. A total of 44 credit hours in mathematics and informational systems courses are required.

#### Math Requirements (26 hours):

- MAT 1230/1240 Calculus I and Lab
- MAT 1250/1260 Calculus II and Lab
- MAT 2250 Calculus III
- MAT 2100 Introduction to Proofs
- MAT 2200 Discrete Mathematics
- MAT 3130 Linear Algebra
- MAT 3200 Probability and Statistics
- MAT 4020 Senior Seminar in Mathematics

#### Information Systems Requirements (18 hours):

- ISM 1150 Intro to Computer Science
- ISM 2100 Object-Oriented Programming
- ISM 2700 HTML and Web Development
- ISM 3400 Database
- ISM 3500 Data Structures
- One of the following
- ISM 4110 Client Side Programming
- ISM 4120 Server Side Programming
- ISM 3470 Business Information Systems

#### Elective (3 hours):

One additional course from MAT or ISM 3000 level or higher

A minor is required for this major.

NOTE: Course descriptions for ISM can be found in the Department of Business course listings.

## **MATHEMATICS EDUCATION—SECONDARY MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The mathematics education major provides preparation for careers in high school and middle school mathematics teaching. The program begins with a series of required courses, after which students take electives depending on personal interests.

#### Required Courses (38 hours):

- ISM 1150 Introduction to Computer Science
- MAT 1230/1240 Calculus I and Lab
- MAT 1250/1260 Calculus II and Lab
- MAT 2250 Calculus III
- MAT 2100 Introduction to Proofs
- MAT 2200 Discrete Mathematics
- MAT 3130 Linear Algebra
- MAT 3200 Probability & Statistics

MAT 3280 College Geometry  
MAT 4020 Senior Seminar in Mathematics  
MAT 4140 Abstract Algebra

Electives - choose 2 of the following (6 hours):

MAT 2280 Differential Equations  
MAT 3260 History of Mathematics  
MAT 3930 Independent Study in Mathematics  
MAT 4200 Probability Theory  
MAT 4280 Real Analysis  
MAT 4320 Mathematical Statistics  
MAT4830 Research in Mathematics

Professional Education Requirements (36 hours):

SED 1000 Teaching School in America  
SED 2200 The School Age Child  
SED 2210 Responsive and Differentiated Instruction  
SED 2400 Teaching Exceptional Learners  
SED 2500 Teaching in a Pluralistic Society  
SED 2600 Teaching and Learning  
SED 3600 Teaching in the Middle and High School Setting  
SED 4650 Methods of Teaching Secondary Mathematics  
SED 4700 The Moral Practitioner  
SED 4900 Student Teaching and Seminar

A minor is not required for this major.

NOTE: Course descriptions for SED can be found in the School of Education course listings. Course descriptions for ISM can be found in the Department of Business course listings.

## **APPLIED MATHEMATICS MINOR**

Required Courses (17 hours):

MAT 1230/1240 Calculus I and Lab  
MAT 1250/1260 Calculus II and Lab  
MAT 2250 Calculus III  
MAT 2280 Differential Equations  
MAT 3130 Linear Algebra

Electives – choose 1 from the following (3 hours):

MAT 2100 Introduction to Proofs  
MAT 2200 Discrete Mathematics  
MAT 4200 Probability Theory  
MAT 4320 Mathematical Statistics

## **MATHEMATICS MINOR**

Required Courses (11 hours):

MAT 1230/1240 Calculus I and Lab  
MAT 1250/1260 Calculus II and Lab  
MAT 2100 Introduction to Proofs

Electives – choose 3 from the following (9 hours):

- MAT 2200 Discrete Mathematics
- MAT 2250 Calculus III
- MAT 2280 Differential Equations
- MAT 3130 Linear Algebra
- MAT 3200 Probability and Statistics
- MAT 3260 History of Mathematics
- MAT 3280 College Geometry
- MAT 3380 Number Theory
- MAT 4140 Abstract Algebra
- MAT 4200 Probability Theory
- MAT 4280 Real Analysis
- MAT 4320 Mathematical Statistics

## **PHYSICAL SCIENCE PROGRAM**

The purpose of the physical science program at Grace College is to present the facts and theories of physical science and to provide laboratory experiences which emphasize scientific methods. The department seeks to help the student appreciate the truths of creation as revealed in the physical sciences. The courses are designed for students who desire broad cultural training, for prospective teachers, and for pre-professional students.

