Science and Mathematics Department

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

The following majors and minors are offered.

**Majors**
- Biology (B.A. or B.S.)
- Environmental Biology (B.S.)
- Life Science Education (B.S.)
- Mathematics (B.S. or B.S.)
- Mathematics Education—Secondary (B.A. or B.S.)

**Minors**
- Biology
- Chemistry
- Environmental Biology
- Mathematics

The Science and Mathematics department offers learning experiences and competency in the areas of the life sciences, physical sciences, and mathematics. Department majors are equipped for service in current scientific fields and encouraged to cultivate a commitment to stewardship of God’s creation.

**Strengths within the Science and Mathematics Department**

**Pre-professional preparation**
The Biology 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, and pre-veterinary medicine.

**Environmental Biology**
The Environmental Biology 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, actuarial science, and graduate studies.

**BIOLOGY 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 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 support the grand design of God the Creator. The key words of strengthening character, developing competence and preparing for service from the mission statement of Grace College drive the mission of the biology program. While the curriculum for the biology major is designed to give the student a strong background in the traditional areas of biology, there is an increased emphasis on molecular aspects since modern biology involves extensive study of the molecular and cellular level.

There are currently four degrees offered within the biology program: the Bachelor of Arts and Bachelor of Science in Biology 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 biology major is designed for the pre-professional preparation of students preparing credentials for admission into professional programs of dentistry, medicine, optometry, pharmacy, physician assistant, physical therapy and veterinary medicine. It is also designed for students desiring graduate work in many areas of biology including anatomy, biochemistry, botany, genetics, microbiology, physiology, zoology but excluding ecology and environmental biology which has its own program of preparation at Grace. Since a few professional programs may have an option of less than four years for the pre-professional preparation, 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.
MAJORS AND MINORS IN THE BIOLOGY PROGRAM

BIOLOGY

Bachelor of Science

The requirements for **Bachelor of Science in Biology** is 44 hours in biology or designated biology related courses, a minor in chemistry, a year of physics and a supporting math course beyond the liberal arts requirement. The following courses are required for the major:

- BSC101 General Biology I
- BSC105 General Biology I Lab
- BSC102 General Biology II
- BSC106 General Biology II Lab
- BSC221 Plant Biology
- BSC223 Plant Biology Lab
- BSC222 Animal Biology
- BSC224 Animal Biology Lab
- BSC265 Cellular & Molecular Biology
- BSC321 Anatomy & Physiology I
- BSC322 Anatomy & Physiology I Lab
- BSC323 Anatomy & Physiology II
- BSC324 Anatomy & Physiology II Lab
- BSC353 Microbiology
- BSC354 Microbiology Lab
- BSC402 Senior Seminar
- BSC414 Genetics
- ENB211 General Ecology
- ENB212 General Ecology Lab

Plus three–four hours of biology electives.

CHEMISTRY MINOR (which is required to support the biology major)

- CHM111 General Chemistry I
- CHM113 General Chemistry I Lab
- CHM112 General Chemistry II
- CHM114 General Chemistry II Lab
- CHM211 Organic Chemistry I
- CHM213 Organic Chemistry I Lab
- CHM212 Organic Chemistry II
- CHM214 Organic Chemistry II Lab
- BSC245 Biochemistry

Additional supporting courses required for the major include:

- PHY201 Physics I
- PHY203 Physics I Lab
- PHY202 Physics II
- PHY204 Physics II Lab
Plus three hours of math beyond the three hours counted towards the liberal arts requirement.

**Bachelor Of Arts**
The requirements for the B.A. degree in biology are the same as those of the B.S. degree except that the three hour biology elective required for the B.S. degree is replaced by three to six hours of modern foreign language at level 200.

**LIFE SCIENCE EDUCATION**
**Bachelor of Science**
The major in Life Science Education is designed for students desiring to teach biology at the secondary level.

