Department of Life Sciences

GRACE COLLEGE & GRACE THEOLOGICAL SEMINARY CATALOG 2026-2027

GRACE COLLEGE

Department of Life Sciences

Faculty

Full-time Faculty

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Chair, Department of Life Sciences
Director, Biology Program

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Director, Lilly Center for Lakes & Streams
Director, Environmental Science Program

Steve M. Douglas, Ph.D.

Richard C. Roberts, Ph.D.
Pre-Health Professions Coordinator

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Director, Center for Movement & Wellbeing
Director, Exercise Science Program

T.J. Zinke, Ph.D.

Part-time Instructors

Sushree Mohan, Ph.D.
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Megan Neuhart, M.S.
Jeremy Price, M.S.
Michael Voss, M.S.

Purpose

This Department prepares majors for careers in the life sciences, 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 – With Christ at the forefront of our thoughts, students come to understand that there are moral implications to how they conduct themselves both personally and professionally.
2. Competence – Students mature into a confident, yet humble understanding of their discipline enabling them to be competitive in the workplace and in graduate programs.
3. Service – Knowing how much God has gifted us, Grace Life Science students are motivated to serve others with the expectation of receiving nothing in return.

The Life Sciences Department offers coursework and programs in the biological, exercise, and environmental sciences.

Master's Degree

Blended programs in partnership with John Patrick University*
- Healthcare Administration (M.S. – a JPU degree) *

Majors

- Biology (B.S. or B.A. – 3 different concentrations available)
- 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. – 6 different concentrations available)
- Health Science (B.S. or B.A. – 10 different concentrations available)
- Life Science Education (B.S.)

Minors

- Biology
- Environmental Science
- Exercise Science
- Nutrition
- Public Health (in partnership with Lower Cost Model Consortium [LCMC]) *

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.

*Additional information regarding our partnership programs is available below in the general descriptions.

STRENGTHS WITHIN THE LIFE SCIENCES DEPARTMENT

Pre-professional preparation

The biological science programs offer students a contemporary understanding of life science topics and concepts through robust applied learning experiences in both the classroom and laboratory. This program includes traditional biology (with emphasis on research), neurobiology, pre-medicine, pre-dentistry, pre-pharmacy, pre-physical therapy, pre-physician assistant, pre-veterinary as well as other areas of healthcare.

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.

Exercise Science

The Grace College Exercise Science program develops Christ followers who apply Biblical values as they prepare for careers in Exercise Science or medical education graduate school in the areas of physical, occupational therapy, athletic training, nutrition and additional Health and Wellness professions through academic classes and applied learning experiences.

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.

BIOLOGICAL SCIENCE 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 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 conveys the wisdom 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 professions 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 several degrees offered within this program: the Bachelor of Arts and Bachelor of Science in Biology, the Bachelor of Arts and Bachelor of Science in Health Science, and the Master of Science in Healthcare Administration (a dual degree with JPU). Additionally, there is a minor in biology for those students in other majors desiring biology to accompany their chosen major. The Public Health Minor is also available in partnership with LCMC.

Biology majors are required to minor in chemistry and to take supporting physical science and math coursework. The focus of the biology major at Grace is to prepare students for graduate work in many areas of biology including anatomy, biochemistry, biotechnology, botany, genetics, microbiology, physiology and zoology, as well as providing general preparation for a health professions graduate program. 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, medical and pharmaceutical sales, or food science. Ecology and environmental biology have their own program of preparation at Grace.

The health science major provides a solid foundation in the biological and physical sciences, and is specifically 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. Students will meet with the health professions advisor early 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.

Program Learning Outcomes

1. Successful biology students are able to synthesize solutions to real-world biological problems using contemporary knowledge, tools and instrumentation rooted in fundamental biology.
2. Graduates are competent in using modern (and widely available) digital tools to assess and solve biological problems.
3. Students are able to articulate complex biological concepts and/or processes in essays and reports using contemporary (last 10 years) primary and secondary resources.
4. Graduates are equipped with specific techniques and skillsets required for practicing modern biology which have direct correlation with workforce skills that are in reasonable demand based on current labor statistics.
5. Students apply quantitative reasoning skills in solving biological problems, including computational and graphical analyses.

6. Students consistently apply ethical considerations to advances in biotechnology, carefully weighing incongruencies between Christianity and the development of new and powerful tools within the various subdisciplines of biology (e.g., gene editing).

MASTER'S DEGREE – BIOLOGICAL SCIENCES PROGRAM

MASTER OF SCIENCE IN HEALTHCARE ADMINISTRATION (MHA)*

The Master of Science in Healthcare Administration degree is offered through a partnership with John Patrick University (JPU) and consists of 40 credits. The master of science program can be combined with either the exercise science or health science undergraduate degree and can be completed within 4 years on the accelerated path. The MHA degree prepares students for administrative roles within the modern healthcare industry. These future administrators are trained within a variety of areas related to healthcare, including financial, marketing, legal and health information systems.

Required JPU courses (34 credits):

MHA 501 Healthcare Service Systems
MHA 503 Human Resources and Professional Development
MHA 504 Business Management for Healthcare Services
MHA 505 Health Policy: Legal Aspects
MHA 506 Organizational Theory of Management in Healthcare
MHA 508 Healthcare Economics
MHA 509 Healthcare Information Technology
MHA 510 Biostatistics for Decision Making
MHA 512 Quantitative Methods
MHA 513 Epidemiology and Research Activities
MHA 602 Medical Ethics
MHA 613 Market Research and Technology

Concentrations – select one (6 credits):

Radiology Concentration:
MHA 601 Economics in Radiology
MHA 604 Capstone Course

Oncology Concentration:
MHA 610 Economics in Oncology: Surgical, Medical, Radiation
MHA 614 Capstone Course

Executive Concentration:
MHA 626 CEO, CFO, COO Seminar Series
MHA 624 Capstone Course

NOTE: All course codes listed here are JPU designations and are subject to change. Coursework is completed entirely online at the time of this catalog printing. Course descriptions for JPU courses can be found here. Additional fees may apply to partnership programs. For more information, please contact the administrator of the Partnership Program at leitchjd@grace.edu or the Biology Program Director.