### **APPLIED PHYSICS MAJOR (dual degree with Engineering Majors)**

This bachelor of science degree is only available as a dual degree with a major in engineering. The dual majors available in cooperation with Trine University are: Bachelor of Science in Design Engineering Technology and Bachelor of Engineering in Mechanical Engineering Management. For more information on these majors, please see the Engineering Program section of the catalog.

## **GENERAL SCIENCE MAJOR**

### **Bachelor of Science and Bachelor of Arts**

The requirement for a degree in general science includes 37-38 hours in a variety of science and math disciplines in addition to the liberal arts core requirements. The general science major broadly surveys the physical and biological sciences. Students have opportunity to explore in depth areas of special science interest.

Science and Math Requirements (28 hours):

- MAT 1230/1240 Calculus I and Lab
- BIO 1610/1620 General Biology I and Lab
- BIO 1710/1720 General Biology II and Lab
- CHM 1610/1620 General Chemistry I and Lab
- CHM 1710/1720 General Chemistry II and Lab
- PHY 2510/2520 General Physics I and Lab
- PHY 2610/2620 General Physics II and Lab
- MAT 4020 *or* BIO 4010 Senior Seminar

Electives – choose 2 of the following (6-7 hours):

- ENV 2110/2220 General Ecology and Lab
- SCI 1160 Theories of Origins
- SCI 2230 Physical Geography
- SCI 2240 Physical Geology
- SCI 2360 Introduction to Astronomy

A minor is required to accompany this major.

## **CHEMISTRY MINOR**

The requirement for a minor in chemistry is 19 credit hours of selected courses in chemistry. All biology and environmental biology majors are required to complete the chemistry minor.

Required Courses (19 hours):

CHM 1610/1620 General Chemistry I and Lab

CHM 1710/1720 General Chemistry II and Lab

CHM 2610/2620 Organic Chemistry I and Lab

CHM 2710/2720 Organic Chemistry II and Lab

BIO 2310 Biochemistry

## **GENERAL SCIENCE MINOR**

The requirement for a minor in general science is 24 credit hours of courses in biology and/or physical science. Choose any courses from biology (BIO and ENV course prefixes) or physical science (CHM, PHY and SCI course prefixes). Note that some courses have prerequisites.

## **COURSE DESCRIPTIONS**

### **BIOLOGY**

#### **BIO 1010 Biological Science Survey**

A study of living organisms, their structure, function, and relationships to their non-living environment, to each other, and to humans. Special attention is given to cellular biology as it applies to both lower and higher forms of life. Students must enroll concurrently in BIO 1020 Biological Science Survey Laboratory. (Credit will not be given for both BIO 1010 & BIO 1610). Three credit hours.

#### **BIO 1020 Biological Science Survey Laboratory**

The laboratory is designed to support BIO 1010 and must be taken concurrently with the course.

#### **BIO 1610 General Biology I**

Principles of structure, function, and cellular organisms. Includes an introduction to the scientific method, characteristics of cytoplasm, and basic cytology, energy acquisition and release and heredity. Also includes basic plant structure and function. Students must enroll concurrently in BIO 1620. Four credit hours.

#### **BIO 1620 General Biology I Laboratory**

The laboratory is designed to support BIO 1610 and must be taken concurrently with the course.

#### **BIO 1710 General Biology II**

A continuation of BIO 1610. Includes structure, function and interrelationships of the organ systems of animals with particular attention to the human body. Also includes introductory taxonomy, surveying the major groups of plants and animals. Prerequisite: BIO 1610 or permission of the instructor. Students must enroll concurrently in BIO 1720. Four credit hours.

#### **BIO 1720 General Biology II Laboratory**

The laboratory is designed to support BIO 1710 and must be taken concurrently with the course.

#### **BIO 2010 Anatomy and Physiology I**

This course is designed for students pursuing a career in an allied health field (nursing, health and wellness, etc.) The class includes the study of basic gross and microscopic anatomy and the function of

the body on cellular, tissue, and organ system levels. The class will include organization of the body, cytology, basic histology, and the study of several organ systems – integumentary, skeletal, muscular, nervous, and endocrine. Remaining body systems including – circulatory, respiratory, digestive, urinary, and reproductive to be covered in course BIO 2040. (BIO 2020 is to be taken concurrently). Four credit hours.

### **BIO 2020 Anatomy and Physiology I Lab**

The laboratory is designed to support BIO 2010 and must be taken concurrently with the course.

