GENERAL EDUCATION:

Distribution Courses

Distribution courses emphasize ways of thinking and methods of inquiry within various disciplines. Students are required to take one course in each of the following seven areas:

• Arts—Visual and Performing

• History

• Literature

• Mathematics

• Natural Science (lab required)

• Social and Behavioral Sciences

• Advanced Quantitative/Scientific Reasoning

Courses

Advanced Quantitative/Scientific Reasoning (AQSR)

Courses in the AQSR category have Mathematics or Natural Science prerequisites and often additional prerequisites. For the full list of prerequisites, see the course description section of this catalog.

ONE COURSE from

|  |  |  |  |
| --- | --- | --- | --- |
| ANTH 235 | Bones and Stones: How Archaeologists Know | 4 | Annually |
| ANTH 306 | Primate Ecology and Social Behavior | 4 | F, Sp |
| ANTH 307 | Human Nature: Evolution, Ecology, and Behavior | 4 | F, Sp |
| BIOL 314 | Genetics | 4 | F |
| BIOL 335 | Human Physiology | 4 | F, Sp, Su |
| CHEM 104 | General Chemistry II | 4 | F, Sp, Su |
| CHEM 106 | General, Organic, and Biological Chemistry II | 4 | F, Sp, Su |
| CSCI 423 | Analysis of Algorithms | 4 | Sp |
| GEOG 201 | Mapping Our Changing World | 4 | F, Sp |
| GEOG 205 | Earth's Physical Environments | 4 | F, Sp |

Biology B.S.

Course Requirements

Courses

|  |  |  |  |
| --- | --- | --- | --- |
| BIOL 111 | Introductory Biology I | 4 | F, Sp, Su |
| BIOL 112 | Introductory Biology II | 4 | F, Sp, Su |
| BIOL 213 | Plant and Animal Form and Function | 4 | F, Sp |
|  |  |  |  |
| BIOL 241 | Biology Research Colloquium | 0.5 | F, Sp |
| BIOL 314 | Genetics | 4 | F |
| BIOL 318 | Ecology | 4 | F |
| BIOL 320 | Cell and Molecular Biology | 4 | Sp |
| BIOL 460 | Biology Senior Seminar | 3 | F, Sp |

Note: BIOL 241: (take twice for 0.5 credits each)

ONE COURSE from

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| BIOL 321 | Invertebrate Zoology | 4 | As needed |
| BIOL 324 | Vertebrate Zoology | 4 | As needed |
| BIOL 329 | Comparative Vertebrate Anatomy | 4 | As needed |
|  |  |  |  |
| BIOL 330 | Developmental Biology of Animals | 4 | Alternate years |
| BIOL 353 | The Plant Kingdom | 4 | As needed |
| BIOL 354 | Plant Growth and Development | 4 | As needed |

TWO ADDITIONAL COURSES in biology at the 300-level or above (One of the two courses may consist of 3 or more credits in BIOL 491-494.)

Cognates

|  |  |  |  |
| --- | --- | --- | --- |
| CHEM 103 | General Chemistry I | 4 | F, Sp, Su |
| CHEM 104 | General Chemistry II | 4 | F, Sp, Su |
| CHEM 205 | Organic Chemistry I | 4 | F, Su |
| CHEM 206 | Organic Chemistry II | 4 | Sp, Su |
|  |   |  |  |
| MATH 240 | Statistical Methods I | 4 | F, Sp, Su |
|  | -Or- |  |  |
| BIOL 240 | Biostatistics | 4 | Sp |
|  |   |  |  |
| MATH 209 | Precalculus Mathematics | 4 | F, Sp, Su |
|  | -Or- |  |  |
| MATH 212 | Calculus I | 4 | F, Sp, Su |
|  |   |  |  |
| PHYS 101 | General Physics I | 4 | F, Su |
|  | -And- |  |  |
| PHYS 102 | General Physics II | 4 | Sp, Su |
|  |   |  |  |
|  | -Or- |  |  |
|  |   |  |  |
| PHYS 200 | Mechanics | 4 | F |
|  | -And- |  |  |
| PHYS 201 | Electricity and Magnetism | 4 | Sp |

Note: Students considering a double major in biology and chemistry should select PHYS 200 and PHYS 201.

