

# Natural Science Program

## Purpose Statement

*The Department of Natural Science provides:*

- a career-oriented approach to pre-professional preparation in the health sciences
- a liberal arts and sciences approach to environmental health and sustainability
- a hands-on approach to education in the laboratory and through student research
- preparation to meet the Kansas State Department of Education standards for licensure in biology and chemistry

**General Education Student Learning Outcome:** Students should be able to demonstrate an understanding of how the natural sciences construct knowledge of the world.

## General Education Performance Indicators

Students should be able to:

1. Summarize the current consensus of the scientific community with regards to the structure and function of some aspect of the physical or biological world.
2. Illustrate their knowledge of the changing nature of the consensus of the scientific community with regards to the structure and function of some aspect of the physical or biological world, by outlining the historical changes in that consensus.
3. Report on their experiences with those methods and processes of the natural sciences which they conducted in the laboratory.

## Biochemistry Major (Recommended for Pre-Medical Students)

### Requirements (44 hours)

**G-CH 111** College Chemistry I (5 hours)

**CH 112** College Chemistry II (5 hours)

**CH 251** Organic Chemistry I (5 hours)

**CH 252** Organic Chemistry II (5 hours)

**CH 201** Quantitative Analysis (4 hours)

**BI/CH 370** Biochemistry I (4 hours)

**G-BI 111** College Biology I (4 hours)

**BI 112** College Biology II (4 hours)

**BI/CH 310** Statistical Data Analysis (4 hours)

**BI/CH 373** Biochemistry II (4 hours)

### Select one from the following (3-4 hours)

**BI 283** Genetics (4 hours)

**BI 384** Advanced Genetics (4 hours)

**CH 390** Instrumental Analysis (3 hours)

### Required Supporting Courses (12 hours)

**G-PH 215** General Physics I (4 hours)

**PH 216** General Physics II (4 hours)

**\*NS 375A** Research Methods (1 hour)

**NS 375B** Junior Seminar (1 hour)

**\*NS 475A** Senior Research Part A (1 hour)

**NS 475B** Senior Research Part B (1 hour)

*Total: 59-60 hours*

## Biology Major

### Requirements (32 hours)

*A minimum of 32 semester hours of biological science coursework, including*

**G-BI 111** College Biology I (4 hours)

**BI 112** College Biology II (4 hours)

**BI 283** Genetics (4 hours)

**BI 310** Statistical Data Analysis (4 hours)

8 credit hours chosen from among the 300 Level BI Courses  
8 additional credit hours of biology electives to reach required 32 hours

### **Required Supporting Courses (28 hours)**

**G-CH 111** College Chemistry I (5 hours)  
**CH 112** College Chemistry II (5 hours)  
**CH 251** Organic Chemistry I (5 hours)  
**CH 252** Organic Chemistry II (5 hours)  
**G-PH 215** General Physics I (4 hours)  
**\*NS 375A** Research Methods (1 hour)  
**NS 375B** Junior Seminar (1 hour)  
**\*NS 475A** Senior Research Part A (1 hour)  
**NS 475B** Senior Research Part B (1 hour)

*Total: 60 hours*

## **Biology Major: Pre-Med Track**

### **Requirements (16 hours)**

**G-BI 111** College Biology I (4 hours)  
**BI 112** College Biology II (4 hours)  
**BI 283** Genetics (4 hours)  
**BI 310** Statistical Data Analysis (4 hours)

### **Additional Biology courses (8 hours)**

**BI 334** Immunology (4 hours)  
Another 4-hour biology course

### **300-level Biology courses (8 hours)**

**BI/CH 370** Biochemistry I (4 hours)  
**BI/CH 373** Biochemistry II (4 hours)

### **Required Supporting Courses (28 hours)**

**G-CH 111** College Chemistry I (5 hours)  
**CH 112** College Chemistry II (5 hours)  
**CH 251** Organic Chemistry I (5 hours)  
**CH 252** Organic Chemistry II (5 hours)  
**G-PH 215** General Physics I (4 hours)  
**\*NS 375A** Research Methods (1 hour)  
**NS 375B** Junior Seminar (1 hour)  
**\*NS 475A** Senior Research Part A (1 hour)  
**NS 475B** Senior Research Part B (1 hour)

*Total: 60 hours*

### **Suggested Course:**

**PH 216** General Physics II (4 hours)

## **Biology Major: PA Track**

### **Requirements (16 hours)**

**G-BI 111** College Biology I (4 hours)  
**BI 112** College Biology II (4 hours)  
**BI 283** Genetics (4 hours)  
**BI 310** Statistical Data Analysis (4 hours)