### **BIO 2040 Anatomy and Physiology II**

This course is designed for students pursuing a career in an allied health field (nursing, health and wellness, etc.) This course includes a basic study of the gross and microscopic structure of several major organ systems – endocrine, circulatory, respiratory, digestive, urinary, and reproductive. The other body systems including – integumentary, skeletal, muscular, nervous, and endocrine to be covered in course BIO 2010. (BIO 2050 is to be taken concurrently). Four credit hours.

### **BIO 2050 Anatomy and Physiology II Lab**

The laboratory is designed to support BIO 2040 and must be taken concurrently with the course.

### **BIO 2100 Health Sciences Seminar**

An overview of the health professions, as presented by current practicing medical professionals. Includes occupations ranging from nurse to medical doctor to veterinarian to chiropractor, with many others included. Prerequisite: BIO 1710 or consent of the instructor. One credit hour.

### **BIO 2110 General Ecology**

A study of the interaction of organisms with their physical environment and with each other. Particular focus will be on application of ecological concepts and field work in various local ecosystems. Students must enroll concurrently in BIO 2120. Four credit hours. (Cross-listed; register as ENV 2110.)

### **BIO 2120 General Ecology Lab**

This laboratory is designed to support BIO 2110 and must be taken concurrently with the course. (Cross-listed; register as ENV 2120.)

### **BIO 2210 Nutrition**

Functions and interrelationships of food nutrients throughout the life cycle of man. Includes digestion, absorption and metabolism of nutrients, as well as dietary evaluation and modification for physiological needs. Other areas of study include: role of social, psychological and cultural factors in food selection. Prerequisite: BIO 1610 or consent of the biology program director. Three credit hours.

### **BIO 2310 Biochemistry**

A study of the basic composition and metabolism of carbohydrates, lipids, proteins, enzymes, and nucleic acids. Some consideration is given to biological oxidations, energy transfers, protein biosynthesis, and gene function. The course includes hands-on laboratory experiments involving current procedures in biochemistry. Prerequisite: CHM 1710 and BIO 1610 or consent of instructor. Three credit hours.

### **BIO 2410 Plant Biology**

Integrated study of plants as organisms. Deals with plant structure, physiology, development, genetics, ecology, and classification of major plant groups. Prerequisite: BIO 1610 or consent of the instructor. Students must enroll concurrently in BIO 2420. Four credit hours.

### **BIO 2420 Plant Biology Laboratory**

The laboratory is designed to support BIO 2410 and must be taken concurrently with the course.

### **BIO 2510 Animal Biology**

Integrated study of animals as organisms. Deals with animal structure, physiology, development, genetics, ecology, and classification of major animal groups. Prerequisite: BIO 1610 or consent of the instructor. Students must enroll concurrently in BIO 2520. Four credit hours.

### **BIO 2520 Animal Biology Laboratory**

The laboratory is designed to support BIO 2510 and must be taken concurrently with the course.

### **BIO 3110 Cell and Molecular Biology**

A study of the basic principles that guide cellular composition, organization and function. Particular attention will be paid to understanding the molecular mechanism that underlies cell function. Topics studied in the course include, but are not limited to, processes of energy extraction, membrane transport, flow of genetic information, cell surface communication, cell cycle and regulation, cell division, along with the study of specialized cells like gametes, lymphocytes, neurons, muscle cells, and cancer cells. The course includes hands-on laboratory experiments involving current procedures in cell and molecular biology. Prerequisite: BIO 1610 and BIO 2310 or consent of the instructor. Three credit hours.

### **BIO 3210 Advanced Anatomy and Physiology I**

This course is designed for students preparing for graduate studies in biology/medically related programs (medicine, physical therapy, pharmacy, veterinary medicine, etc.). The class includes an in-depth look at organization of the human body, cytology, histology, and the study of several of the major organ systems – integumentary, skeletal, muscular, nervous, and endocrine. A detailed study of the remaining body systems including – circulatory, respiratory, digestive, urinary, and reproductive to be covered in course BIO 3310. (BIO 3220 is to be taken concurrently). Prerequisites: BIO 1710 and 1720 (or consent of the instructor). Four credit hours.

### **BIO 3220 Anatomy and Physiology I Lab**

The laboratory is designed to support BIO 3210 and must be taken concurrently with the course.