*This program results in a Master of Science degree from John Patrick University along with a bachelor's degree from Grace College.

MAJORS AND MINORS IN THE BIOLOGICAL SCIENCES PROGRAM

BIOLOGY MAJOR

Bachelor of Science and Bachelor of Arts

The requirement for a major in biology is 48-52 credits in biology and designated biology-related supporting courses, and includes a required minor in chemistry. Students can select a concentration in General Biology, Neurobiology or Medical Sales.

General Education Requirements (45 credits)

Grace Core (39 credits)
Bachelor of Arts or Bachelor of Science courses (6 credits for either)

Required Science Courses (21 credits):

BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
ENV 2110/2120 General Ecology I and Lab
BIO 3110 Cellular & Molecular Biology
BIO 4210 Genetics
BIO 4010 Senior Seminar

Choose Two Courses (7-8 credits):

CHM 3610 Environmental and Analytical Chemistry
BIO 3210/3220 Advanced Anatomy and Physiology I and Lab
BIO 3310/3320 Advanced Anatomy and Physiology II and Lab
BIO 4110/4120 Microbiology and Lab

General Biology Concentration (22 credits)

BIO 2210 Nutrition
BIO 2410/2420 Plant Biology and Lab
BIO 2510/2520 Animal Biology and Lab
BIO 3400 Development Biology
PHY 2140/2150 College Physics I and Lab
MAT 1230/1240 Calculus I and Lab

Neurobiology Concentration (21 credits)

PSY 2170 Abnormal Psychology
CHM 3610 Analytical & Environmental Chemistry
NSC 3110/NSM I Neuroscience Foundations
NSC 3120/NSM II Biological Basis of Perception & Movement
NSC 3130/NSM III Cognitive Neuroscience
NSC 3140/NSM IV Clinical Neuropathology
BIO 3710 Pathophysiology

Medical Sales Concentration (21 credits)

LPS 3110 Relationship Driven Professional Sales
LPS 3130 Negotiation in Business and Sales
LPS 3150 Sales Leadership
LPS 4110 Advanced Relationship Driven Professional Sales
COM 3030 Persuasion
PSY 3600 Motivation and Emotion
EXS 2000 Kinesiology

Experiential Learning Requirement (3 credits)
BIO 29XO Biology Internship
BIO 48XO Research in Bioscience

NOTE: Course description for PSY can be found in the Department of Behavioral Science course listings. LPS and NSC courses are offered via partnership with LCMC and course descriptions can be found here. Additional fees may apply to partnership programs. For more information, please contact the administrator of the Partnership Program at leitchjd@grace.edu.

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. Many concentrations require a minor in chemistry; for those areas for which this minor is not required (Physical and Occupational Therapy), another minor must be completed.

A health science major must also declare a concentration, which defines 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. A comparative analysis of the courses required to apply to each health professions field is available from the Pre-Health Professions advisor, if desired. Available concentrations include pre-medicine, pre-podiatry, pre-optometry, pre-dental, pre-veterinary, pre-chiropractic, pre-physician assistant, pre-physical therapy, pre-pharmacy, and pre-occupational therapy.

General Education Requirements for all concentrations (45 credits)
Grace Core (39 credits)
Bachelor of Arts or Bachelor of Science courses (6 credits for either)

CHIROPRACTIC CONCENTRATION (40-41 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 4210 Genetics
BIO 4010 Senior Seminar
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab

Choose One of These Course/Labs:
BIO 3210/3220 Advanced Anatomy & Physiology I + lab
BIO 3310/3320 Advanced Anatomy & Physiology II + lab
BIO 4110/4120 Microbiology + lab

Choose One of These Course/Labs:
MAT 1230/1240 Calculus I + lab
MAT 3200 Probability and Statistics

Required Field Learning
***Choose three credits from the following*:**
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

DENTAL CONCENTRATION (48-49 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 4210 Genetics
BIO 4010 Senior Seminar
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
BIO 3210/3220 Advanced Anatomy & Physiology I + lab
BIO 3310/3320 Advanced Anatomy & Physiology II + lab
BIO 4110/4120 Microbiology + lab

Choose One of These Course/Labs:
MAT 1230/1240 Calculus I + lab
MAT 3200 Probability and Statistics

Required Field Learning
***Choose three credits from the following*:**
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

MEDICINE (MD or DO) CONCENTRATION (43 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 4210 Genetics
BIO 4010 Senior Seminar

***Choose one of the following*:**
BIO 3210/3220 Advanced Anatomy & Physiology I + lab
BIO 3310/3320 Advanced Anatomy & Physiology II + lab
BIO 4110/4120 Microbiology + lab

Required Mathematics/Physical Sciences:
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
MAT 3200 Probability and Statistics

Additional Required Course:
PSY 1100 Introduction to Psychology

Required Field Learning
***Choose three credits from the following*:**
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

OPTOMETRY CONCENTRATION (45 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 3210/3220 Advanced Anatomy & Physiology I and Lab
BIO 4110/4120 Microbiology and Lab
BIO 4210 Genetics
BIO 4010 Senior Seminar

Required Mathematics/Physical Sciences:
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
MAT 1230/1240 Calculus I and Lab

Required Field Learning
***Choose three credits from the following*:**
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

OCCUPATIONAL THERAPY CONCENTRATION (45 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 1200 Medical Terminology
BIO 3210/3220 Advanced Anatomy & Physiology I and Lab
BIO 3310/3320 Advanced Anatomy & Physiology II and Lab
BIO 4210 Genetics
BIO 4010 Senior Seminar