### **Additional Biology courses (8 hours)**

**BI 225** Human Anatomy (4 hours)  
**BI 315** Human Physiology (4 hours)

### **300-level Biology courses (8 hours)**

**BI/CH 370** Biochemistry I (4 hours)

**BI/CH 373** Biochemistry II (4 hours)

### **Required Supporting Courses (28 hours)**

**G-CH 111** College Chemistry I (5 hours)

**CH 112** College Chemistry II (5 hours)

**CH 251** Organic Chemistry I (5 hours)

**CH 252** Organic Chemistry II (5 hours)

**G-PH 215** General Physics I (4 hours)

**\*NS 375A** Research Methods (1 hour)

**NS 375B** Junior Seminar (1 hour)

**\*NS 475A** Senior Research Part A (1 hour)

**NS 475B** Senior Research Part B (1 hour)

*Total: 60 hours*

## **Biology Major: Pre-Vet Track**

### **Requirements (16 hours)**

**G-BI 111** College Biology I (4 hours)

**BI 112** College Biology II (4 hours)

**BI 283** Genetics (4 hours)

**BI 310** Statistical Data Analysis (4 hours)

### **Additional Biology courses (9 hours)**

**BI 234** Microbiology (5 hours)

**BI 315** Human Physiology (4 hours)

### **300-level Biology courses (8 hours)**

**BI/CH 370** Biochemistry I (4 hours)

**BI/CH 373** Biochemistry II (4 hours)

### **Required Supporting Courses (28 hours)**

**G-CH 111** College Chemistry I (5 hours)

**CH 112** College Chemistry II (5 hours)

**CH 251** Organic Chemistry I (5 hours)

**CH 252** Organic Chemistry II (5 hours)

**G-PH 215** General Physics I (4 hours)

**\*NS 375A** Research Methods (1 hour)

**NS 375B** Junior Seminar (1 hour)

**\*NS 475A** Senior Research Part A (1 hour)

**NS 475B** Senior Research Part B (1 hour)

*Total: 61 hours*

## **Biology Major - Teaching Licensure in Biology (6-12)**

### **Biology Major for Teacher Licensure**

*A minimum of 32 semester hours, including:*

**G-BI 111** College Biology I (4 hours)

**BI 112** College Biology II (4 hours)

**G-BI 201** Biodiversity (4 hours)

**BI 283** Genetics (4 hours)

**\*NS 375A** Research Methods (1 hour)

**NS 375B** Junior Seminar (1 hour)

12 credit hours chosen from among the remaining BI or NS courses numbered 200 or higher, including at least one organismal course and one population course.

## Required Supporting Courses

- G-CH 111** College Chemistry I (5 hours)
- CH 112** College Chemistry II (5 hours)
- CH 251** Organic Chemistry I (5 hours)
- CI 232** Educational Technology (2 hours)
- G-MA 221** Elementary Applied Statistics (4 hours)
- G-PE 150** Concepts in Holistic Health (3 hours)
- G-PH 215** General Physics I (4 hours)
- G-PY 101** Introduction to Psychology (3 hours)

Students pursuing this major must also meet all professional requirements for teacher licensure in the Curriculum and Instruction Department.

## Biology Minor

### Requirements

*A minimum of 20 semester hours, including*

- G-BI 111** College Biology I (4 hours)
- BI 112** College Biology II (4 hours)
- BI 283** Genetics (4 hours)

At least eight hours of additional biology courses, numbered 200 or higher

### Required Supporting Courses

- G-CH 111** College Chemistry I (5 hours)
- CH 251** Organic Chemistry I (5 hours)

## Chemistry Major

### Requirements

*A minimum of 36 semester hours including*

- G-CH 111** Chemistry I (5 hours)
- CH 112** Chemistry II (5 hours)
- CH 251** Organic Chemistry I (5 hours)
- CH 252** Organic Chemistry II (5 hours)
- CH 201** Quantitative Analysis (4 hours)
- CH 390** Instrumental Analysis (3 hours)
- CH 385** Advanced Inorganic Chemistry (4 hours)
- CH 400** General Physical Chemistry (5 hours)

### Required Supporting Courses

- G-PH 205** College Physics I (5 hour)
- PH 206** College Physics II (5 hour)
- \*NS 375A** Research Methods (1 hour)
- NS 375B** Junior Seminar (1 hour)
- \*NS 475A** Senior Research Part A (1 hour)
- NS 475B** Senior Research Part B (1 hour)
- G-MA 111** Calculus I (4 hours)
- MA 112** Calculus II (4 hours)

### Recommended Supporting Courses

- G-BI 111** College Biology I (4 hours)
- BI 112** College Biology II (4 hours)

## Chemistry Major - Teaching Licensure in Chemistry (6-12)

### Chemistry Major for Teacher Licensure

A minimum of 32 hours including:

- G- CH 111** College Chemistry I (5 hours)
- CH 112** College Chemistry II (5 hours)
- CH 251** Organic Chemistry I (5 hours)
- CH 201** Quantitative Analysis (4 hours)
- CH 310** Statistical Data Analysis (4 hours)
- CH 385** Advanced Inorganic (4 hours)
- CH 388** Lab Assisting Internship (2 hours)

Remaining hours must come from CH 252 Organic Chemistry II or CH courses 300 level or above.