### **BIO 3310 Anatomy and Physiology II**

This course is designed for students preparing for graduate studies in biology/medically related programs (medicine, physical therapy, pharmacy, veterinary medicine, etc.). This course includes an in depth study of the gross and microscopic structure of several major organ systems – endocrine, circulatory, respiratory, digestive, urinary, and reproductive. A detailed study of the other body systems including – integumentary, skeletal, muscular, nervous, and endocrine to be covered in course BIO 3210. (BIO 3320 is to be taken concurrently). Prerequisites: BIO 1710 and 1720 or consent of the instructor. Four credit hours.

### **BIO 3320 Anatomy and Physiology II Lab**

The laboratory is designed to support BIO 3310 and must be taken concurrently with the course.

### **BIO 4110 Microbiology**

An introductory study of microorganisms dealing with the morphology, physiology and cultivation and identification of microbes and their role in the environment. Other areas studied include: immunology, genetics, metabolism, food, preservation, and diseases. Prerequisite: BIO 1610 and BIO 1710 or consent of the instructor. Students must enroll concurrently in BIO 3520. Four credit hours.

### **BIO 4120 Microbiology Laboratory**

The laboratory is designed to support BIO 4110 and must be taken concurrently with the course.

### **BIO 3810-3830 Readings in Biological Science**

This course is designed to allow the student a more in-depth investigation of a topic of special interest in the areas of biological science. Prerequisite: permission of the individual instructor. One to three credit hours; non-repeatable.

### **BIO 3910-3940 Independent Study in Biological Science**

Topics or projects to be chosen and investigated in the areas of biological science in consultation with the individual instructor. Prerequisite: permission of the biology program director. One to four credit hours, non-repeatable.

### **BIO 4010 Biology Senior Seminar**

This course is designed as a capstone course for science majors and is meant to teach valuable skills and give experience with tools needed for science careers or post-graduate education. Prerequisites: BIO 1610, BIO 2310, and senior class standing or consent of the instructor. Three credit hours.

### **BIO 4210 Genetics**

A study of both in-depth classical genetics and underlying molecular mechanisms; also genetic mechanisms and processes, recombination, genetic interaction, and gene regulation. The course includes hands-on laboratory experiments involving current procedures in molecular genetics. Prerequisites: BIO 1610 and BIO 2310 or consent of the instructor. Three credit hours.

### **BIO 4810-4830 Research in Biological Science**

A course designed to give the student an opportunity to do individual research on special problems in biology. Prerequisite: BIO 1610, BIO 1710, and BIO 2310, or consent of the biology program director. One to three credit hours. Maximum of six hours permitted.

## **CHEMISTRY**

### **CHM 1010 Introduction to Chemistry**

A course designed to give the student a broad introduction to general, organic, and biological chemistry. The lecture emphasizes general chemical concepts while the laboratory concentrates on techniques and data handling. Students must enroll concurrently in CHM 1020. Four credit hours.

### **CHM 1020 Introduction to Chemistry Lab**

Designed to support CHM 1010 and must be taken concurrently with the course.

### **CHM 1610 General Chemistry I**

A course designed to give the student knowledge of the principles of general chemistry. The lecture will involve general aspects of physical chemistry, organic chemistry, inorganic chemistry, and qualitative and quantitative chemistry. The laboratory will emphasize techniques and procedures relevant to lecture topics. Prerequisites: One year of high school chemistry and two years of high school mathematics, or consent of the instructor. Students must enroll concurrently in CHM 1620. Four credit hours.

### **CHM 1620 General Chemistry I Lab**

Designed to support CHM1610 and must be taken concurrently with the course.

### **CHM 1710 General Chemistry II**

A continuation of General Chemistry I. Prerequisite: CHM 1610. Students must enroll concurrently in CHM 1720. Four credit hours.

### **CHM 1720 General Chemistry II Lab**

Designed to support CHM 1710 and must be taken concurrently with the course.

**CHM 2300 Forensic Chemistry**

Designed to study the methods and instrumentation used in contemporary crime laboratories. Drugs, blood enzymes, organic and inorganic analysis, gunshot residue, microscopy, spectroscopy, and chromatography are covered. Prerequisite: None required. Three credit hours.

**CHM 2610 Organic Chemistry I**

A study of carbon-containing compounds and their relation to inorganic and biological chemistry and materials science. A course designed to give the student a broad knowledge of the properties and reactions of organic compounds where discussion focuses primarily on structure, reaction, and mechanism. Prerequisite: CHM 1710 or equivalent, or consent of the instructor. Students must enroll concurrently in CHM 2620. Four credit hours.

**CHM 2620 Organic Chemistry I Lab**

Designed to support CHM 2610 and must be taken concurrently with the course.