Additional Required Courses:
MAT 3200 Probability and Statistics
PSY 1100 Introduction to Psychology
PSY 2170 Abnormal Psychology
PSY 2880 Life Span Development

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

PHYSICIAN ASSISTANT CONCENTRATION (46 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
BIO 1200 Medical Terminology
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and 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
BIO 4010 Senior Seminar

Additional Required Courses:
MAT 3200 Probability and Statistics
PSY 1100 Introduction to Psychology

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

PHARMACY CONCENTRATION (52 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and 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
BIO 4010 Senior Seminar

Required Mathematics/Physical Sciences:
MAT 1230/1240 Calculus I and Lab
PHY 2140/2150 College Physics I and Lab

Choose one of the following:
PHY 2160/2170 College Physics II + lab
MAT 1250/1260 Calculus II + lab

Additional Required Course:
BUS 2230 Economics

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

PODIATRY CONCENTRATION (43 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 4210 Genetics
BIO 4010 Senior Seminar

Choose one of the following:
BIO 3210/3220 Advanced Anatomy & Physiology I + lab
BIO 3310/3320 Advanced Anatomy & Physiology II + lab
BIO 4110/4120 Microbiology + lab

Required Mathematics/Physical Sciences:
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
MAT 3200 Probability and Statistics

Additional Required Course:
PSY 1100 Introduction to Psychology

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

PHYSICAL THERAPY CONCENTRATION (50 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 3210/3220 Advanced Anatomy & Physiology I and Lab
BIO 3310/3320 Advanced Anatomy & Physiology II and Lab
BIO 4210 Genetics
BIO 4010 Senior Seminar

Required Mathematics/Physical Sciences:
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
MAT 3200 Probability and Statistics

Choose one of the following:
PSY 2170 Abnormal Psychology
PSY 2880 Life Span Development

Additional Required Course:
EXS 4180 Exercise Physiology

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

VETERINARY CONCENTRATION (40 credits)

Required Science Courses:
BIO 1610/1620 General Biology I and Lab
BIO 1710/1720 General Biology II and Lab
BIO 2100 Health Science Seminar
ENV 2110/2120 General Ecology and Lab
BIO 3110 Cell and Molecular Biology
BIO 4110/4120 Microbiology and Lab
BIO 4210 Genetics
BIO 4010 Senior Seminar

Required Mathematics/Physical Sciences:
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
MAT 3200 Probability and Statistics

Required Field Learning
Choose three credits from the following:
BIO 2850/60/70 Healthcare Observation – 1 credit each
BIO 2810/20/30 Healthcare Experience

BIOLOGY MINOR

The requirement for a minor in biology is 20-21 credits in the life sciences.

Required Courses (12 credits):
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 – choose from the following (8-9 credits):
ENV 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 3400 Developmental Biology
BIO 4110/4120 Microbiology and Lab
BIO 4210 Genetics

PUBLIC HEALTH MINOR

The public minor complements many existing healthcare-related majors, including health and behavioral sciences. Students enrolled in this minor will learn about practices for assessing health indicators and outcomes, as well as the social and psychological factors that influence healthcare reform. Two of the courses in this minor are delivered remotely via partner institutions (LCMC).

Required Public Health Courses (15 credits):

BIO 2240 Introduction to Public Health
PHM 3100/PHM II Epidemiology
PHM 3200/PHM III Health Services
MAT 3200 Probability and Statistics
PSY 3550 Health Psychology

Elective – choose one of the following (3 credits):

SOC 1100 Introduction to Sociology
BIO 2200 Nutrition
BIO 2700/2710 Introduction to Microbiology and Lab*

*pre-requisite required

NOTE: Course descriptions for PSY and SOC can be found in the Department of Behavioral Science course listings. PHM courses are offered via partnership with LCMC and course descriptions can be found here. Additional fees may apply to partnership programs. For more information, please contact the administrator of the Partnership Program at leitchjd@grace.edu.

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.

Program Learning Outcomes

1. Students will develop a sense of purpose and satisfaction stemming from Biblical stewardship principles.
2. Students will demonstrate application of ecological concepts.
3. Students will demonstrate field sampling skills.
4. Students will apply field sampling skills in a research context.
5. Students will demonstrate oral presentation skills.
6. Students will demonstrate written communication skills.

Majors and Minors in the Environmental Science Program

ENVIRONMENTAL BIOLOGY MAJOR

Bachelor of Science and Bachelor of Arts

The requirement to complete a major in environmental biology is 49 credits in ecology, biology, and supporting courses. A minor in chemistry is also required. 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.

General Education Requirements (45 credits)

Grace Core (39 credits)
Bachelor of Arts or Bachelor of Science courses (6 credits for either)

Required Courses (36 credits):

MAT 1230/1240 Calculus I and Lab
BIO 1610/1620 General Biology I and Lab
ENV 2110/2120 General Ecology and Lab
PHY 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab
ENV 3210/3220 Aquatic Ecology and Lab
ENV 3410 Environmental Ethics
ENV 4010 Senior Seminar
ENV 4210 Genetics
ENV 4830 Field Education

Electives – choose from the following (at least 13 credits):

SCI 1160 Theories on Origins
BIO 1710/1720 General Biology II and Lab
ENV 2410/2420 Plant Biology and Lab
ENV 2510/2520 Animal Biology and Lab
POS 3010 State and Local Government
MAT 3200 Probability and Statistics
ENV 3950 Various Au Sable Institute courses
ENV 4110/4120 Microbiology and Lab
ENV 4810 Field Education
ENV 4820 Field Education
ENV 4830 Field Education

Required Chemistry minor (19 credits):

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 3610 Environmental Analytical Chemistry

NOTE: MAT 3200 Probability and Statistics and POS 3010 State and Local Government are the required courses for the additional general education portion of the Bachelor of Science degree.