Total Credit Hours: 70-72

Biology Minor

Course Requirements

The minor in biology consists of a minimum of 21 credit hours, as follows:

Courses

|  |  |  |  |
| --- | --- | --- | --- |
| BIOL 111 | Introductory Biology I | 4 | F, Sp, Su |
| BIOL 112 | Introductory Biology II | 4 | F, Sp, Su |
| BIOL 213 | Plant and Animal Form and Function | 4 | F, Sp |

and a minimum of 9 additional credits from BIOL 231 or any others at the 300-level or above.

Total Credit Hours: 21-24

Biology M.A.

Admission Requirements

1. A completed application form accompanied by a $50 nonrefundable application fee.

2. Official transcripts of all undergraduate and graduate records.

3. A minimum cumulative grade point average of 3.00 on a 4.00 scale in undergraduate course work.

4. A minimum of 24 credit hours of courses in biology, including those courses required of RIC undergraduate biology majors.

5. A minimum of 6 credit hours of courses in physics.

6. A minimum of 16 credit hours of courses in chemistry, including organic chemistry.

7. An official report of scores on the Graduate Record Examination, including the general test and the subject test in biology. (This may be waived for RIC graduates in biology.)

8. Three letters of recommendation.

9. A faculty research advisor must be identified.

10. A plan of study approved by the advisor and appropriate dean.

11. An interview. (This may be waived for RIC graduates in biology.)

Retention Requirements

1. Students must maintain an overall graduate G.P.A. of 3.0 or above (B grade or better in each course).

2. Students must remain continuously enrolled in at least 1 credit of required coursework per semester (summer sessions are optional).

Course Requirements

Courses

|  |  |  |  |
| --- | --- | --- | --- |
| BIOL 560 | Graduate Seminar | 1 | F |
| BIOL 651-654 | Advanced Topics in Biology | 1-4 | F, Sp, Su |
| BIOL 691-696 | Directed Research | 1-6 | F, Sp, Su |
|  | ADDITIONAL COURSES in science at the graduate level | 18-21 |  |
|  | WRITTEN THESIS based on the research done in BIOL 691–696 |  |  |

Note: BIOL 560: Taken twice for a total of 2 credits.

Note: BIOL 691-696: 6 credit hours minimum

Note: Additional courses in science: 12 to 15 credit hours must be in biology for a total of 24 credit hours of biology courses.

Total Credit Hours: 30

**FSEHD programs:**

**Secondary Education:**

Biology Major

Students electing a major in Biology apply to the Feinstein School of Education and Human Development and meet admission requirements that include a 2.50 in their content grade point average (GPA) and a minimum grade of C. Students must maintain the content GPA of 2.50 for retention and, along with satisfactorily completing required courses in secondary education (minimum grade B-), complete the following courses to obtain Biology certification:

Requirements

Biology

|  |  |  |  |
| --- | --- | --- | --- |
| BIOL 111 | Introductory Biology I | 4 | F, Sp, Su |
| BIOL 112 | Introductory Biology II | 4 | F, Sp, Su |
| BIOL 213 | Plant and Animal Form and Function | 4 | F, Sp |
| BIOL 314 | Genetics | 4 | F |
| BIOL 318 | Ecology | 4 | F |
| BIOL 320 | Cell and Molecular Biology | 4 | Sp |
| BIOL 348 | Microbiology | 4 | F, Sp, Su |
| BIOL 491-494 | Research in Biology | 1-4 | F, Sp, Su |

Chemistry

|  |  |  |  |
| --- | --- | --- | --- |
| CHEM 103 | General Chemistry I | 4 | F, Sp, Su |
| CHEM 104 | General Chemistry II | 4 | F, Sp, Su |
| CHEM 205 | Organic Chemistry I | 4 | F, Su |
| CHEM 206 | Organic Chemistry II | 4 | Sp, Su |

Mathematics

|  |  |  |  |
| --- | --- | --- | --- |
| MATH 209 | Precalculus Mathematics | 4 | F, Sp, Su |
| MATH 240 | Statistical Methods I | 4 | F, Sp, Su |

Physical Science

|  |  |  |  |
| --- | --- | --- | --- |
| PSCI 212 | Introduction to Geology | 4 | F, Su |
| PSCI 357 | Historical and Contemporary Contexts of Science | 3 | As needed |

Physics

|  |  |  |  |
| --- | --- | --- | --- |
| PHYS 101 | General Physics I | 4 | F, Su |
|  | -Or- |  |  |
| PHYS 200 | Mechanics | 4 | F |

ONE COURSE from:

|  |  |  |  |
| --- | --- | --- | --- |
| BIOL 321 | Invertebrate Zoology | 4 | As needed |
| BIOL 324 | Vertebrate Zoology | 4 | As needed |
| BIOL 329 | Comparative Vertebrate Anatomy | 4 | As needed |
| BIOL 330 | Developmental Biology of Animals | 4 | Alternate yesars |
| BIOL 353 | The Plant Kingdom | 4 | As needed |
| BIOL 354 | Plant Growth and Development | 4 | As needed |

Note: To enroll in SED 411 and SED 412, students must have completed at least 55 credit hours of required and cognate courses in the major or have the consent of the program advisor. Prior to enrolling in SED 421, students must have completed all requirements in the biology major.