**CHM 2710 Organic Chemistry II**

A continuation of Organic Chemistry I. Prerequisite: CHM 2610. Students must enroll concurrently in CHM 2720. Four credit hours.

**CHM 2720 Organic Chemistry II Lab**

Designed to support CHM 2710 and must be taken concurrently with the course.

**CHM 3210 Environmental Chemistry**

A study of the chemistry associated with the atmosphere, soil and groundwater, and surface waters. Prerequisite: CHM 1020 or CHM 1610 and 1710. Students must enroll concurrently in CHM 3220. Four credit hours.

**CHM 3220 Environmental Chemistry Lab**

This laboratory is designed to support CHM 3210 and can be taken concurrently with the course.

**CHM 3400 Selected Topics in Chemistry**

A course designed to give the student an in-depth study of some specific aspects of chemistry not normally covered in other required courses. Course topics will fluctuate with student needs and interests. Prerequisite: dependent on topic; see instructor. Two credit hours.

**CHM 4810 Research in Chemistry**

A course designed to give the student an opportunity to do individual research in an area of special interest in chemistry. A written report or professional presentation of the results at an external meeting at the regional or national level is required. Prerequisite: consent of the faculty research advisor. One credit hour.

**ENVIRONMENTAL SCIENCE**

**ENV 2110 General Ecology**

A study of the interaction of organisms with their physical environment and with each other. Particular focus will be on application of ecological concepts and field work in various local ecosystems. Students must enroll concurrently in ENV 2120. Four credit hours.

**ENV 2120 General Ecology Lab**

This laboratory is designed to support ENV 2110 and must be taken concurrently with the course.

### **ENV 2410 Plant Biology**

Integrated study of plants as organisms. Deals with plant structure, physiology, development, genetics, ecology, and classification of major plant groups. Prerequisite: BIO 1610 or consent of the instructor. Students must enroll concurrently in ENV 2420. Four credit hours. (Cross-listed; register as BIO 2410.)

### **ENV 2420 Plant Biology Laboratory**

The laboratory is designed to support ENV 2410 and must be taken concurrently with the course. (Cross-listed; register as BIO 2420.)

### **ENV 2510 Animal Biology**

Integrated study of animals as organisms. Deals with animal structure, physiology, development, genetics, ecology, and classification of major animal groups. Prerequisite: BIO1610 or consent of the instructor. Students must enroll concurrently in ENV 2520. Four hours. (Cross-listed; register as BIO 2510.)

### **ENV 2520 Animal Biology Laboratory**

The laboratory is designed to support ENV 2510 and must be taken concurrently with the course. (Cross-listed; register as BIO 2520.)

### **ENV 3210 Aquatic Ecology**

An overview of physical, chemical, and biological components and their interactions in streams and lakes. Prerequisite: ENV 2110. Students must enroll concurrently in ENV 3220. Four credit hours.

### **ENV 3220 Aquatic Ecology Lab**

This laboratory is designed to support ENV 3210 and must be taken concurrently with the course.

### **ENV 3410 Environmental Ethics**

An exploratory study of secular and Christian views of the natural world and humanity's place in it. Special attention on practical application of a Biblical stewardship ethic. Prerequisite: 55 credit hours. Three credit hours.

### **ENV 4010 Senior Seminar**

This course is designed as a capstone course for science majors and is meant to teach valuable skills and give experience with tools needed for science careers or post-graduate education. Prerequisites: BIO 1610 and senior class standing or consent of the instructor. Three credit hours. (Cross-listed; register as BIO 4010.)

### **ENV 4210 Genetics**

A study of both in-depth, classical genetics and underlying molecular mechanisms, genetic mechanisms and processes, recombination, genetic interaction, and gene regulation. The course includes hands-on laboratory experiments involving current procedures in molecular genetics. Prerequisite: BIO 1610 and BIO 2310 or consent of the instructor. Three credit hours. (Cross-listed; register as BIO 4210.)

### **ENV 4810-4860 Field Education**

Research projects or internships to be chosen in the areas of environmental science and outreach in consultation with the instructor. Prerequisite: permission of the environmental science program director. 1-6 credit hours.

## **EXERCISE SCIENCE**

### **EXS 1000 Introduction to Exercise Science**

Introduction to Exercise Science is an entry level course that is designed to introduce students to the field of exercise science. This course will prepare students with knowledge and information on related health

topics including: the history of exercise science, fitness assessment, nutrition, biology, exercise physiology, biomechanics, physical fitness, career opportunities, and beginning diagnostic tools. Three credit hours.