The requirements for *Bachelor of Science in Life Science Education* requires a minimum of 58 hours in the sciences including a minimum of 32 hours of designated biology courses and four hours of general ecology. The major also requires a minimum of 40 hours of designated professional education courses. Students desiring this major must register their intent with the School of Education preferably their first year of study at Grace to ensure that they receive the most recent communications from the School of Education in this ever changing discipline.

The following science courses are required:
- BSC101 General Biology I
- BSC105 General Biology I Lab
- BSC221 Plant Biology
- BSC223 Plant Biology Lab
- BSC222 Animal Biology
- BSC224 Animal Biology Lab
- BSC245 Biochemistry
- BSC265 Cellular & Molecular Biology
- BSC321 Anatomy & Physiology I
- BSC322 Anatomy & Physiology I Lab
- BSC323 Anatomy & Physiology II
- BSC324 Anatomy & Physiology II Lab
- BSC414 Genetics
- ENB 211 General Ecology
- ENB 212 General Ecology Lab

Three–four hours of biology elective.
- CHM111 General Chemistry I
- CHM113 General Chemistry I Lab
- CHM112 General Chemistry II
- CHM114 General Chemistry II Lab
CHM211 Organic Chemistry I
CHM213 Organic Chemistry I Lab
PHY201 General Physics I
PHY203 General Physics I Lab
SCI224 Physical Geology
SCI236 Introduction to Astronomy

While not required, it is recommended that additional math beyond the liberal arts elective be taken.

Professional Education Requirements:
EDU110 Foundations of Education
EDU235 Instructional Methods & Materials
EDU240 Educational Psychology
EDU244 Exceptional Learners
EDU254 Diversity in the Classroom
EDU265 Computer Applications in Education
EDU311 Classroom Management
EDU332 Professionalism in Teaching
EDU333 Classroom Assessment
EDU430 Philosophy of Education
EDU471–5 Student Teaching
EDU495 Senior Seminar
SCI464 Methods of Teaching Secondary Science.

Biology Minor
The requirement for a minor in biology is 33 hours in science including:
BSC101 General Biology I
BSC105 General Biology I Lab
BSC102 General Biology II
BSC106 General Biology II Lab
BSC221 Plant Biology
BSC223 Plant Biology Lab
BSC222 Animal Biology
BSC224 Animal Biology Lab
BSC245 Biochemistry
ENB 211 General Ecology
ENB 212 General Ecology Lab
Plus two hours of biology elective, and eight hours in general chemistry.

ENVIRONMENTAL BIOLOGY PROGRAM
The Environmental Biology 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 major as well as individual courses have been designed to emphasize hands-on, field-based learning in addition to classroom instruction. The major has been intentionally constructed to prepare both 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 Biology Program

The Bachelor of Science in Environmental Biology is the major (53–54 credit hours total) offered through the Environmental Biology program. The listed requirements are in addition to the Grace core requirements (left column of check sheet) which all students must complete as well as a Chemistry minor which is required for all Environmental Biology majors.

All students are required to take the following 31 credit hours:
- BSC101 General Biology I
- BSC105 General Biology I Lab
- BSC221 Plant Biology
- BSC223 Plant Biology Lab
- BSC222 Animal Biology
- BSC224 Animal Biology Lab
- BSC414 Genetics
- ENB211 General Ecology
- ENB212 General Ecology Lab
- ENB311 Aquatic Ecology
- ENB312 Aquatic Ecology Lab
- ENB331 Environmental Ethics
- ENB400 Field Education
- ENB401 Environmental Analysis (Senior Seminar)

Students must also choose from the following electives (at least 8 credit hours):
- BSC245 Biochemistry
- BSC353 Microbiology
- BSC354 Microbiology Lab
- SCI116 Theories on Origins
- SCI224 Physical Geology
- And various Au Sable Institute courses

Students are required to take the following math and foundational science courses (14 credit hours):
- MAT121 Calculus I
- MAT320 Probability & Statistics
- PHY201 General Physics I
PHY203 General Physics I Lab
PHY202 General Physics II
PHY204 General Physics II Lab

A Chemistry minor is also required for the Environmental Biology major. Environmental Chemistry (ENB 321) must be chosen as the elective course for this minor.