ENVIRONMENTAL SCIENCE MAJOR

Bachelor of Science and Bachelor of Arts

The requirement to complete a major in environmental science is 45 credits 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.

General Education Requirements (45 credits)

Grace Core (39 credits)
Bachelor of Arts or Bachelor of Science courses (6 credits for either)

Required Courses (38 credits):

PSY 1100 Introduction to Psychology
BIO 1610/1620 General Biology I and Lab
CHM 1610/1620 General Chemistry I and Lab
CHM 1710/1720 General Chemistry II and Lab
SCI 2240 Physical Geology
ENV 2110/2120 General Ecology and Lab
ENV 3210/3220 Aquatic Ecology and Lab
ENV 3410 Environmental Ethics
CHM 3610 Environmental Analytical Chemistry
ENV 4010 Senior Seminar
ENV 4830 Field Education

Electives – choose from the following (at least 7 credits):

POS 2010 Introduction to Political Thought
SCI 1160 Theories of Origins
SOC 2140 Social Problems
ENV 2410/2420 Plant Biology and Lab
ENV 2510/2520 Animal Biology and Lab
POS 3010 State and Local Government
MAT 3200 Probability and Statistics
ENV 3950 Various Au Sable Institute courses
BIO 4110/4120 Microbiology and Lab
ENV 4210 Genetics
ENV 4810 Field Education
ENV 4820 Field Education
ENV 4830 Field Education

A minor is required for this major.

NOTE: MAT 3200 Probability and Statistics and POS 3010 State and Local Government are the required courses for the additional general education portion of the Bachelor of Science degree.

ENVIRONMENTAL STUDIES MAJOR

Bachelor of Science and Bachelor of Arts

The requirement to complete a major in environmental studies is 43 credits 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.

General Education Requirements (45 credits)
Grace Core (39 credits)
Bachelor of Arts or Bachelor of Science courses (6 credits for either)

Required Courses (33 credits):
BIO 1010/1020 Biological Science Survey and Lab
BUS 1010 Foundations of Business
CHM 1010/1020 Introduction to Chemistry and Lab
PSY 1100 Introduction to Psychology
SCI 2240 Physical Geology
ENV 2110/2120 General Ecology and Lab
ENV 3210/3220 Aquatic Ecology and Lab
ENV 3410 Environmental Ethics
ENV 4010 Senior Seminar
ENV 4830 Field Education

Electives – choose from the following (at least 10 credits):
GEO 1010 World Geography
SCI 1160 Theories of Origins
MAT 1185 Quantitative Reasoning
SOC 2140 Social Problems
POS 2200 Intro to American Government
ENV 2410/2420 Plant Biology and Lab
ENV 2510/2520 Animal Biology and Lab
POS 2010 Introduction to Political Thought
POS 3010 State and Local Government
POS 3100 Global Politics
MAT 3200 Probability & Statistics
GEO 3300 Geography of North America
CHM 3610 Environmental Analytical Chemistry
ENV 4110/4120 Microbiology and Lab
ENV 4810-4830 Field Education

A minor is required for this major.

NOTE: MAT 1185 Quantitative Reasoning and POS 3010 State and Local Government are the required courses for the additional general education portion of the Bachelor of Science degree.

ENVIRONMENTAL SCIENCE MINOR

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

Required Courses (14 credits):
BIO 1010/1020 Biological Science Survey and Lab
ENV 2110/2120 General Ecology and Lab
ENV 3210/3220 Aquatic Ecology and Lab
ENV 3410 Environmental Ethics

Elective – choose one of the following (4 credits):
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. Students develop assessment and management skills as they build upon knowledge and learn to integrate course material into decision making. These proficiencies launch students into practical and effective professional careers. The emphasis of this program is hands-on learning and skills training to prepare students for their desired professional field. Exercise science majors at Grace will be prepared for graduate work in various fields including physical therapy, occupational therapy, athletic training, nutritionist/registered dietician, exercise physiology, clinical rehab, and biomechanics. In addition, this major prepares students for careers in such areas as cardiopulmonary rehab, strength and conditioning, wellness center/health agency, corporate/adult fitness, personal training, group exercise instructor, and coaching. The Exercise Science major has six concentrations of study: Health and Wellness; Fitness and Nutrition; Nutrition; Pre-Athletic Training; Pre-Occupational Therapy and Pre-Physical Therapy.

Program Learning Outcomes

1. Describe, understand, and apply basic scientific knowledge, concepts and theories of anatomy, physiology, nutrition, biometrics, metabolism and other supplementary topics as they relate to human movement and exercise.
2. Demonstrate content comprehension of research along with the ability to read, understand, design, perform, and apply research as it relates to the fields of exercise science, human movement, health and wellness.
3. Design and implement exercise programs for healthy individuals, chronic diseases, and special populations along with providing appropriate modifications in response to health and performance goals.
4. Demonstrate the ability to effectively communicate (verbal, written, etc.) as a means to educate and manage the safe and proper instruction for fitness testing and/or exercise.
5. Perform physical fitness/health assessments by demonstrating the ability to select, perform and analyze various clinical tests and exams associated with determining current status or improvement of health and fitness in accordance with accepted guidelines.

EXERCISE SCIENCE MAJOR

Bachelor of Science

The requirements for the majors in exercise science are as follows: Health and Wellness - 53 credits (requires a minor); Fitness and Nutrition – 73 credits (no minor required); Nutrition - 71 credits (no minor required); Pre-Athletic Training - 69 credits (no minor required); Pre-Occupational Therapy - 64 credits (no minor required); and Pre-Physical Therapy – 66 credits (no minor required).