Total Credit Hours: 68

**COURSE DESCRIPTIONS:**

## ANTH - Anthropology

ANTH 390 - Directed Study (1-4)

Designed to be a substitute for a traditional course under the instruction of a faculty member. This course may be repeated with a change in topic.

Prerequisite: Completion of at least 60 college credits; completion of at least two of the following courses: ANTH 101, ANTH 102, ANTH 103, ANTH 104; and consent of instructor and department chair.

Offered: As needed.

ANTH 402 - Evolution of the Capacity for Culture (4)

The evolution of the biological and social capacities that made culture the central attribute of humans is examined. Topics include evolution of the human diet, tool making, social interaction, and language.

Prerequisite: Completion of at least one of the following: ANTH 304, ANTH 306, or BIOL 314; or consent of instructor.

Offered: Alternate years.

ANTH 424 - North American Indians (4)

Selected societies of Native North America are examined as they relate to anthropological concerns and contribute to an understanding of the similarities and variations in cultures of the region.

Prerequisite: Completion of at least 60 college credits and any course in a social or behavioral science, or consent of department chair.

Offered: Alternate years.

## BIOL - Biology

BIOL 100 - Fundamental Concepts of Biology (4)

Unifying concepts from various levels of biological organization are considered. This course is for students pursuing studies other than the natural sciences. Lecture and laboratory. 6 contact hours. Not open to biology and clinical laboratory science majors. Students cannot receive credit for both BIOL 100 and BIOL 109.

General Education Category: Natural Science.

Prerequisite: Completed college mathematics competency.

Offered: Fall, Spring, Summer.

BIOL 103 - Human Biology (3)

The fundamental principles and concepts of biology as they pertain to the human organism are introduced. This course is intended for students who are pursuing studies in areas other than the natural sciences. Lecture.

Prerequisite: Completed college mathematics competency.

Offered: Fall, Spring, Summer.

BIOL 108 - Basic Principles of Biology (4)

Basic biological principles are introduced. This course prepares students for courses in anatomy, physiology, and microbiology. Lecture and laboratory (dissection included). 6 contact hours. Not open to biology majors.

General Education Category: Natural Science.

Prerequisite: Completed college mathematics competency.

Offered: Fall, Spring, Summer.

BIOL 111 - Introductory Biology I (4)

Emphasis is on the molecular and cellular nature of living systems. This course is intended for science majors and any student with an interest in science. Lecture and laboratory. 6 contact hours.

General Education Category: Natural Science.

Prerequisite: Completed college mathematics competency.

Offered: Fall, Spring, Summer.

BIOL 112 - Introductory Biology II (4)

Emphasis is on organismal and ecological levels of organization. This course is intended for science majors and any student with an interest in science. Lecture and laboratory (dissection included). 6 contact hours.

Prerequisite: BIOL 111 with a minimum grade of C-.

Offered: Fall, Spring, Summer.

BIOL 213 – Plant and Animal Form and Function (4)

Students explore multicellularity by examining the anatomical and physiological adaptations of plants and animals to the common challenges of life. Mathematical problem-solving and scientific writing skills are practiced throughout. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a minimum grade of C..

Offered: Fall, Spring.

BIOL 231 - Human Anatomy (4)

By using a systematic approach, study is made of the human organism with respect to the histological and gross anatomy. Lecture and laboratory (dissection included). 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or BIOL 108, with a grade of C or better.

Offered: Fall, Spring, Summer.

BIOL 240 - Biostatistics (4)

Elementary probability theory serves as a foundation to learn research design, sampling, hypothesis testing, and statistical inferences in biology. Students use SPSS to statistically analyze problems typical of biological research.

Prerequisite: Completion of college mathematics competency and a grade of C or better in BIOL 100, BIOL 108 or BIOL 112.