Environmental Biology Minor
The requirement for a minor in biology is 14–15 hours in the Science Division including:

All students are required to take the following 10–11 credit hours:
  BSC100 (or 101) Biology Science Survey (or General Biology I)
  BSC104 (or 105) Biology Science Survey Lab (or General Biology I Lab)
  ENB211 General Ecology
  ENB212 General Ecology Lab
  ENB331 Environmental Ethics

Students must also choose from the following electives (at least 4 credit hours):
  ENB311 Aquatic Ecology
  ENB312 Aquatic Ecology Lab
  various Au Sable Institute courses
  BSC221 Plant Biology
  BSC223 Plant Biology Lab
  BSC222 Animal Biology
  BSC224 Animal Biology Lab

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. The program offered is the chemistry minor.

Physical Science Minors
Chemistry Minor
The requirement for a minor in chemistry is 19 credit hours of selected courses in chemistry. Environmental Biology majors are required to complete a chemistry minor and must choose Environmental Chemistry (ENB 321) as their elective.

All students are required to take the following 16 credit hours:
CHM 111 General Chemistry I
CHM 113 General Chemistry I Lab
CHM 112 General Chemistry II
CHM 114 General Chemistry II Lab
CHM 211 Organic Chemistry I
CHM 213 Organic Chemistry I Lab
CHM 212 Organic Chemistry II
CHM 214 Organic Chemistry II Lab

Students must also choose from the following electives (at least 3 credit hours):
  BSC245 Biochemistry
  ENB321 Environmental Chemistry
  ENB322 Environmental Chemistry Lab

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 two areas of strength: education and pure math. The math education—secondary major (B.A. and B.S. degree options) prepares students for a career in teaching. The mathematics program offers a variety of liberal arts and support courses to service other majors.

Liberal Arts Electives

Every student at Grace College is required to take a math class as one of his or her liberal arts electives (certain majors have specific requirements). The mathematics program offers a variety of courses to fit the interests of each student: Mathematical Models, Business Mathematics, Probability and Statistics, Calculus 1, etc.

Course Credit by Examination

CLEP Exams

Students may obtain college credit for calculus through the CLEP testing program. See the Academic Affairs Office in order to arrange CLEP exams.

MAT121 (Calculus 1)

Students may receive credit for MAT121 by either passing the high school advanced placement A-B Calculus exam with a score of “4” or “5,” or by passing the CLEP exam for calculus.

MAT122 (Calculus 2)

Students may receive credit for MAT122 by either passing the high school advanced placement B-C Calculus exam with a score of “4” or “5.”
Mathematics Programs
The following programs are offered through the mathematics program. The listed requirements, unless otherwise specified, are in addition to the liberal arts core requirements and the liberal arts elective requirements which every student must take.

MAJORS AND MINORS IN THE MATHEMATICS PROGRAM

Bachelor of Science in Mathematics Education—Secondary
Note: The general education core elective requirement of a class with an MAT prefix is met by this major.

Degree Requirements:
One of the following courses:
- SCI223 Physical Geography
- SCI224 Physical Geology
- SCI236 Introduction to Astronomy
- PHY202/204 General Physics II & Lab

All of the following:
- ISM110 Introduction to Technology
- PHY201/203 General Physics I & Lab
- MAT121 Calculus I
- MAT122 Calculus II
- MAT223 Calculus III
- MAT224 Calculus IV
- MAT313 Linear Algebra
- MAT320 Probability & Statistics
- MAT328 Modern Geometry
- MAT402 Senior Seminar in Mathematics
- MAT414 Modern Algebra
- MAT464 Methods of Teaching Mathematics

Two of the following courses:
- MAT326 History of Mathematics
- MAT338 Number Theory
- MAT393 Independent Study in Mathematics
- MAT420 Probability Theory
- MAT425 Real Analysis
- MAT483 Research in Mathematics