### **EXS 1050 Dynamics of Fitness**

This course will investigate major topics in the study of lifestyle management. Topics included are: wellness, physical fitness, nutrition, disease, prevention, stress management, and consumerism. Three credit hours.

### **EXS 2000 Kinesiology**

This course is designed to guide students in the exploration of human anatomy, functional anatomy, fundamental movements and select movements. This will include an in-depth examination of the musculoskeletal framework through structure, function, and application in sport and exercise. Three credit hours.

### **EXS 2150 Practicum in Exercise Science**

A practical experience rotation in real-world settings. Students observe exercise science professionals in their prospective fields, and work on interpersonal skills at rotation settings. Pre-requisite: EXS 1000. Two credit hours.

### **EXS 2520 Care and Prevention**

Designed to provide information needed to manage the care of athletic injuries—from prevention, identification and assessment of injuries to interaction with players, parents and physicians. Geared toward those beginning careers in fitness or coaching, equipping them for management and implementation of injury and emergency situations.

### **EXS 3000 Strength and Conditioning**

Principles of strength and conditioning draws students into a creative design and implementation of exercise for various areas of the body. A large majority of students pursuing careers dealing with exercise will encounter prescription weight training and physical conditioning. This course specifically addresses form, function, and programming for the upcoming professional. Prerequisite: EXS 2000. Three credit hours.

### **EXS 3600 Fitness Assessment**

This course prepares students to understand the fundamentals of proper fitness assessment and development of prescriptive exercise. The focus of the course is placed on assessment methodology, developing skills with modern test equipment, and incorporating collected data into exercise programs. Prerequisites: BIO 3210/3220 and BIO 3310/3320. Three credit hours.

### **EXS 4180 Exercise Physiology**

This course examines the structural components of the musculoskeletal, nervous, cardiovascular, respiratory, and endocrine systems. In addition, there is a comprehensive review of the body's response to exercise, optimal work capacity during exercise training, and limitations due to environmental factors, age, sex, and physical health. Prerequisites: BIO 3210/3220 and BIO 3310/3320. Three credit hours.

### **EXS 4240 Biomechanics**

This course introduces concepts of mechanics in relation to human movement, specifically in exercise, sport and physical activity. The primary focus is to gain understanding of mechanical and anatomical principles that control the link between human motion and structural mechanics in coordination with functional mechanisms. Prerequisites: BIO 3210/3220 and BIO 3310/3320. Three credit hours.

### **EXS 4840 Research in Exercise Science**

A course designed to give the student an opportunity to do individual research on a topic of interest in Exercise Science. Prerequisites: EXS 1000 and EXS 2150. Two credit hours.

### **EXS 4930 Internship in Exercise Science**

The internship includes activity in a work environment, allowing the student to experience a hands-on opportunity to apply the skills and principles learned in class to a real-world, professional setting. Three hours of credit is given and is equivalent to approximately 120 hours in the work-place (or 40 work hours per credit hour). Prerequisites: EXS 1000 and EXS 2150. Three credit hours.

## **MATHEMATICS**

### **MAT 1110 Mathematics for Elementary School Teachers**

This course investigates a variety of topics necessary for future elementary school teachers. Topics covered include numbers, measurement, probability, statistics, geometry, patterns, spatial relationships, and logic. This is not a methods class; it is a mathematics content class. Prerequisites: 12 credit hours; Basic Algebra and SED 1000. Three credit hours.

### **MAT 1120 College Algebra**

Topics include algebraic operations, manipulation of functions, polynomial equation solutions, inequalities, logarithms, and exponentials. There will be practice with solving systems of equations, graphing, and algebra applications. Three credit hours.

### **MAT 1180 Mathematical Models**

This is a course on mathematical applications which uses algebra, statistics, logic, and other mathematical concepts to study and model the world around us. Topics include applied statistical applications, Fibonacci numbers, the golden ratio, population growth, and logic. Prerequisites: 12 credit hours; Basic Algebra. Three credit hours.

### **MAT 1230 Calculus I**

This course is a traditional introductory calculus course. We will study functions, limits, derivatives, and integrals. Applications of the derivative and the fundamental theorem of calculus will be particular highlights of this class as well as integrals and derivatives of logarithms and exponential functions. Four credit hours.

