

# Natural Science

## Requirements for Bachelor of Arts with Major in Natural Science

Concentration in Georgia Secondary School Broad Fields Science

Concentration in Pre-engineering

Concentration in Pre-nursing

Concentration in Pre-physical therapy

(See individual sections for each listing)

## Requirements for Associate of Arts Degree in Basic Health Sciences

This program provides the foundation for entering a number of baccalaureate-level programs in the health professions. Examples are medical technology, occupational therapy, respiratory therapy, and radiologic technology.

The core and distribution requirements for an associate of arts degree in basic health sciences are those listed for associate degrees on page 27, with the exception that a mathematics (3 hours) and natural science lab course (4 hours) is not required since they are included in the concentration..

## Core Requirements

|  |    |
|--|----|
| BIB 111. Old Testament Introduction.....   | 3  |
| BIB 142. New Testament Introduction.....   | 3  |
| COR 100. The Christian Mind.....   | 2  |
| COR 225-226. Cultural Heritage of the West I, II.....  | 6  |
| ENG 111. English Composition.....  | 3  |
| (Exemption permitted with credit from AP language/ composition.)   |    |
| HIS 325. Twentieth-Century World History.....  | 3  |
| PE 151. Concepts in Physical Education.....  | 2  |
| PE 152. Personal Aerobics and General Fitness.....   | 1  |
| See the Core and Distribution Requirements section for descriptions of requirements and lists of courses. Courses from a major department can not fulfill both a concentration requirement and a distribution requirement. |    |
| Fine Arts Distribution Requirement.....  | 3  |
| Social Science Distribution Requirement.....   | 3  |
| Core requirements subtotal.....  | 29 |

## Area of Concentration

|  |    |
|--|----|
| BIO 111-112. General Biology I, II.....      | 8  |
| CHE 121-122. General Chemistry I, II.....    | 8  |
| MAT 141. College Algebra.....                | 4  |
| MAT 142. Pre-Calculus or                     |    |
| STA 251. Elementary Statistical Methods..... | 4  |
| Additional Science.....                      | 4  |
| Elective Units.....                          | *8 |
| Concentration requirements subtotal.....     | 36 |
| Total degree hours.....                      | 65 |

## Requirements for Major in Natural Science with Georgia Secondary School Broad Fields Science Certification (grades 6-12)

Students interested in secondary level certification should consult with the Chair of the Education Department and should also refer to the Education Department's section of this catalog.

## Core Requirements

|   |   |
|---|---|
| BIB 111. Old Testament Introduction.....  | 3 |
| BIB 142. New Testament Introduction.....  | 3 |
| BIB 277-278. Christian Doctrine I, II.....  | 6 |
| COR 100. The Christian Mind.....  | 2 |
| COR 225-226. Cultural Heritage of the West I, II.....   | 6 |
| COR 325. Global Trends for the Twenty-First Century.....  | 3 |
| COR 337. Intercultural Experience.....  | 1 |
| COR 340. Christ and Culture Seminar.....  | 1 |
| ENG 111. English Composition.....   | 3 |
| Must be completed during first year at Covenant.  |   |
| Exemption permitted with credit from AP language/ composition.                                  |   |
| HIS 325. Twentieth-Century World History.....   | 3 |
| PE 151. Concepts in PE.....   | 2 |
| PE 152. Personal Aerobics.....  | 1 |
| Fine Arts Distribution Requirement.....   | 3 |
| (See the Core and Distribution Requirements section on page 24 for a list of approved courses.) |   |

\* Students should consult the catalogs of particular institutions offering baccalaureate degrees in professions in order to select appropriate social science, science, and elective courses. Depending on the program desired, students might select such courses as the following: **Social Science:** General Psychology, Developmental Psychology, Principles of Sociology, Sociology of Health, American Government, U.S. History. **Science:** General Physics, Microbiology, Genetics, Anatomy and Physiology, Organic Chemistry, Analytical Chemistry.

|   |    |
|---|----|
| Foreign Language.....   | 8  |
| Proficiency in one year of an elementary-level foreign language. (Note: Students who have taken two years of the same foreign language in high school and attained an average grade of 2.67 or higher on a 4.0 scale are exempted from the foreign language requirement.) |    |
| Humanities Distribution Requirement.....  | 3  |
| (See the Core and Distribution Requirements section on page 24 for a list of approved courses.)   |    |
| Social Science Distribution Requirement.....  | 3  |
| (See the Core and Distribution Requirements section on page 24 for a list of approved courses.)   |    |
| General education core subtotal.....  | 51 |