General Education Requirements (45 credits)
Grace Core (39 credits)
Bachelor of Science courses (6 credits)

HEALTH & WELLNESS CONCENTRATION (59 credits)

Exercise Science Foundation (33 credits):

EXS 1000 Introduction to Exercise Science
EXS 1050 Dynamics of Fitness
EXS 2000 Kinesiology
EXS 2130 Principles of Coaching
EXS 2250 Care and Prevention of Injuries
EXS 3000 Strength and Conditioning
EXS 3500 Fitness Assessment
EXS 3520 Exercise Prescription
EXS 3750 Exercise Cardiology
EXS 4180 Exercise Physiology
EXS 4240 Biomechanics

Science Requirements (19 credits):

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

Experiential Learning Requirements (3-5 credits):

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

FITNESS AND NUTRITION CONCENTRATION (73 credit credits)

Exercise Science Foundation (30 credits):

EXS 1000 Introduction to Exercise Science
EXS 1050 Dynamics of Fitness
EXS 2000 Kinesiology
EXS 2130 Principles of Coaching
EXS 2250 Care and Prevention of Injuries
EXS 1500 Group Fitness Instruction
EXS 3000 Strength and Conditioning
EXS 3300 Special Topics in Fitness
EXS 3500 Fitness Assessment
EXS 3520 Exercise Prescription
EXS 4180 Exercise Physiology

Nutrition Requirements (22 credits):

CHM 1010/1020 Introduction to Chemistry and Lab
BIO 2210 Nutrition
BIO 2240 Introduction to Public Health
EXS 2300 Nutrition for Life Cycles
EXS 3200 Nutrition for Sport Performance
EXS 3240 Nutrition Assessment and Counseling
EXS 3280 Nutrition for Health and Disease

Experiential Learning Requirements (3-5 credits):
EXS 4840 Research in Exercise Science
EXS 4930 Internship in Exercise Science

Science Requirements (8 credits):
BIO 2010/2020 Anatomy & Physiology I and Lab
BIO 2040/2050 Anatomy & Physiology II and Lab

Psychology Requirements – choose 2 courses from the following (6 credits):
PSY 1100 Introduction to Psychology
PSY 2170 Abnormal Psychology
PSY 2880 Lifespan Development
PSY 3300 Sports Psychology
PSY 3550 Health Psychology
PSY 3600 Motivation and Emotion

No minor is required for this major concentration.

NUTRITION CONCENTRATION (71 credits)

Science Courses (37 credits)

BIO 1610/1620 General Biology I and Lab
BIO 2010/2020 Anatomy & Physiology I and Lab
BIO 2040/2050 Anatomy & Physiology II and Lab
BIO 2210 Nutrition
BIO 2240 Introduction Public Health
BIO 2310 Biochemistry
BIO 2700/2010 Introduction to Microbiology and Lab
CHM 1610/1620 General Chemistry I and Lab
CHM 1710/1720 General Chemistry II and Lab
CHM 2610/2620 Organic Chemistry I and Lab

Psychology Course (3 credits)
PSY 2420 Organizational Psychology

Exercise Science Courses (24 credits):
EXS 1050 Dynamics of Fitness
EXS 2300 Nutrition for Lifecycles
EXS 3200 Nutrition for Sports Performance
EXS 3240 Nutrition Assessment & Counseling
EXS 3280 Nutrition for Health & Disease
NTR 2220/NDMII Food Science
NTR 2230/NDMIII Food Economics
NTR 3200/NDMVI Medical Nutrition Therapy

Experiential Learning Requirements (5 credits):
EXS 4840 Research in Exercise Science
EXS 4930 Internship in Exercise Science

No minor is required for this major concentration.

NTR courses are offered via partnership with LCMC and course descriptions can be found here. Additional fees may apply to partnership programs. For more information, please contact the administrator of the Partnership Program at leitchjd@grace.edu.

PRE-ATHLETIC TRAINING CONCENTRATION (69 credits)

Exercise Science Foundation (27 credits):

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 3500 Fitness Assessment
EXS 3520 Exercise Prescription
EXS 3750 Exercise Cardiology
EXS 4180 Exercise Physiology
EXS 4240 Biomechanics

Science Requirements (28 credits):

BIO 1200 Medical Terminology
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
PHY 2140/2150 College Physics I + Lab

Sports Psychology Requirements (9 credits)

PSY 3300 Sports Psychology
PSY 3550 Health Psychology
PSY 3600 Motivation and Emotion

Experiential Learning Requirements (3-5 credits):

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

PRE-OCCUPATIONAL THERAPY CONCENTRATION (64 credits)

Exercise Science Foundation (24 credits):

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 3500 Fitness Assessment
EXS 3520 Exercise Prescription
EXS 4180 Exercise Physiology
EXS 4240 Biomechanics

Science Requirements (20 credits):
BIO 1200 Medical Terminology
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

Mathematics Requirement (3 credits)
MAT 3200 Probability and Statistics

Sociology Requirement (3 credits)
SOC 1100 Introduction to Sociology

Sports Psychology Requirements (9 credits)
PSY 3300 Sports Psychology
PSY 3550 Health Psychology
PSY 3600 Motivation and Emotion

Experiential Learning Requirements (3-5 credits):
EXS 4840 Research in Exercise Science
EXS 4930 Internship in Exercise Science

PRE-PHYSICAL THERAPY CONCENTRATION (66 credits)

Exercise Science Foundation (24 credits):
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 3500 Fitness Assessment
EXS 3520 Exercise Prescription
EXS 4180 Exercise Physiology
EXS 4240 Biomechanics

Science Requirements (35 credits):
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 2140/2150 College Physics I and Lab
PHY 2160/2170 College Physics II and Lab

Experiential Learning Requirements (3-5 credits):
EXS 4840 Research in Exercise Science
EXS 4930 Internship in Exercise Science

Suggested Electives* - choose from the following (6 credits):
BIO 1200 Medical Terminology
PSY 2170 Abnormal Psychology
PSY 2360 Child and Adolescent Psychology
PSY 2880 Life Span Development
PSY 3300 Sport Psychology
PSY 3550 Health Psychology
PSY 3600 Motivation and Emotion

*Suggested electives are intended to enhance the major, but are not part of the required 66 credits.