Offered: Spring.

BIOL 241 - Biology Research Colloquium (0.5)

Students attend formal scientific research seminars given by invited outside speakers from diverse fields of biology. Students discuss the research with the speaker and their peers. This course must be taken for two semesters. Graded S, U.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or BIOL 108, with a grade of C or better.

Offered: Fall, Spring.

BIOL 261 - The World's Forests (4)

Interactions between people and the three major types of forests of the world (boreal, temperate, and tropical) are explored from historical, ecological, cultural, socioeconomic, environmental, and ethical perspectives.

General Education Category: Connections.

Prerequisite: FYS 100, FYW 100/FYW 100P/FYW 100H, and at least 45 credits.

Offered: Fall (even years).

BIOL 314 - Genetics (4)

A balanced treatment of classical Mendelian concepts, population topics, and the recent advances in molecular genetics are presented. Lecture and laboratory. 6 contact hours.

General Education Category: Advanced Quantitative/Scientific Reasoning.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better.

Offered: Fall.

BIOL 318 - Ecology (4)

The ecosystem is introduced. Emphasis is on how the interaction of environmental factors has shaped, influenced, and controlled the distribution of biomes, communities, and populations. Lecture, laboratory, and field trips. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, and BIOL 213.

Offered: Fall.

BIOL 320 - Cell and Molecular Biology (4)

The structure and function of cells as living units are presented. Cell metabolism, reproduction, and steady-state controls are discussed. The biochemical and ultrastructural nature of cells is examined. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111, BIOL 112, with a grade of C or better, BIOL 314; CHEM 205.

Offered: Spring.

BIOL 321 - Invertebrate Zoology (4)

Study is made of common invertebrate types, their life histories, adaptive morphology, and physiology, with respect to their environment and to their phylogenetic position. Lecture and laboratory.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better.

Offered: As needed.

BIOL 324 - Vertebrate Zoology (4)

The origin, evolution, life history, and adaptation of the subphylum vertebrata are studied. Local fauna is stressed in the laboratory. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better.

Offered: As needed.

BIOL 329 - Comparative Vertebrate Anatomy (4)

Comparison of the anatomy and functions of the vertebrates from the evolutionary point of view is presented. Included is detailed dissection of selected representatives from five classes of vertebrates. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better.

Offered: As needed.

BIOL 330 - Developmental Biology of Animals (4)

A descriptive and experimental approach is applied to animal ontogeny, with consideration of cell fate determination, differentiation, morphogenesis, and pattern formation. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111, BIOL 112, with a grade of C or better, and BIOL 314.

Offered: Alternate years.

BIOL 335 - Human Physiology (4)

Basic principles of physiology are introduced, with emphasis on homeostatic mechanisms. Attention is given to the functions of organ systems and coordination in the whole human organism. 6 contact hours.

General Education Category: Gen. Ed. Advanced Quantitative/Scientific Reasoning.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or BIOL 108, with a grade of C or better and BIOL 231.

Offered: Fall, Spring, Summer.

BIOL 348 - Microbiology (4)

Microbial structure and metabolism, dynamics of microbial populations, disease causation, microbial genetics, and virology are presented. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or BIOL 108, with a grade of C or better.

Offered: Fall, Spring, Summer.

BIOL 353 - The Plant Kingdom (4)

The major groups of plants are surveyed, with emphasis on evolutionary aspects, reproductive strategies, and ecological interrelationships. Structural features of plant cells, tissues, and organs are emphasized. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or consent of instructor.

Offered: As needed.

BIOL 354 - Plant Growth and Development (4)

Topics include photophysiology, nitrogen metabolism, phytohormones, translocation, mineral nutrition, and the anatomical structures associated with these processes. Lecture and laboratory. 6 contact hours.

Prerequisite: BIOL 111 and BIOL 112, with a grade of C or better, or consent of instructor.

Offered: As needed.

BIOL 420 - Biochemistry of Proteins and Nucleic Acids (3)

The physical and chemical properties and metabolism of proteins and nucleic acids are discussed. Students cannot receive credit for both BIOL 420 and CHEM 420. Lecture.

Prerequisite: Completed college mathematics competency, CHEM 206 and either BIOL 320 or CHEM 310.

Offered: As needed.

BIOL 421 - Biochemistry of Energy Metabolism (3)

The physical and chemical properties of carbohydrates and lipids are presented. Students cannot receive credit for both BIOL 421 and CHEM 421. Lecture.