### Required Courses

- G-BI 111** College Biology I (4 hours)
- BI 112** College Biology II (4 hours)
- CI 406 (ED 406)** Methods for Teaching Natural Science in the Secondary School (3 hours)
- G-PH 215** General Physics I (4 hours)
- PH 216** General Physics II (4 hours)
- \*NS 375A** Research Methods (1 hour)
- NS 375B** Junior Seminar (1 hour)

### Suggested Courses

- G-NS 141** Environmental Science (4 hours)
- G-PC 251** Geology (4 hours)
- G-PC 275** Astronomy (4 hours)
- CH 252** Organic Chemistry II (5 hours)
- G-MA 111** Calculus I (4 hours)
- MA 112** Calculus II (4 hours)
- PH 205** College Physics I (replace G-PH 215) (5 hours)
- PH 206** College Physics II (replace G-PH 216) (5 hours)
- \*NS 475A** Senior Research Part A (1 hour)
- NS 475B** Senior Research Part B (1 hour)

Students pursuing this major must also meet all professional requirements for teacher licensure in the curriculum and instruction department.

## Chemistry Minor

### Requirements

A minimum of 24 hours including

- G-CH 111** College Chemistry I (5 hours)
- CH 112** College Chemistry II (5 hours)
- CH 251** Organic Chemistry I (5 hours)
- CH 252** Organic Chemistry II (5 hours)
- CH 201** Quantitative Analysis (4 hours)

## Environmental Stewardship Major

This program achieves its purposes when its graduates:

- demonstrate knowledge of contemporary theories in the natural sciences
- demonstrate skill in the application of laboratory and field experimental techniques
- demonstrate knowledge of contemporary theories of human social systems and behavior
- demonstrate a critical understanding of their personal roles in history, culture, and community
- evaluate the impacts of human society and Earth's natural systems on one another
- differentiate between their personal belief system and societal belief systems

- express a personal environmental ethic

## Required Natural Science Courses

**G-BI 101** Principles of Biology (4 hours) or **G-BI 111** College Biology I (4 hours)  
**G-BI 201** Biodiversity (4 hours)  
**G-CH 101** Principles of Chemistry (4 hours) or **G-CH105** GOB Chemistry for Life  
**G-NS 141** Environmental Science (4 hours)  
**G-PH 215** General Physics I (4 hours)  
**G-PC 251** Geology (4 hours)  
**G-NS 245** Climatology (4 hours)  
**BI 325** Human Ecology, Epidemiology and Public Health (4 hours) OR  
**BI 365** Evolution and Ecology (4 hours)  
**NS 404** Environmental Ethics (2 hours)  
**NS 495** Field Experience (4 hours)

## Electives from Humanities, Social Science, and Technology

Select at least 27 hours from the following:

**CM 325** Conflict Communication (3 hours)  
**EC 202** Survey of Economics (3 hours)  
**G-ET 201** Social Entrepreneurship (3 hours)  
 Up to 2 courses (G-HI or HI200+) (6 hours)  
**G-PE 170** Personal/Community Health (2 hours)  
**G-PR 104** Ethics (3 hours)  
**G-PR 107** Critical Thinking (3 hours)  
**G-PR 203** Science and Religion (3 hours)  
**G-PR 206** Religion and Environmental Stewardship (3 hours)  
**G-PS 125** International Relations (3 hours)  
**G-PS 130** Principles of Geography (3 hours)  
**G-PS 215** Global Peace Studies (3 hours)  
**PY/SO 303** Social Psychology (3-4 hours)  
**G-SO 101** Introduction to Sociology (3 hours)  
**SO 206** Social Problems (3-4 hours)  
**SO 320** Urban Sociology (3 hours)  
**\*G-TE 333** Technology and Society (3-4 hours)

Other courses as approved by both the advisor and co-advisor.

## Other Course Requirements

**NS 350** Stewardship Seminar 1/semester (4 required)  
**\*NS 375A** Research Methods (1 hour)  
**NS 375B** Junior Seminar (1 hour)  
**\*NS 475A** Senior Research Part A (1 hour)  
**NS 475B** Senior Research Part B (1 hour)

## Environmental Science Minor

### Requirements

**G-BI 101** Principles of Biology or **G-BI 111** College Biology I or **G-CH 101** Principles of Chemistry (4 hours) or **G-CH105** GOB Chemistry for Life (4 hours)  
**G-NS 141** Environmental Science (4 hours)  
**G-PC 251** Geology (4 hours)  
**G-NS 245** Climatology (4 hours)  
**NS 495** Field Experience (4 hours)

## Environmental Stewardship Minor

### Requirements

**G-NS 141** Environmental Science (4 hours)

**G-PC 251** Geology or

**G-PC 245** Climatology (4 hours)

**NS 495** Field Experience (4 hours)

**NS 350** Stewardship Seminar (2 hours)

Electives from Environmental Stewardship Major Electives list (6 hours)