Professional Education Requirements:
- EDU110 Foundations of Education
- EDU235 Instructional Methods & Materials
- EDU240 Educational Psychology
EDU244 Exceptional Learners
EDU254 Diversity in the Classroom
EDU265 Computer Applications in Education
EDU311 Classroom Management
EDU332 Professionalism in Teaching
EDU333 Classroom Assessment
EDU430 Philosophy of Education
EDU471-5 Student Teaching
EDU495 Senior Seminar
MAT464 Methods of Teaching Mathematics

A minor is not required.

Bachelor of Arts in Mathematics Education—Secondary

Degree Requirements:
All of the following:
ISM110 Introduction to Technology
MAT121 Calculus I
MAT122 Calculus II
MAT224 Calculus IV
MAT313 Linear Algebra
MAT320 Probability & Statistics
MAT328 Modern Geometry
MAT402 Senior Seminar in Mathematics
MAT414 Modern Algebra
MAT464 Methods of Teaching Mathematics

Two of the following courses:
MAT326 History of Mathematics
MAT338 Number Theory
MAT393 Independent Study in Mathematics
MAT420 Probability Theory
MAT483 Research in Mathematics

Complete intermediate year (level 200) of a modern foreign language

Professional Education Requirements:
EDU110 Foundations of Education
EDU235 Instructional Methods & Materials
EDU240 Educational Psychology
EDU244 Exceptional Learners
EDU254 Diversity in the Classroom
EDU265 Computer Applications in Education
EDU311 Classroom Management
EDU332 Professionalism in Teaching
EDU333 Classroom Assessment
EDU430 Philosophy of Education
EDU471-5 Student Teaching
EDU495 Senior Seminar
MAT464 Methods of Teaching Mathematics

A minor is not required.

**Bachelor of Science in Mathematics**

**Degree Requirements:**
- ISM110 Intro to Technology
- MAT121 Calculus I
- MAT122 Calculus II
- MAT223 Calculus III
- MAT224 Calculus IV
- MAT313 Linear Algebra
- MAT320 Probability and Statistics
- MAT328 Modern Geometry
- MAT402 Senior Seminar in Mathematics
- MAT414 Modern Algebra
- PHY201/203 Physics & Lab

Choose 2 of the following:
- MAT321 Differential Equations
- MAT326 History of Mathematics
- MAT338 Number Theory
- MAT393 Independent Study in Mathematics
- MAT420 Probability Theory
- MAT428 Real Analysis
- MAT483 Research in Mathematics

Choose 1 of the following:
- SCI223 Physical Geography
- SCI224 Physical Geology
- SCI236 Introduction to Astronomy
- PHY202/204 Physics II & Lab

**Bachelor of Arts in Mathematics**

**Degree Requirements:**
- ISM110 Intro to Technology
- MAT121 Calculus I
- MAT122 Calculus II
- MAT223 Calculus III
- MAT224 Calculus IV
- MAT313 Linear Algebra
- MAT320 Probability and Statistics
- MAT328 Modern Geometry
- MAT402 Senior Seminar in Mathematics
- MAT414 Modern Algebra
Choose 2 of the following:
  MAT321 Differential Equations
  MAT326 History of Mathematics
  MAT338 Number Theory
  MAT393 Independent Study in Mathematics
  MAT420 Probability Theory
  MAT428 Real Analysis
  MAT483 Research in Mathematics

Complete intermediate year of language & culture
  201 & 202 in French or Spanish
  201 in Greek or 202 in Hebrew

A minor is required.

Minor in Mathematics
Note: The general education core elective requirement of a class with an MAT prefix is met by this minor.