No minor is required for this major.

NOTE: Course descriptions for PSY can be found in the Department of Behavioral Science course listings.

EXERCISE SCIENCE MINOR

The requirement for a minor in exercise nutrition is 22 credits in exercise science-focused courses.

Anatomy and Physiology Requirements – choose one of the following:
BIO 2010/2020 Anatomy & Physiology 1 and Lab
BIO 3310/3320 Adv Anatomy & Physiology 1 and Lab

Exercise Science (15 credits):
EXS 1050 Dynamics of Fitness
EXS 2000 Kinesiology
EXS 2250 Care and Prevention of Injury
EXS 3000 Strength and Conditioning
EXS 3500 Fitness Assessment

***Choose one of the following*:**
BIO 2210 Nutrition
EXS 4180 Exercise Physiology
EXS 4240 Biomechanics

NUTRITION MINOR

The requirement for a minor in nutrition is 22 credits in nutrition-focused courses.

Required Courses (22 credits):
CHM 1010/1020 Introduction to Chemistry and Lab
BIO 2240 Introduction to Public Health
BIO 2210 Nutrition
EXS 2300 Nutrition for Life Cycles
EXS 3200 Nutrition for Sports Performance
EXS 3240 Nutrition Assessment & Counseling
EXS 3280 Nutrition for Health and Disease

LIFE SCIENCE EDUCATION MAJOR

Bachelor of Science

The major in life science education is designed for students desiring to teach science, particularly biology, at the secondary level (high school and middle school).

The requirement for a major in life science education is a minimum of 32 credits in the sciences, including a minimum of 17 credits of designated biology courses, eight credits of chemistry and four credits of general ecology. The major also requires a minimum of 36 credits 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.

General Education Requirements (45 credits)

Grace Core (39 credits)
Bachelor of Science courses (6 credits)

Required Science Courses (32 credits):

SCI 1140 Physical Science Survey
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 3110 Cell & Molecular Biology
BIO 4210 Genetics

Professional Education Requirements (36 credits):

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 3800 Classroom Assessment & Learning Environment
SED 4600 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 Department of Education course listings. MAT 1185 Quantitative Reasoning is the required math course for the additional general education portion of the Bachelor of Science degree.

COURSE DESCRIPTIONS

Some majors, minors, concentrations, and courses are offered online through a consortium of regionally accredited colleges and universities. Instruction is provided by faculty employed by partner institutions within the consortium, with technology and administrative support provided by Rize Education.

Oversight of courses offered through the consortium are reviewed and approved by Grace College and its accreditor. Students register through Grace College and receive academic credit from Grace College.

BIOLOGY

BIO 1010 Bioscience Survey
A broad overview 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 Bioscience Survey Laboratory. (Credit will not be given for both BIO 1010 and BIO 1610). Three credits.

BIO 1020 Bioscience Survey Laboratory
The laboratory is designed to support BIO 1010 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 1040 Introduction to Medical Terminology
An introductory level course which surveys terms and phrases commonly used in the medical setting. Emphasis is placed on understanding word roots which enables students to synthesize understanding of both familiar and unfamiliar medical language. Word elements from major body systems, medical procedures (including laboratory and diagnostic) and pharmacotherapeutics are covered by this course. One credit.

BIO 1200 Medical Terminology
Students will focus on building core medical vocabulary by analyzing their prefix, suffix, root, connecting and combining forms. Through such analysis, students gain an understanding of the human body's structure, function and diseases. Prerequisite: BIO 1710 or BIO 2040, or permission of the instructor. Three credits.

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 credits.

BIO 1620 General Biology I Laboratory
The laboratory is designed to support BIO 1610 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

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 1610/1620 or permission of the instructor. Students must enroll concurrently in BIO 1720. Four credits.

BIO 1720 General Biology II Laboratory
The laboratory is designed to support BIO 1710 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 2010 Anatomy and Physiology I
This course is designed for students pursuing a career in an allied health field (nursing, medical imaging, 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 are covered in course BIO 2040. Students must enroll concurrently in BIO 2020. Four credits.

BIO 2020 Anatomy and Physiology I Lab
The laboratory is designed to support BIO 2010 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 2040 Anatomy and Physiology II
This course is designed for students pursuing a career in an allied health field (nursing, medical imaging, 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 are covered in course BIO 2010. Students must enroll concurrently in BIO 2050. Prerequisites: BIO 2010/2020 or consent of the instructor. Four credits.

BIO 2050 Anatomy and Physiology II Lab
The laboratory is designed to support BIO 2040 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

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. Prerequisites: BIO 1610/1620 and BIO 1710/1720, or consent of the instructor. One credit.

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 credits. (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.) This course has a fee for consumables used in its labs.

BIO 2210 Principles of 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 1610/1620 or consent of the biology program director. Three credits.

BIO 2240 Introduction to Public Health
This is an introductory course in public health designed for students pursuing careers in healthcare. Various aspects of public health are explored, including: infection disease, psychosocial behavior, environmental issues, and governmental policy-making. Epidemiological approaches to understanding public health data feature prominently throughout the course. Three credits.

BIO 2310 Biochemistry
A study of the basic composition, function and metabolism of carbohydrates, lipids and proteins. Emphasis is placed on the catalytic function and regulation of enzymes, and on the process of cellular respiration. Some consideration is given to the role of nucleic acids in cellular metabolism. The course includes hands-on laboratory experiments involving current procedures in biochemistry. This course has a fee for consumables used in its labs. Prerequisite: CHM 1710/1720 and BIO 1610/1620, or consent of instructor. Three credits.

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 1010/1020 or BIO 1610/1620 or consent of the instructor. Students must enroll concurrently in BIO 2420. Four credits.

