

DEPARTMENT OF BIOLOGICAL SCIENCES

Contacts: Dr. Brian Antonsen, Chair

Website: <http://www.marshall.edu/biology> (<http://www.marshall.edu/biology/>)

biology@marshall.edu

Courses offered by the Department of Biological Sciences are intended to meet the needs of students preparing themselves for careers in the biological and related sciences, or who want a knowledge of the life sciences as part of their general education and/or to satisfy science requirements in other departments or programs.

Programs

- Biological Sciences, Accelerated Master's Degree (<http://catalog.marshall.edu/undergraduate/programs-az/science/biological-sciences/accelerated-masters/>)
- Biological Sciences, B.S. (<http://catalog.marshall.edu/undergraduate/programs-az/science/biological-sciences/biological-sciences-bs/>)
- Biological Sciences, Minor (<http://catalog.marshall.edu/undergraduate/programs-az/science/biological-sciences/biological-sciences-minor/>)

Courses

 - General Education Course

BSC 104 Introduction to Biology **4 Credit hours**

Fundamentals of biology with emphasis on the unity of life, energetics, genetics and the world of living things. Intended for non-science majors. 3 lec-2 lab.

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 105 Human Biology **4 Credit hours**

Fundamentals of biological human structure, function, and interactions with the environment. Intended for non-science majors. Does not count for health professions credit. 3 lec-2 lab.

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 120 Principles of Biology **4 Credit hours**

Study of basic biological principles common to all organisms through lecture and laboratory activities. Intended for science majors and pre-professional students. 3 lec-2 lab.

Pre-req: ACT Math with a score of 21 or SAT Mathematics Before Mar. 16 with a score of 500 or SAT MATH SECTION SCORE with a score of 530 or (MTH 121 with a minimum grade of C or MTH 123 with a minimum grade of C or MTH 127 with a minimum grade of C or MTH 130 with a minimum grade of C or MTH 132 with a minimum grade of C).

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 120H Principles of Biology Honors **4 Credit hours**

Study of basic biological principles common to all organisms through lecture and laboratory activities. Chemistry of life, cell biology, metabolism, heredity, and evolution. Intended for science majors and pre-professional students. 3 lec-2-lab.

Pre-req: Admitted Honors College with a score of 1 and (ACT Math with a score of 21 or SAT Mathematics Before Mar. 16 with a score of 500 or SAT MATH SECTION SCORE with a score of 530 or MTH 121 with a minimum grade of C or MTH 127 with a minimum grade of C or MTH 130 with a minimum grade of C or MTH 132 with a minimum grade of C).

Attributes: Honors, Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 121 Principles of Biology **4 Credit hours**

A continuation of the study of basic biological principles common to all organisms. Intended for science majors and pre-professional students. 3 lec-2 lab.

Pre-req: BSC 120 with a minimum grade of C.

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 227 Human Anatomy **4 Credit hours**

Principles of gross and microscopic anatomy of human body systems and their development. Provides preparation for degrees in health professions. Does not count towards a major in Biological Science. 3 lec-2 lab (ACT composite 19 or higher or 12 hrs. college credit, 100 level or above with minimum GPA of 2.3)

Pre-req: ACT Composite with a score of 19 or ACT Recalculated Composite with a score of 19 or SAT Mathematics Before Mar. 16 with a score of 480 or SAT MATH SECTION SCORE with a score of 510.

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 228 Human Physiology **4 Credit hours**

Fundamentals of normal human physiology, from cells to systems. Provides the scientific background for understanding pathophysiology and preparation for degrees in health professions. Does not count toward a major in Biological Science. 3 lec-3 lab (PR: BSC 227 with grade C or better)

Pre-req: BSC 227 with a minimum grade of C.

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 250 Microbiol & Human Disease **4 Credit hours**

Introduction to microbiology with emphasis on the role of microorganisms in the disease process.

Pre-req: BSC 227 with a minimum grade of C.

Attributes: Natural Sciences, Core II Natural Sciences

Grade Mode: Normal Grading Mode

BSC 280 Special Topics **1-4 Credit hours**

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 281 Special Topics **1-4 Credit hours**

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 282 Special Topics **1-4 Credit hours**

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 283 Special Topics **1-4 Credit hours**