Degree Requirements:
  MAT121 Calculus I
  MAT122 Calculus II
  MAT223 Calculus III
  MAT313 Linear Algebra

Two of the following courses:
  MAT224 Calculus IV
  MAT326 History of Mathematics
  MAT328 Modern Geometry
  MAT338 Number Theory
  MAT414 Modern Algebra
  MAT420 Probability Theory
 COURSE DESCRIPTIONS

Biology

BSC100 Biological Science Survey
A study of living organisms, their structure, function, and relationships to their non-living environment, to each other, and to man. Special attention is given to cellular biology as it applies to both lower and higher forms of life. Students must enroll concurrently in BSC104 Biological Science Survey Laboratory. (Credit will not be given for both BSC100 & BSC101). Two hours lecture per week. Three credit hours.

BSC104 Biological Science Survey Laboratory
The laboratory is designed to support BSC100 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC101 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 BSC105. Three hours lecture per week. Four credit hours.

BSC105 General Biology I Laboratory
The laboratory is designed to support BSC101 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC102 General Biology II
A continuation of BSC101. 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. Three hours lecture per week. Prerequisite: BSC101 or permission of the instructor. Students must enroll concurrently in BSC106. Four credit hours.

BSC106 General Biology II Laboratory
The laboratory is designed to support BSC102 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC103 Human Biology
This course is designed to develop an understanding of the interrelationship between structure and function in the human body. It begins by introducing the student to cellular biology, inheritance, and genetic engineering. It covers various human organ systems with special emphasis on health, disease, and current health care issues. (Credit will not be given for both BSC101 and BSC103.) Students must enroll concurrently in BSC107. Three credit hours.
BSC107 Human Biology Laboratory
The laboratory is designed to support BSC103 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC218 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 BSC100, BSC101, BSC102, BSC321, be a nursing student or consent of instructor. Three hours of lecture per week. Three credit hours.

BSC221 Plant Biology
Integrated study of plants as organisms. Deals with plant structure, physiology, development, genetics, ecology, and classification of major plant groups. Three hours lecture per week. Prerequisite: BSC101. Students must enroll concurrently in BSC223. Four credit hours.

BSC223 Plant Biology Laboratory
The laboratory is designed to support BSC221 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC222 Animal Biology
Integrated study of animals as organisms. Deals with animal structure, physiology, development, genetics, ecology, and classification of major animal groups. Three hours lecture per week. Prerequisite: BSC101. Students must enroll concurrently in BSC224. Four hours.

BSC224 Animal Biology Laboratory
The laboratory is designed to support BSC222 and must be taken concurrently with the course. One two-hour laboratory per week.

BSC245 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. Prerequisite: CHM111 or consent of instructor. Three credit hours.

BSC265 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 like 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. Prerequisite: BSC245 or consent of the instructor. Three credit hours.
**BSC321 Anatomy and Physiology I**
The study of the basic gross and microscopic anatomy with an introduction to body organization, cytology and histology. This course includes an in-depth study of several major organ systems. Three hours of lecture per week. Prerequisite: BSC101 or consent of the instructor. Students must enroll concurrently in BSC322. Four credit hours.

**BSC322 Anatomy and Physiology I Lab**
The laboratory is designed to support BSC321 and must be taken concurrently with the course. One two-hour laboratory per week.

**BSC323 Anatomy and Physiology II**
Anatomy and Physiology II is a continuation of Anatomy and Physiology I with a focus on the remaining organ systems. Three hours of lecture per week. Prerequisite: BSC321 or consent of the instructor. Students must enroll concurrently in BSC324. Four credit hours.

**BSC324 Anatomy and Physiology II Lab**
The laboratory is designed to support BSC323 and must be taken concurrently with the course. One two-hour laboratory per week.

**BSC353 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. Three hours lecture period each week. Prerequisite: BSC101 or BSC100. Students must enroll concurrently in BSC354. Four credit hours.

**BSC354 Microbiology Laboratory**
The laboratory is designed to support BSC353 and must be taken concurrently with the course. One two-hour laboratory per week.

**BSC381–383 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.

**BSC391–393 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 curriculum director. One to three credit hours, non-repeatable.