Prerequisite: Completed college mathematics competency, CHEM 206 and either BIOL 320 or CHEM 310.

Offered: As needed.

BIOL 429 - Medical Microbiology (4)

This is a study of medically important microorganisms, with emphasis on the molecular mechanisms of pathogenicity. 6 contact hours.

Prerequisite: BIOL 348; CHEM 205, CHEM 206.

Offered: As needed.

BIOL 431 - Immunology (3)

This is a study of animal immune responses, with emphasis on the properties of antigens and immunoglobulins, cellular communication, pathology, and the development and regulation of humoral and cellular immunity. Lecture.

Prerequisite: BIOL 111, BIOL 112, with a grade of C or better; CHEM 205; or consent of department chair.

Offered: As needed.

BIOL 435 - Comparative Animal Physiology (3)

This is an exploration of diverse physiological adaptations to environmental conditions. Particular emphasis is placed on the wide variety of mechanisms that animals use to cope with diverse environmental conditions.

Prerequisite: BIOL 111, BIOL 112 with a grade of C or better, and BIOL 314.

Offered: As needed.

BIOL 440 - Evolution (3)

An interdisciplinary approach is used to examine evolutionary trends of plants and animals, the origin of life, molecular evolution, and speciation. Lecture.

Prerequisite: BIOL 314.

Offered: As needed.

BIOL 443 - Fundamentals of Neurobiology (4)

A comprehensive survey of central nervous system (CNS) biology is presented. Emphasis is placed on molecular, cellular and physiological processes of the nervous system.. 6 contact hours.

Prerequisite: BIOL 111, BIOL 112 and BIOL 314.

Offered: As needed.

BIOL 445 - Behavioral Neuroscience (4)

Advanced assessment of neural systems and function is presented, with an emphasis on techniques and laboratory approaches. Neuroscience labs include anatomical, physiological, pharmacological, genetic, and behavioral analyses in animal models. Credit cannot be received for both PSYC 445 and BIOL 445. 5 contact hours.

Prerequisite: Completed college mathematics competency, PSYC 110, PSYC 221 and PSYC 345.

Offered: Annually.

BIOL 460 - Biology Senior Seminar (3)

Topics covering the breadth of biology content are synthesized in this capstone experience. Skills emphasized are writing and oral presentation in science. A content examination and literature review are required. Graded H, S, U.

Prerequisite: Senior status (90 credit hours successfully completed), BIOL 111, BIOL 112, with a grade of C or better, BIOL 314, BIOL 318, BIOL 320; or consent of department chair.

Offered: Fall, Spring.

 **…..**

BIOL 531 - Mammalian Endocrinology (3)

Topics include neuroendocrinology, hypothalamic-pituitary relationships, mechanisms of hormone action, endocrine aspects of reproduction, carbohydrate metabolism, calcium homeostasis, and water/electrolyte balance. Lecture.

Prerequisite: Graduate status, two 300-level or above biology courses and consent of department chair.
Offered: As needed.

BIOL 532 - Advanced Developmental Biology (4)

The molecular regulation of development, differentiation, control of the cell cycle, and regeneration are examined, with emphasis on recent research. Lecture and laboratory. 6 contact hours.
Prerequisite: Graduate status, BIOL 314, , BIOL 320, BIOL 330, or equivalents.

Offered: As needed.

BIOL 533 - Research Methods in Molecular Biology (4)

Students undertake a single semester-long research project, which requires the integration of diverse biological facts, principles, and techniques in order to answer a novel biological question. Prerequisite: Graduate status or senior undergraduate status, with consent of department instructor, chair and dean.

Offered: As needed.

## AFTER NURSING and Before Performing ARTS—two NUER courses both to be deleted:

## ~~NEUR - Neuroscience~~

~~NEUR 443 - Fundamentals of Neurobiology (4)~~

~~A comprehensive survey of central nervous system (CNS) biology is presented. Emphasis is placed on molecular, cellular and physiological processes of the nervous system. 6 contact hours.~~

~~Prerequisite: BIOL 111, BIOL 112 and BIOL 314.~~

~~Offered: Annually.~~

~~NEUR 460 - Current Issues in Neuroscience (4)~~

~~Contemporary issues and developments in neuroscience are explored. Recent research and theoretical literature are considered. Topics vary. The course may be repeated for credit with a change in content.~~

~~Prerequisite: NEUR 443, BIOL 443 or PSYC 445.~~

~~Offered: Annually.~~