## Teaching Field

Choose one of the three following options:

### Biology Option

|   |        |
|---|--------|
| BIO 111-112. General Biology I, II .....  | 8      |
| BIO 220-221. Human Anatomy and Physiology or<br>BIO 320-321. Comparative Anatomy and Comparative<br>Animal Physiology ..... | 8      |
| BIO 315. Macroevolution and Microevolution or<br>BIO. 413. Genetics .....   | 3 or 4 |
| BIO 360. Ecology.....   | 4      |
| BIO 492. Senior Integration Paper .....   | 2      |
| CHE 121-122. General Chemistry .....  | 8      |
| MAT 142. Pre-Calculus Math.....   | 4      |
| NSC 108. Problems of Geological Science.....  | 4      |
| NSC 112. Astronomy .....  | 4      |
| PHY 131. General College Physics I .....  | 4      |
| Total Biology Option subtotal.....  | 49-50  |

### Chemistry Option

|  |    |
|--|----|
| BIO 111. General Biology I.....                            | 4  |
| BIO 112. General Biology II or<br>NSC 112. Astronomy ..... | 4  |
| CHE 121-122. General Chemistry I, II .....                 | 8  |
| CHE 323-324. Organic Chemistry I, II .....                 | 8  |
| CHE 225. Analytical Chemistry.....                         | 4  |
| CHE 423. Biochemistry .....                                | 4  |
| CHE 492. Senior Integration Paper .....                    | 2  |
| MAT 142. Pre-Calculus math .....                           | 4  |
| NSC 108. Problems of Geological Science.....               | 4  |
| PHY 131-132. General College Physics I, II .....           | 8  |
| Total Chemistry Option subtotal .....                      | 50 |

### Physics Option

|   |   |
|---|---|
| BIO 111. General Biology I.....                                       | 4 |
| CHE 121. General Chemistry I .....                                    | 4 |
| CHE 122. General Chemistry II or<br>BIO 112. General Biology II ..... | 4 |
| MAT 145-146. Calculus I, II.....                                      | 8 |
| MAT 247. Calculus III.....  | 4 |

|   |    |
|---|----|
| NSC 108. Problems of Geological Science ..... | 4  |
| NSC 112. Astronomy .....                      | 4  |
| PHY 231-232. General Physics I, II .....      | 8  |
| PHY 233. Optics and Modern Physics .....      | 4  |
| PHY 351-352. Quantum Mechanics I, II.....     | 6  |
| PHY 341. Electromagnetism I.....              | 3  |
| PHY 492. Senior Integration Paper .....       | 2  |
| Total Physics Option subtotal .....           | 55 |

## Professional Education

|  |         |
|--|---------|
| EDU 215. Technology for Educators .....                            | 3       |
| EDU 221. Introduction to Teaching .....                            | 3       |
| EDU 222. Educational Psychology .....                              | 3       |
| EDU 234. Teaching in a Pluralistic Society .....                   | 3       |
| EDU 322. Nature and Needs of the Early Adolescent<br>Learner ..... | 3       |
| EDU 340. Curriculum and Methods in the Secondary<br>School .....   | 4       |
| EDU 361. Education of Exceptional Children.....                    | 3       |
| EDU 370. History and Philosophy of American<br>Education 'W' ..... | 3       |
| EDU 411. Educational Assessment .....                              | 1       |
| EDU 491. Student Teaching Seminar.....                             | 1       |
| EDU 497-498. Teaching Practicums I, II - Secondary 'S' .           | 15      |
| Professional Education subtotal .....                              | 42      |
| Total degree hours for Biology Option.....                         | 142-143 |
| Total degree hours for Chemistry Option.....                       | 143     |
| Total degree hours for Physics Option .....                        | 148     |

(Total hours will vary depending on need to take mathematics prerequisites.)

Also, COR 337. Intercultural Experience may be taken for 0-3 units. In addition, it is possible to be exempt from taking foreign language and/or math and/or English composition courses. Total minimum number of credit units required for graduation is 126.

## Natural Science Courses

The courses NSC 105, 108, 110, 112 and 115 all satisfy the core laboratory science requirement. These courses may not be applied to the majors in biology, chemistry or physics.