### **MAT 1240 Calculus I Lab**

The laboratory is designed to support MAT 1230 and must be taken concurrently with the course. Zero credit hours.

### **MAT 1250 Calculus II**

This course is a continuation of the topics covered in Calculus 1. We will study integration techniques, as well as integrals and derivatives of a variety of functions: logarithms, exponential functions, inverse trigonometric functions, and hyperbolic trigonometric functions. We will also study applications of integration, improper Riemann integrals, and L'Hopital's rule for taking limits. Investigating infinite sequences and infinite series will be a highlight of this course. Prerequisites: MAT 1230 or permission of the mathematics program director. Four credit hours.

### **MAT 1260 Calculus II Lab**

The laboratory is designed to support MAT 1250 and must be taken concurrently with the course. Zero credit hours.

### **MAT 2100 Introduction to Proofs**

This course is an introductory course on proofs—and emphasizes logic, set theory and proof techniques. Theorems will be taken from topics including set theory, number theory and real analysis. Oral presentations of proofs are required. Prerequisites: none. Three credit hours.

### **MAT 2220 Discrete Mathematics**

This course is an introduction to discrete mathematics, including combinatorics and graph theory. Topics covered include graph coloring, trees and searching, network flows, network algorithms and complexity analysis, recurrence relations, functions and relations, generating functions, matrices, set theory, and probability. An emphasis will be on proof by induction. Prerequisite: MAT 2100. Three credit hours.

### **MAT 2250 Calculus III**

This course is an investigation of limits, derivatives, and integrals of functions of more than one variable. We will study various applications of calculus, further topics of multivariable calculus, and ways in which calculus interplays with the other mathematical disciplines such as linear algebra, probability theory, and complex analysis. Prerequisites: MAT 1250 or permission of the mathematics program director. Three credit hours.

### **MAT 2280 Differential Equations**

A study of differential equations using analytical, numerical and graphical techniques. Emphasis is placed on solving first and second order, and systems of differential equations. Various types of differential equations, their solutions and their applications in physical sciences will be studied. Prerequisite: MAT 2250. Three credit hours.

### **MAT 3130 Linear Algebra**

This class is an introductory course in matrices and vector spaces. We will study the arithmetic of matrices and how to utilize matrices to solve systems of linear equations. Our study of matrices will give us a natural entry point into the theory of vector spaces. We will study the vector space axioms and their consequences, and finish the class by investigating the major theorems involving linear transformations and bases of vector spaces. Prerequisite: MAT 2250. Three credit hours.

### **MAT 3200 Probability and Statistics**

This is an introductory course in probability and statistics. Topics covered include probability theorems and models, statistical techniques, and practices for applying statistical techniques in the world around us. Prerequisites: 12 credit hours; Basic Algebra. Three credit hours.

### **MAT 3260 History of Mathematics**

In this course we will study the development of mathematics from ancient history up through today; the significant people and cultures behind the development of mathematics; and the symbols, the theorems, and the applications of mathematics throughout the centuries. We will see how the mathematics of the day was revolutionized with the discovery of new theorems, and how often times the development of mathematics within a culture went hand in hand with the development of the culture itself. Prerequisite: MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 3280 College Geometry**

This course is a thorough investigation of the axioms and theorems of Euclidean geometry. Throughout this course we will also cover several topics in non-Euclidean geometry, symbolic logic, and axiomatic systems in general. This course is designed to thoroughly equip a future high school teacher with the content knowledge needed to successfully teach geometry. Prerequisite: MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 3380 Number Theory**

This is a course on integers, and covers a variety of theorems dealing with mathematical induction, prime numbers, congruence equations, and arithmetic functions. Throughout this course we lay the foundation for understanding the RSA encryption algorithm. We finish this course by studying RSA and its applications. Prerequisite: MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 3930 Independent Study in Mathematics**

An independent study in mathematics is designed for students who have excelled in several post-calculus classes and have a desire to study a topic that is not currently available in the curriculum. A student wishing to take an independent study will establish a topic to study and seek out a faculty member to whom he or she will be responsible. Once a topic and a faculty member are determined, permission for the independent study must be obtained from the mathematics program director. Independent study in mathematics is a non-repeatable class. Prerequisites: MAT 2250; availability of professor; permission of the mathematics program director. Three credit hours.

### **MAT 4020 Senior Seminar in Mathematics**

This is a capstone course for mathematics and mathematics education majors. This course will cover several topics that draw together the various mathematical disciplines, and will portray the global perspective of mainstream mathematics. This course may meet in conjunction with other capstone courses within the science division for a portion of the semester. Prerequisites: declared mathematics or mathematics education major; MAT 2250. Three credit hours.