BIO 2420 Plant Biology Laboratory
The laboratory is designed to support BIO 2410 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

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 1010/1020 or BIO 1610/1620 or consent of the instructor. Students must enroll concurrently in BIO 2520. Four credits.

BIO 2520 Animal Biology Laboratory
The laboratory is designed to support BIO 2510 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 2700 Introduction to Microbiology
An organ systems approach to the study of disease-related microorganisms intended for the nursing major. The foundations of microbiology are presented through the lens of disease processes as bacterial, viral and parasitic infections relevant to health professionals are explored. Other course topics include: host-parasite interaction; virulence factors; hospital and community acquired infections; mechanisms of gene transfer; disinfection; antimicrobial drugs; and, immunology. Prerequisite: BIO 1010/1020; or BIO 1610/1620; or BIO 2010/2020; or consent of the instructor. Students must enroll concurrently in BIO 2710. Four credits.

BIO 2710 Introduction to Microbiology Laboratory
The laboratory is designed to support BIO 2700 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 2810-2830 Healthcare Experience
This course requires 40 hours per credit earned of active participation in providing healthcare as a trained healthcare worker, during which time the student will better understand the roles in medicine and the art of interacting with patients in a healthcare setting. This could include serving as a Certified Nursing Assistant, Patient Care Technician, Pharmacy Technician, Occupational Therapy or Physical Therapy Aide, etc. Several of these require outside licensing and training that is to be pursued by the student independently. As these are paid occupations, securing employment in such positions is the student's responsibility. If this course is taken more than once, the same occupation and position may be used for subsequent enrollments. Prerequisite: BIO 1610/1620 and BIO 1710/1720, or consent of the instructor. One to three credits.

BIO 2850, 2860 and 2870 Healthcare Observation 1, 2, 3
Each of these courses requires 40 hours of shadowing a healthcare professional in the area of the student's desired future occupation, during which time the student will become more familiar with the specifics of the career. Shadowing may require that the student be vetted through the volunteer process of a healthcare facility (may include an application, drug screening and/or health testing, which are the student's responsibility to complete). A different healthcare professional must be shadowed for each course; the intent is that the student completes all 3 courses to fulfill the required 3 credits of practical experience (the shadowed medical practitioners may be in the same profession). Prerequisite: BIO 1610/1620 and BIO 1710/1720, or consent of the instructor. The courses may be taken concurrently. One credit per course.

BIO 2910-2930 Biology Internship
This course is designed to award college credit to students who participate in a life science internship. Internship opportunities can range from working alongside zookeepers and wildlife managers to participating in bench science at Q/A and research laboratories. Students must commit to a total of 40 hours per credit at the internship site which can also include the time needed for completing the required internship journal assignments. Students are responsible for providing their own transportation during the duration of the internship opportunity and must complete an off-campus safety training course prior to starting the internship. Prerequisite: BIO 1610/1620 and BIO 1710/1720, or consent of the instructor. One to three credits.

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, processes of energy extraction, membrane transport, 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. This course has a fee for consumables used in its labs. Prerequisite: BIO 2310 or consent of the instructor. Three credits.

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, 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 is covered in course BIO 3310/3320. Students must enroll concurrently in BIO 3220. Prerequisites: BIO 1710/1720 or consent of the instructor. Four credits.

BIO 3220 Advanced Anatomy and Physiology I Lab
The laboratory is designed to support BIO 3210 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 3310 Advanced Anatomy and Physiology II
This course is designed for students preparing for graduate studies in biology/medically related programs (medicine, physical therapy, pharmacy, 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 is covered in course BIO 3210/3220. Students must enroll concurrently in BIO 3320. Prerequisites: BIO 1710/1720 or consent of the instructor. Four credits.

BIO 3320 Advanced Anatomy and Physiology II Lab
The laboratory is designed to support BIO 3310 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

BIO 3400 Developmental Biology
This course uses modern biology in understanding the molecular and cellular basis for the formation of tissues, organs and organisms. Model organisms both classically and contemporarily used for understanding developmental biology will be discussed in detail, including: Xenopus, the zebrafish, the chick, the mouse and Drosophila, in addition to others. An understanding of the embryonic origins and development of the ectoderm, mesoderm and endoderm in humans is guided by recent scientific discoveries and experimentation. Students will also learn important bench skills being employed for studying and understanding development such as tissue staining, phase-contrast microscopy and real-time PCR. Moral and ethical issues facing Christians regarding preimplantation diagnosis, gene editing and stem cell technology are also discussed. Prerequisites: BIO 1610/1620 and 1710/1720. Three credits.

BIO 3710 Pathophysiology
This course covers the biological basis for disease within the human body. Pathological conditions are presented by organ system, including disorders caused by injury, infection, deficiency, and genetics. A review of basic anatomy and physiology is included with each body system in order to contrast normal and diseased states of tissues and organs. The origin of each disease is analyzed down to a cellular or tissue level to provide root understanding of the cause of human disease. Prerequisite: BIO 1710/1720 or BIO 2040/2050. Three credits.

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 credits, 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. Coursework is designed to challenge the student to integrate their current biological knowledge with a Biblical worldview, as well as to consider their future role as a Christ-follower in the workforce. Prerequisites: BIO 3110 and senior class standing, or consent of the instructor. Three credits.

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: Life

immunology, genetics, metabolism, food, preservation, and diseases. Prerequisite: BIO 1610/1620 and BIO 1710/1720, or consent of the instructor. Students must enroll concurrently in BIO 4120. Four credits.

BIO 4120 Microbiology Laboratory
The laboratory is designed to support BIO 4110 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

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 process of expression of genetic information through protein synthesis is also considered in depth. The course includes hands-on laboratory experiments involving current procedures in molecular genetics. This course has a fee for consumables used in its labs. Prerequisite: BIO 2310 or consent of the instructor. Three credits.

