BIOLOGY (BIOL)

BIOL 000 - Community Service Learning (0 Credits)
40 hours of community service in which biology classroom learning is applied. Students must submit a journal and attend one 2-hour reflective discussion section. Fulfills the general education experiential learning requirement. No Credits.

BIOL 121 - Biological Concepts (4 Credits)
An introduction to biological concepts common to all organisms. Includes discussions of current topics in cellular biology, genetics, ecology, and evolution. Laboratory. Does not count toward the biology major. Credit for only one introductory biology course (121 or 125) can be counted toward degree requirements.

BIOL 125 - Phage Hunters I (4 Credits)
This research course sequence is designed for freshmen using a 'learning by doing' approach to introductory biology. It is a hands-on, discovery course with an emphasis on critical thinking. Themes covered will be similar to BIOL 121, 132 with an emphasis on microbiology, molecular biology, genomics and bioinformatics. In the lab, students will isolate and characterize their own unique virus. Laboratory. BIOL 125 does not count toward the biology major. BIOL 126 counts toward the biology major and is a prerequisite for all other required courses in the major. Credit for only one introductory biology sequence (121-132 or 125-126) can count toward degree requirements.

BIOL 126 - Phage Hunters II (4 Credits)
Prerequisite: BIOL 125. This research course sequence is designed for freshmen using a “learning by doing” approach to introductory biology. It is a hands-on, discovery course with an emphasis on critical thinking. Themes covered will be similar to BIOL 121, 132 with an emphasis on microbiology, molecular biology, genomics and bioinformatics. In the lab, students will isolate and characterize their own unique virus. Laboratory. BIOL 125 does not count toward the biology major. BIOL 126 counts toward the biology major and is a prerequisite for all other required courses in the major. Credit for only one introductory biology sequence (121-132 or 125-126) can count toward degree requirements.

BIOL 127 - Human Biology (3 Credits)
Prerequisite: BIOL 121. This course will examine the structure and function of the human body, human genetics and the influence of humans on their environment. It will also examine ethical issues that affect humans in these different areas. Students may only count credit for BIOL 127, BIOL 128, or BIOL 132 toward degree requirements. Does not count towards biology, biomedical sciences, or conservation biology major.

BIOL 132 - Organism Function and Diversity (4 Credits)
Prerequisite: BIOL 121 (C- or better). Survey of organisms, focusing on structure, physiology, and diversity. Plant and animal form and function are emphasized. Laboratory. This course counts toward the biology, biomedical sciences, and conservation biology majors and it is a prerequisite for several required courses in these majors. Students may only count credit for BIOL 127, BIOL 128, or BIOL 132 toward degree requirements.

BIOL 203 - Science in Perspective (3 Credits)
Restricted to students accepted into the B.S. Ed. program in Elementary Education and who have completed their General Education lab science requirement. Designed to fulfill the need for non-science majors to have a clear understanding and appreciation of natural and scientific phenomenon. Topics will be presented in a manner that will challenge students to reason, make appropriate connections between various science disciplines and to effectively communicate and apply scientific principles. The course will consist of lecture/discussions and student presentations. In addition, emphasis will be placed on reading and understanding current scientific literature. Does not count toward biology, biomedical sciences, or conservation biology major.

BIOL 210 - Introduction to Ecology and Evolution (3 Credits)
Prerequisites: BIOL 126 or BIOL 132 and CHEM 111 (C- or better in each course). Introduction to ecological principles and the study of interactions of plants, animals, and microbes with each other and with their environment.

BIOL 231 - Plant Biology (4 Credits)
Prerequisites: BIOL 126 or BIOL 132 (C- or better in each course). Biological survey of plants, with a focus on the flowering plants. Areas of study include anatomy, physiology, phylogenetics and evolution, and reproductive processes. Laboratory.

BIOL 251 - History of Biology (3 Credits)
Prerequisite: BIOL 132 or 126 (C- or better in each course). Chronological development of selected biological theories and their impact on contemporary biology.

BIOL 260 - Biostatistics and Research Design (4 Credits)
Prerequisites: BIOL 132 or BIOL 126 (C- or better in each course). Survey of research practices in the biological sciences. Covers statistical methods of data analysis and interpretation, design of surveys and experiments, and scientific communication.

BIOL 271 - Special Topics (2-4 Credits)
Prerequisites: Will be determined for each specific course. Courses on particular topics in biology that are of current interest to students and faculty. Depending on the topic, the specific course may or may not count toward the biology major

BIOL 301 - Anatomy Chordates, w/lab (4 Credits)
Prerequisites: BIOL 126 or 132 (C- or better in each course). The anatomy of selected Chordates with special emphasis on the Vertebrates. Lecture also examines the evolution of the organ systems of vertebrates. Laboratory.

BIOL 311 - Plant Ecology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Ecological principles as applied to plants, including major biomes, plant succession, competition, environmental parameters, and methods of data collection and evaluation. Laboratory.

BIOL 313 - Natural History: Observing Plants from Individuals to Ecosystem (4 Credits)
Prerequisite: BIOL 260. Natural history is fundamental to much of science. First we observe, then we investigate. We will observe and identify a variety of plant species on and around UMW Campus. Our observation begins with plant identification and expands to observational study designs. The class investigates biological diversity on campus.

BIOL 321 - Invertebrate Zoology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Survey of invertebrate phyla emphasizing structural characteristics, life histories, and evolutionary relationships. Laboratory.