### **MAT 4140 Abstract Algebra**

Standard algebra is a study of the arithmetic structure of numbers, and of functions of numbers. There are other objects that we study in mathematics besides numbers, and consequently other arithmetic structures; for example, matrices, functions, and permutations. Modern Algebra is the study of general arithmetic structures, and of functions of these general structures. In this course we study the axioms of group theory and develop the body of theorems associated with these axioms. If time permits, we will also investigate the axioms and theorems of ring theory and field theory. Prerequisite: MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 4200 Probability Theory**

In this course we study the axioms and theorems of probability theory. We study probability distributions of discrete and continuous random variables, and many of their applications. Throughout this course we will use a significant amount of calculus to develop the theory of probability. Prerequisite: MAT 2250 and MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 4320 Mathematical Statistics**

This course is the study of multivariable statistics on real data sets. Correlation, hypothesis testing and ANOVA are highlights of this class. Significant use of calculus will be utilized. We use Minitab extensively. Prerequisite: MAT 2250, MAT 3200.

### **MAT 4280 Real Analysis**

Introduction to the fundamental concepts of real analysis. A study of the real number system, limits, sequences, series, convergence, functions, continuity, differentiability, and Riemann integration can all be touched on. Prerequisite: MAT 2100 or permission of the mathematics program director. Three credit hours.

### **MAT 4830 Research in Mathematics**

Research in mathematics is designed for students who have excelled in several post-calculus classes and have a desire to investigate the fine details of a topic in an attempt to advance the theory with new theorems, new proofs, or new applications. A student wishing to undertake such a research project must do so under the strict supervision of a faculty member and with the permission of the mathematics

program director. The supervising faculty member must be willing to invest significant time into helping the student find appropriate resources, ask appropriate research questions, and seek out coherent answers to the questions asked. This course is intended to give students precursory experience into what a graduate thesis experience would be like. Research in mathematics is a non-repeatable class. Prerequisites: MAT 2200; availability of professor; permission of mathematics program director. Three credit hours.

## **PHYSICS**

### **PHY 2510 General Physics I**

A lecture, demonstration, and laboratory class covering mechanics, heat, sound, electricity, relativity, nuclear science, and light. Prerequisite: MAT 1230 or consent of the instructor. Four credit hours.

### **PHY 2520 General Physics I Lab**

Designed to support PHY 2510 and must be taken concurrently with the course.

### **PHY 2610 General Physics II**

A continuation of PHY 2510. Prerequisite: PHY 2510. Four credit hours.

### **PHY 2620 General Physics II Lab**

Designed to support PHY 2610 and must be taken concurrently with the course.

### **PHY 4810–4830 Research in Physics**

Designed for research on a topic of interest. One to three credit hours.

## **GENERAL SCIENCE**

### **SCI 1140 Physical Science Survey**

Activities and lectures will cover motion, energy, gravity, light, radiation, earth materials, and space. Three credit hours.

### **SCI 1160 Theories on Origins**

A survey of origin theories with emphasis on creation/evolution. Explores fossils, design, thermodynamics, chronology, flood geology, life in space, and current creation research. Three credit hours.

### **SCI 2030 Faith, Science, and Reason**

Faith, Science, and Reason is designed to assist the student in demonstrating the scope and magnitude of science and mathematics: why we study these subjects; knowing the limitations of these subjects; where the Christian fits and operates within the scientific paradigm; how a Christian can incorporate their faith and reason within the scientific enterprise; and how to use it as a productive platform when communicating to those of different worldviews. Three credit hours.

### **SCI 2230 Physical Geography**

A study of the physical features of the earth's surface and their changing aspects. Provides the basic information needed for the interpretation of maps, climatic terms, soils, and landforms. Three credit hours.

### **SCI 2240 Physical Geology**

A study of the earth, components of the crust, weathering erosional processes, and tectonics. Three credit hours.

**SCI 2360 Introduction to Astronomy**

A survey of our created universe: the solar system, types of stars, constellations, and galactic distribution. Emphasis on night observation, laboratory, and individual projects. Three credit hours.

**SCI 3910–3930 Independent Study in Physical Science**

Topics or projects to be chosen and investigated in the areas of physical science in consultation with the individual instructor. Prerequisite: permission of the physical science program director. One to three credit hours, non-repeatable.