### 105. Problems of Physical Science

An introduction to the methods of physical science, including experimentation, formulation of hypotheses and testing hypotheses. The course will include a brief survey of the history of science and a discussion of the meaning of scientific proof. Problems of Physical Science is recommended for elementary education majors. It may be taken only if at least one of the following prerequisites has been met: the student has passed MAT 122. Fundamentals of Mathematics or a higher level mathematics course with a "C" or better, or the student has qualified for and is currently taking a mathematics course higher than MAT 122, or the

student has been granted an exemption to the Covenant College mathematics requirement due to a demonstrated proficiency in mathematics. Three hours lecture. Two hours laboratory. Laboratory fee: \$15. Four units.

#### **106. Problems of Biological Science**

An examination of major topics in contemporary biology that raise issues of particular concern for Christians in the early 21<sup>st</sup> century: The role and status of contemporary science in the modern, postmodern and Christian perspective; the revolution in molecular genetics and its implications for technology and human self understanding. Origins issues including evolutionary theories, creation and intelligent design perspectives will be studied. Human nature issues including sociobiology and related evolutionary explanations for human behavior, morality and religion will also be examined. Laboratory sessions will focus on understanding science as a human endeavor, taxonomy topics, exercises in genetic engineering and examination of evolutionary theory. Three hours lecture, two hours laboratory. Laboratory fee: \$15. Four units.

#### **107. Concepts in Human Heredity**

An introduction to key concepts in human genetics, with emphasis on the molecular mechanisms of information flow in cells, the impact of genes on phenotype, human genetic disease and population genetics. A long-term quantitative analysis of inheritance patterns in fruit flies, and molecular analysis of human genes are included as major components of the course laboratory. Three hours lecture. Three hours laboratory. Laboratory fee: \$15. Four units.

#### **108. Problems of Geological Science**

An examination of the history of uniformitarianism and its impact on modern geology with an analysis of its consistency in relation to the scientific method. Alternative theories of the development of landforms will be considered. Laboratory will include work with geological specimens. Three hours lecture. Two hours laboratory. Laboratory fee: \$15. Four units.

#### **110. Problems of Environmental Science**

This course is a study of factors affecting the environment with special attention to humankind's responsible stewardship of the natural creation. The course includes a study of the chemistry and physics of the atmosphere, including weather phenomena, and the chemistry and physics of internal and surface characteristics of landforms. Weathering and erosion are discussed in relation to climatology. Special emphasis will be placed on pollution problems of land, water and the atmosphere. Three hours lecture. One hour laboratory. Laboratory fee: \$15. Four units.

#### **112. Astronomy**

A study of our understanding of the solar system from ancient times to the present, including findings of modern observational astronomy. Topics covered may include: the solar system, planets and their moons and rings, satellites, asteroids, comets, the galaxy, stellar theory, quasars, black holes and red shift. Prerequisite: MAT 122 or above, or math placement level 3 or above. Laboratory fee: \$15. Four units.

#### **115. Science in Perspective**

A study of natural science in its historical and philosophical context, paying particular attention to the interplay between the practice of science, and religious and philosophical belief. The course will present a foundation for understanding science from a Christian perspective, and from this vantage point will trace the various philosophical traditions surrounding the growth of science from the Early Modern period to the present. A variety of topics in the physical and biological sciences will be used to illustrate the development of science, and in each case students will focus beyond the science itself to related philosophical and theological considerations. Topics to be discussed: forces and motion, gravity, light, special relativity, quantum theory and atomic structure, properties and molecules of living systems, levels of biological organization, molecular and cellular biology, macro/microevolution and intelligent design theory. Laboratory exercises for this course will attempt to illustrate the human aspects of scientific investigation and provide a foundation for judging the strength of scientific claims. Prerequisite: Sophomore standing or higher; or MAT 122 or above, or math placement level 3 or above. Exceptions can be made with permission of the instructors. Laboratory fee: \$15. Four units.

#### **301. Christian Issues in Nursing**

This course will examine the biblical-theological basis for medical decisions dealing with compassion, care for the elderly, life issues and death issues in nursing. Legal, economic and political issues for nurses may also be addressed. Emphasis throughout the course will be on ministering to the whole person. These issues will often be discussed using a case study methodology and also using professionals who have worked in the medical field. Materials from the Christian Medical and Dental Society may be utilized. Two units.

#### **492. Senior Integration Paper in Natural Science.**

See page 25. Two units.