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

- BSC 301 Vertebrate Embryology** **4 Credit hours**
Vertebrate development based chiefly on frog, chick and pig embryos. 2 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 302 Principles of Microbiology** **3 Credit hours**
Basic microbiological techniques, fundamental principles of microbial action, physiological processes, immunology, serology, disease process. (PR: BSC 121 with grade of C or better) This course is lecture only (the associated lab for this course is listed under a different course number)
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 304 Microbiology Lab** **2 Credit hours**
A laboratory course emphasizing basic microbiological techniques including preparation of culture media, gram staining, isolation and identification of bacteria from diverse environments, and evaluation of antiseptics and disinfectants.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 310 Comp Vertebrate Anatomy** **4 Credit hours**
Structure, function and relationships of systems of selected vertebrates with an emphasis on embryology and evolution. 2 lec.-4 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 312 Invertebrate Zoology** **4 Credit hours**
Survey of invertebrate phyla from protists through non-vertebrate chordates. Emphasis is placed upon identification of taxa, development, microanatomy, life histories and evolutionary relationship.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 320 Principles of Ecology** **4 Credit hours**
A fundamental approach to the basic principles underlying the interrelationships of organisms with their biotic and abiotic environments. A variety of aquatic and terrestrial ecosystems will be studied in the field and in the laboratory. 3 lec-3 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 322 Principles Cell Biology** **4 Credit hours**
A fundamental approach to the principles of cell biology covering general cellular structure and function, organelles, intercellular interactions, molecular interactions, and modern cellular and molecular methods. 3 lec-3 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 324 Principles of Genetics** **4 Credit hours**
The fundamental principles and mechanisms of inheritance. 3 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 365 Introductory Biochemistry** **3 Credit hours**
A survey course including introduction to basic biochemical concepts, metabolic pathways, and bioenergetics. Pre: CHM327 or 356.
Pre-req: BSC 121 with a minimum grade of C and CHM 356 with a minimum grade of C or CHM 327 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 401 Ichthyology** **4 Credit hours**
Anatomy, physiology, ecology, zoogeography, economic importance and classification of major groups and representative local species of fishes. 2 lec-2 lab and field.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 406 Herpetology** **4 Credit hours**
Taxonomy, morphology, distribution, life history, and ecology of reptiles and amphibians with a special emphasis on representatives native to West Virginia. 2 lec-2 lab.
Pre-req: BSC 302 or BSC 320 or BSC 322 or BSC 324.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 408 Ornithology** **4 Credit hours**
An introduction to avian biology: identification, distribution, migration, and breeding activities of birds. 2 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 409 Mammalogy** **4 Credit hours**
A study of the structural features, evolution and classification of mammals; other topics will include ecology, zoogeography, behavior, reproductive strategies, physiological adaptation to extreme environments and economic aspects. 2 lec-2 lab and field.
Pre-req: BSC 121 with a minimum grade of C or BSC 105 with a minimum grade of B.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 410 Remote Sensing/GIS Appl** **4 Credit hours**
A study of the physical systems for collecting remotely sensed data. Statistical/spatial analysis and modeling using image processing/geographic information/spatial computer software systems with earth resources applications.
Pre-req: (BSC 302 or BSC 320 or BSC 322 or BSC 324) and PHY 203 and PHY 204 and (MTH 225 or STA 225).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 411 Dgtl Image Proc/GIS Model** **4 Credit hours**
A study of image processing/geographic information/spatial analysis systems, concurrent and parallel image processing 3-D modeling scenarios utilizing geophysical data for computer simulation modeling.
Pre-req: (BSC 410 or PS 410 or IST 420).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 413 Prin of Organic Evolution** **3 Credit hours**
Facts and possible mechanisms underlying the unity and diversity of life with emphasis on Neo-Darwinian concepts of the role of species in evolutionary phenomena.
Pre-req: BSC 302 or BSC 320 or BSC 322 or BSC 324.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