**BSC402 Biology Senior Seminar**
A course designed to give biology majors the opportunity to apply their knowledge and study skills to the investigation of a relevant, complex problem in biology with global implications. Such an investigation is expected to be
multidisciplinary, penetrating beyond the boundary of traditional biology. Students will be required to utilize the competencies of reading, writing, speaking, critical thinking and world view in their study and presentation of their results. Three credit hours.

**BSC414 Genetics**
A study of genetic mechanisms and processes, recombination, genetic interaction, and gene regulation. Prerequisite: BSC101 or consent of the instructor. Three credit hours.

**BSC481–483 Research in Biological Science**
A course designed to give the student an opportunity to do individual research on special problems in biology. Prerequisite: BSC101, BSC102, BSC245, or consent of the biology curriculum director. One to three credit hours. Maximum of six hours permitted.

**Chemistry**

**CHM105 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. The course involves three class periods and one three-hour laboratory period each week. Three credit hours.

**CHM 106 Introduction to Chemistry Lab**
One hour.

**CHM111–112 General Chemistry I and II**
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. The course will involve three class periods and one three-hour laboratory period each week. Prerequisites: One year of high school chemistry and two years of high school mathematics. Three credit hours.

**CHM113–114 General Chemistry Lab**
One hour.

**CHM211–212 Organic Chemistry I and II**
A study of carbon chemistry and its relationship to life processes. A course designed to give the student a broad knowledge of the properties and reactions of organic compounds. Prerequisite: CHM111 or equivalent. Three class periods, one three-hour laboratory period each week. Three credit hours.

**CHM213–214 Organic Chemistry Lab**
One hour.
**CHM315 Inorganic Chemistry**  
A theoretical study of the properties, structure, and bonding in covalent,  
electron deficient, metallic, organometallic, and ionic compounds,  
Thermodynamic principles, descriptive chemistry, acid–base theories, non–  
aqueous systems, and reaction mechanisms are considered. Three class periods  
and one laboratory period each week. Prerequisites: CHM111–112 or  
equivalent. Three credit hours.

**CHM316 Inorganic Chemistry Lab**  
One hour.

**CHM340 Selected Topics in Chemistry**  
A course designed to give the student an in–depth study of some specific  
aspect of chemistry not normally covered in other required courses. Course  
topics will fluctuate with student needs and interests. The course involves two  
class periods each week. Prerequisite: Dependent on topic, see instructor. Two  
credit hours.

**Environmental Biology**

**ENB211 General Ecology**  
A study of the interaction of organisms with their physical environment and  
with each other. Natural selection, biological populations, and their  
environmental relationships. Prerequisite: BSC100 or BSC101. Students must  
enroll concurrently in ENB 212. Three credit hours.

**ENB212 General Ecology Lab**  
This laboratory is designed to support ENB 211 and must be taken concurrently  
with the course. One credit hour.

**ENB311 Aquatic Ecology**  
An overview of physical, chemical, and biological components and their  
interactions in streams and lakes. Prerequisite: ENB 211. Students must enroll  
concurrently in ENB 312. Two credit hours.

**ENB312 Aquatic Ecology Lab**  
This laboratory is designed to support ENB 311 and must be taken concurrently  
with the course. Two credit hours.

**ENB321 Environmental Chemistry**  
A study of the chemistry associated with the atmosphere, soil and groundwater,  
and surface waters. Prerequisite: CHM 211. Students must enroll concurrently in  
ENB 322. Four credit hours.

**ENB322 Environmental Chemistry Lab**  
This laboratory is designed to support ENB 321 and must be taken concurrently  
with the course.
ENB331 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.

ENB400 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 Biology program director. Two credit hours.

ENB401 Environmental Analysis (Senior Seminar)
Designed as capstone of Environmental Biology major. Meant to teach valuable skills and give experience with tools needed for environmental careers and graduate school. Topics to include scientific writing and presentations, computer simulation modeling, Geographic Information Systems (GIS), and marketing yourself for a job or graduate school. Three credit hours.