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 1710 and BIO 2310 or consent of the biology program director. One to three credits. Maximum of six credits permitted.

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 credits.

ENV 2120 General Ecology Lab
This laboratory is designed to support ENV 2110 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

ENV 2410 Plant Biology
Integrated study of plants as organisms. Deals with plant structure, physiology, development, genetics, ecology, and classification of major plant groups. (Cross-listed; register as BIO 2410.) Prerequisite: BIO 1010/1020 or BIO 1610/1620 or consent of the instructor. Students must enroll concurrently in BIO 2420. Four credits.

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.) This course has a fee for consumables used in its labs.

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: BIO 1010/1020 or BIO 1610/1620 or consent of the instructor. Students must enroll concurrently in ENV 2520. Four credits. (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.) This course has a fee for consumables used in its labs.

ENV 3210 Aquatic Ecology
An overview of physical, chemical, and biological components and their interactions in streams and lakes. Prerequisite: ENV 2110/2120. Students must enroll concurrently in ENV 3220. Four credits.

ENV 3220 Aquatic Ecology Lab
This laboratory is designed to support ENV 3210 and must be taken concurrently with the course. This course has a fee for consumables used in its labs.

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 credits of coursework. Three credits.

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 1610/1620 and senior class standing, or consent of the instructor. Three credits. (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 2310 or consent of the instructor. Three credits. (Cross-listed; register as BIO 4210.) This course has a fee for consumables used in its labs.

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. One to six credits.

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 credits.

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 credits.

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 credits.

EXS 2130 Principles of Coaching
This course is focused on providing a practical guide to coaching. The fundamentals needed to build a successful sport, personal training or team/group experience begin with basic principles such as practice planning, team building and program development. This class provides instruction to assist the student in possessing the skills to lead and coach individuals in their specific field. Three credits. Offered every other year.

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 credits.

EXS 2250 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. Prerequisites: EXS 2000 or BIO 1710/1720 or BIO 3210/3220. Three credits. This course has a fee for consumables used in its labs.

EXS 2300 Nutrition for Life Cycles
Nutrient requirements and anthropometric aspects of nutrition for the following life stages: prenatal, pregnancy, lactation, infancy, childhood, adolescence, adult, and late adulthood. Exploration of the influences on the diet of each life cycle, including physiological, psychological, sociological, and cultural factors. Pre-requisite: CHM 1010/1020. Three credits.

EXS 2500 Group Fitness Instruction
This course prepares students with skill and practice for group fitness instruction. The fundamentals needed to build a successful fitness class that engages the individual as well as the group. Students will begin building basic principles such as class planning, program development, and strategies for modifications or progression of clients. This class positions students for certification in group fitness instruction. Three credits. Offered every other year.

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 fitness professional. Prerequisite: EXS 2000. Three credits.

EXS 3200 Nutrition for Sports Performance
Supporting and advancing athletic performance through nutritional strategies and therapies. Exploring specific nutritional needs among a variety of sports, as well as proper recovery methods and diet planning for optimizing body composition, speed, explosive and endurance-

based performances. Examination of the risks and benefits of ergogenic supplements found in fitness and details concerning the effects of eating disorders. Students will frequently practice planning and strategizing diet and recovery methods for various sports and athlete profiles. Prerequisite: BIO 2210. Three credits.

EXS 3280 Nutrition for Health and Disease

This course examines the biochemical relationship between food and chronic illness and introduces the use of nutrition as an intervention for pathological conditions, encompassing the complex relationship between nutrients and human cells. Additional focus includes the human microbiome, as well as nutrigenetics – how personal genetics impact nutrient uptake and utilization – and nutrigenomics – how food components impact genetic expression. Prerequisites: BIO 2210 and CHM 1010/1020. Three credits.

EXS 3240 Nutrition Assessment and Counseling

This course evaluates current methodologies and professional techniques used to assess an individual's nutritional status, lifestyle, and diet planning abilities. Students explore the utilization of nutritionally therapeutic interventions for disease prevention, counseling techniques for client support, building counselor-client rapport, and proper diet care documentation. Laboratory experience will provide numerous hands-on assessment opportunities and planning experiences. Prerequisite: EXS 3280. Three credits.

EXS 3300 Special Topics in Fitness

This course addresses the wide variety of fitness trends rapidly entering the fitness market space. In a hands-on learning approach, students will learn to engage, experiment, and practice these fitness topics with guidance, empowering students to incorporate different trends and topics into their repertoire as fitness professionals. Three credits. Offered every other year.

EXS 3500 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. Prerequisite: BIO 1710/1720. Three credits. This course has a fee for consumables used in its labs.

EXS 3520 Exercise Prescription

This course applies physiological principles to design targeted exercise programs. Students learn to assess fitness components for diverse populations. Training variables are manipulated to optimize health, fitness, and athletic performance. Coursework emphasizes evidence-based practices from the American College of Sports Medicine (ACSM) and National Academy of Sports Medicine (NASM). Students transition from theoretical exercise science to practical, real-world application. Prerequisites: EXS 3600 Fitness Assessment. Three Credits.

EXS 3750 Exercise Cardiology

The design of the course is geared toward an in-depth study of the anatomy of the heart. Students will engage in assessment and testing of the heart in a resting and active state. An examination of abnormalities found in general, athletic, pediatric, women, and special populations. ECG testing and equipment skills proficiency along with data interpretation will be included as well. Prerequisites: BIO 2010/2020, or BIO 3210/3220. Three credits. This course has a fee for consumables used in its labs.

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 2040/2050 or BIO 3310/3320. Three credits. This course has a fee for consumables used in its labs.

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 2040/2050 or BIO 3310/3320. Three credits.

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 credits.

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 credits of credit is given and is equivalent to approximately 120 hours in the work-place (or 40 work hours per credit). Prerequisites: EXS 1000. Three credits.