- BSC 416 Plant Taxonomy** 4 Credit hours
Recognition of our native seed plants and ferns. 2 lec-4 lab.
Pre-req: BSC 302 or BSC 320 or BSC 322 or BSC 324.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 417 Biostatistics** 3 Credit hours
Statistical skills for biological/biomedical research, with emphasis on applications. Experimental design/survey sampling, estimation/hypothesis testing procedures, regression, ANOVA, multiple comparisons. Implementation using statistical software such as SAS, BMDP. Pre: Permission (consistent with MTH 518 description)
Pre-req: BSC 302 with a minimum grade of D or BSC 320 with a minimum grade of D or BSC 322 with a minimum grade of D or BSC 324 with a minimum grade of D.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 420 Plant Physiology** 4 Credit hours
Experimental study of plant life processes to include applicable biophysical and biochemical principles. 2 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C and CHM 212 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 421 Phycology** 4 Credit hours
Morphology, taxonomy, and techniques used in the study of fresh-water algae with emphasis upon applications of ecological principles to current water quality problems. 2 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C or BSC 105 with a minimum grade of B.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 422 Animal Physiology** 4 Credit hours
Physiological principles operating in cells, organs, and systems of animals, with a focus on vertebrate, including human, function. 3 lec-3 lab (PR: BSC 322, CHM 355, MTH 140 or 132 or 229; or permission)
Pre-req: BSC 322 with a minimum grade of D and CHM 355 with a minimum grade of D and (MTH 140 with a minimum grade of D or MTH 140H with a minimum grade of D or MTH 132 with a minimum grade of D or MTH 229 with a minimum grade of D or MTH 229H with a minimum grade of D).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 424 Animal Parasitology** 4 Credit hours
Morphology, life histories, classification, and host relationships of common parasites. 2 lec-4 lab.
Pre-req: BSC 121 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 425 Systematics** 3 Credit hours
Biosystematics is a unifying discipline that combines taxonomy (collecting, describing and naming organisms), phylogenetics (evolutionary relationships among species), and classification (organization of taxa into groups which ultimately reflect evolutionary relationship).
Pre-req: BSC 121 with a minimum grade of C.
Grade Mode: Normal Grading Mode
- BSC 426 Medical Entomology** 4 Credit hours
Role of certain insects and other arthropods in the transmission of disease organisms and methods of control. 2 lec-4 lab.
Pre-req: BSC 302 with a minimum grade of D or BSC 320 with a minimum grade of D or BSC 322 with a minimum grade of D or BSC 324 with a minimum grade of D.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 428 Neuroscience** 3 Credit hours
The fundamentals of cellular and systems neuroscience, with application towards understanding current research and biomedical problems.
Pre-req: BSC 120 and (BSC 322 with a minimum grade of C or BSC 422 with a minimum grade of C or CHM 355 with a minimum grade of C).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 430 Plant Ecology** 4 Credit hours
The study of plants and their interactions with their environment at different levels of ecological organization: individuals, populations, communities, and ecosystems. Emphasis on quantitative analysis of ecological data.
Pre-req: BSC 121 with a minimum grade of C and BSC 320 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 431 Limnology** 4 Credit hours
Study of inland waters; ecological factors affecting lake and stream productivity and various aquatic communities.
Pre-req: BSC 320.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 438 Emerging Infect Diseases** 3 Credit hours
Introduces students to infectious diseases that are either newly emergent or have returned to prominence within the last decade.
Pre-req: BSC 302 or BSC 320 or BSC 322 or BSC 324.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 443 Microbial Genetics** 3 Credit hours
Microbial Genetics covers the essential functions of DNA replication and gene expression in prokaryotic cells. The course includes molecular genetics of bacteria and phages, bioinformatics and discussion of laboratory techniques.
Grade Mode: Normal Grading Mode
- BSC 445 Microbial Ecology** 3 Credit hours
This course introduces students to the vital roles that microbes play in sustaining life on earth. Includes both theoretical and practical concepts ranging from the origin of life to biodegradation.
Pre-req: BSC 302 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode
- BSC 448 Introductory Immunology** 3 Credit hours
Comprehensive study of the molecules, cells and processes of the immune system. Also covered are diseases with an immunologic basis and technological applications of immunological principles. Pre: C or better in BSC 121, CHM 212
Pre-req: BSC 322 with a minimum grade of D or BSC 324 with a minimum grade of D.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

BSC 450 Molecular Biology 3 Credit hours

Advanced principles in molecular function emphasizing current research using recombinant DNA methodology.

Pre-req: BSC 322.

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 454 Princ Adv Techn Mol Biol 3 Credit hours

Students will gain an understanding of modern molecular biology through standard and novel methods and understand and criticize the published literature.

Pre-req: BSC 322 or BSC 324 or BSC 365 or BSC 450.

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 456 Genes and Development 3 Credit hours

Focuses on mechanisms of complex organismal development including cell specification, morphogenesis, and induction. Genetic manipulations of the model organism *Drosophila* will illustrate current information.

Pre-req: BSC 320 or BSC 322 or BSC 324.

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 460 Conservation Biology 3 Credit hours

This course focuses on the North American model of wildlife conservation (and its history), principles of biological diversity, threats to habitats and species of concern, and conservation policy.

Pre-req: BSC 320.

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 480 Special Topics 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 481 Special Topics 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 482 Special Topics 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 483 Special Topics 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Normal Grading Mode

BSC 485 Independent Study 1-4 Credit hours

Attributes: No Textbook Required, Natural Sciences

Grade Mode: Credit/No Credit Grade Only

BSC 486 Independent Study 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Credit/No Credit Grade Only

BSC 487 Independent Study 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Credit/No Credit Grade Only

BSC 488 Independent Study 1-4 Credit hours

Attributes: Natural Sciences

Grade Mode: Credit/No Credit Grade Only

BSC 491  Capstone Experience 2 Credit hours

An independent study involving a research project or internship. Must be approved by Biological Science Faculty.

Attributes: Capstone Course, No Textbook Required, Natural Sciences

Grade Mode: Normal Grading Mode

Faculty

Professors

Fet, Georgel, O'Keefe, Price, Strait, Trzyna, Valluri, Zhu

Associate Professors

Antonsen, Axel, LoCascio, Mays, Mosher, Schultz, Spitzer, Waldron

Assistant Professors

Chirchir, H. Cyphert, Palmquist, Puppo, Shakirov, Welch

Term Faculty

T. Cyphert