General Science

SCI114 Physical Science Survey
Activities and lectures will cover motion, energy, gravity, light, radiation, earth materials, and space. Three credit hours.

SCI116 Theories on Origins
A survey of origin theories with emphasis on creation/evolution. Explores fossils, design, thermodynamics, chronology, flood geology, life in space, current creation research. Three credit hours.

SCI210 Science and Society
A study of major topics from several areas of science. Emphasis will be on the scientific method and the interaction between science and society. Topics will be examined in light of current societal needs. Three credit hours.

SCI223 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.

SCI224 Physical Geology
A study of the earth, make up of the crust, weathering, and erosional processes, and mountain building forces. Three credit hours.

SCI236 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.

SCI391–393 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 curriculum director. One to three credit hours, non-repeatable.

**SCI464 Methods of Teaching Sciences in the Secondary School**  
A study of the curriculum and methods of teaching sciences on the secondary level. Three credit hours.

**Physics**  
**PHY201–202 General Physics I and II**  
A lecture, demonstration, and laboratory class covering mechanics, heat, sound, electricity, relativity, nuclear science, and light. Prerequisites: MAT121–22. Three credit hours.

**PHY203–204 Physics lab**  
One hour.

**PHY481–483 Research in Physics**  
Designed for research on a topic of interest. One to three credit hours.

**Mathematics**  
**MAT111 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 EDU110. Three credit hours.

**MAT117 Business Mathematics**  
This course consists of a variety of mathematical topics of particular value in the business world. Topics covered include algebra applications, functions and their graphs, financial formulas, logic, and algorithms. Prerequisites: 12 credit hours; Basic Algebra. Three credit hours.

**MAT118 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 logic, and other applications. Prerequisites: 12 credit hours; Basic Algebra. Three credit hours.

**MAT121 Calculus 1**  
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. Three credit hours.

**MAT122 Calculus 2**
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. Prerequisites: MAT121 or permission of the mathematics curriculum director. Three credit hours.

**MAT223 Calculus 3**
We begin this course by investigating infinite sequences and infinite series; this consists of approximately half of the course. We will study particular classes of infinite series, a variety of convergence tests for infinite series, and techniques for finding power series representations for functions. The second half of this course is an investigation of limits, derivatives, and integrals of functions of more than one variable. Prerequisites: MAT122 or permission of the mathematics curriculum director. Three credit hours.

**MAT224 Calculus 4**
This class is a culmination of the topics covered in Calculus 1, Calculus 2, and Calculus 3. 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: MAT223 or permission of the mathematics curriculum director. Three credit hours.

**MAT313 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: MAT223. Three credit hours.

**MAT320 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.

**MAT326 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: MAT122. Three credit hours.

**MAT328 Modern 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: MAT223. Three credit hours.

**MAT338 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 the RSA encryption algorithm and its applications. Prerequisite: MAT122. Three credit hours.

**MAT393 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 curriculum director. Independent study in mathematics is a non-repeatable class. Prerequisites: MAT224; availability of professor; permission of the mathematics curriculum director. Three credit hours.

**MAT402 Senior Seminar in Mathematics**
This is a capstone course for the mathematics and the 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; MAT224. Three credit hours.

**MAT414 Modern 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: MAT223. Three credit hours.

MAT420 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: MAT223. Three credit hours.

MAT428 Real Analysis
Analytic properties of real functions, sequences and series.

MAT 464 Methods of Teaching Mathematics
This course is designed to help prepare the future high school teacher for his or her career in the classroom. We investigate the standard high school math curriculum, and study methods of teaching mathematical concepts to students at various levels within the curriculum. Prerequisite: MAT223. Three credit hours.

MAT483 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 curriculum director. The supervising faculty member must be willing to invest significant time into helping the student find appropriate resources, helping the student ask appropriate research questions, and helping the student 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: MAT224; availability of professor; permission of mathematics curriculum director. Three credit hours.