BIOL 322 - Animal Ecology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Introduction to sample design, population demographics, regulatory mechanisms, and survival strategies of animals. Exercises in data collection, analysis and communication of results. Laboratory.

BIOL 323 - Entomology (4 Credits)
Prerequisite: BIOL 126 or 132 and CHEM 111, 112 (C- or better in each course). Introduction to structure, function and ecology of insects. Students prepare insect collections. Laboratory.

BIOL 340 - Cellular Biology (4 Credits)
Prerequisites: BIOL 126 or 132 and CHEM 112 (C- or better in each course). Study of cell structure and function. Laboratory.

BIOL 341 - General Genetics (4 Credits)
Prerequisite: BIOL 126 or 132 and CHEM 112 (C- or better in each course). Structure, function, and transmission of genetics material using examples from viruses, bacteria, and eukaryotic organisms. Application of these principles to human inheritance. Laboratory.

BIOL 371 - Microbiology (4 Credits)
Prerequisites: BIOL 126 or 132 and CHEM 112 (C- or better in each course). Emphasis is placed on bacteria, their morphology, physiology, nutrition, and ecology. Laboratory.

BIOL 372 - Parasitology (4 Credits)
Prerequisite: BIOL 126 or 132 (C- or better in each course). The structure, life histories, and host relationships on invertebrate parasitic forms. Laboratory.

BIOL 384 - Human Anatomy (4 Credits)
Prerequisites: BIOL 126 or 132 (C- or better in each course).The structure of the human body at the cell, tissue, organ, and system levels of organization. Laboratory.

BIOL 401 - Animal Behavior (3 Credits)
Prerequisite: BIOL 210 (C- or better). Integrative survey of the biology of animal behavior from an evolutionary perspective.

BIOL 406 - Histology (4 Credits)
Prerequisite: BIOL 340 (C- or better). The anatomy and physiology of vertebrate tissues, with an emphasis on human tissues. Laboratory.

BIOL 410 - Neurobiology (4 Credits)
Prerequisite: BIOL 340 (C- or better). Examines the structure and function of neurons, neural networks and nervous systems. The laboratory includes physiological experimentation and basic human neuroanatomy. Laboratory.

BIOL 413 - Human Physiology (4 Credits)
Prerequisite: BIOL 340 (C- or better). A systematic study of the physiology of the human body, with focus on the nervous and endocrine systems, muscle function, cardiovascular and pulmonary systems, kidney function, digestion, and reproduction. Laboratory.

BIOL 414 - Exercise Physiology (3 Credits)
Prerequisite: BIOL 340 (C- or better). A study of the physiological responses of the metabolic, cardiovascular, respiratory, and muscular systems to acute and chronic exercise in the human, and the roles of the nervous and endocrine systems in mediating these responses.

BIOL 415 - Nutrition and Metabolism (3 Credits)
Prerequisite: BIOL 340 (C- or better). A study of the scientific basis for the current recommendations for a healthy diet. Course topics include metabolic pathways, macro and micro nutrients, diet and health, and controversial topics in nutrition.

BIOL 416 - Vertebrate Endocrinology (3 Credits)
Prerequisite: BIOL 340 (C- or better). Structure and function of the endocrine systems of vertebrates, including the molecular and cellular mechanisms underlying hormone actions and regulation, and pathology resulting from dysfunction. Includes analysis and discussion of primary literature.

BIOL 419 - Neuroethology (4 Credits)
Prerequisite: BIOL 260 (C- or better); BIOL 340 (C- or better). A research intensive course (fulfills Biology Research Intensive) that explores the neural circuits of mammals and how they affect behavior. We typically use environmental manipulations, such as exercise, diet, or social enrichment to influence neural circuit activity and behavior.

BIOL 423 - Ecology and Evolution in the Galapagos Islands (4 Credits)
Prerequisite: BIOL 210 (C- or better). Surveys historical and contemporary evolutionary biology and ecology research in the Galapagos Islands. Includes study of evolutionary and ecological processes that shape the unique flora and fauna of isolated island archipelagos and special conservation challenges faced by island ecosystems. Spring break field trip to the Galapagos Islands.

BIOL 424 - Tropical Ecology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Study of tropical ecosystems and their current conservation challenges; interactions of tropical organisms with each other and their environments; adaptations unique to tropical plants and animals. Field trip to Panama or other tropical country.

BIOL 425 - Vertebrate Zoology (4 Credits)
Prerequisite: BIOL 210 (C- or better). A survey of the vertebrates including their natural history, evolution, and taxonomy. The student will become familiar with the biological species concept, speciation and nomenclature as they apply to the vertebrates. Laboratory.

BIOL 426 - Biology of Fishes (4 Credits)
Prerequisite: BIOL 210 (C- or better). A survey of the fishes, including their anatomy, physiology, natural history, and systematics. The laboratory includes the collection and identification of local species. Each student will be required to develop and complete an independent project during the semester. Laboratory.

BIOL 427 - Ornithology (4 Credits)
Prerequisites: BIOL 210 and 260 (C- or better in each course). Comprehensive survey of the anatomy, physiology, behavior, ecology, and evolution of birds. Laboratory emphasizes scientific investigation and development of research skills in ornithology. Laboratory.

BIOL 428 - Conservation Biology (4 Credits)
Prerequisite: BIOL 210 (C- or better). Study of social science and natural science approaches to the conservation of biological diversity. Course topics include conservation law, conservation values, population genetics, and population dynamics. Laboratory.

BIOL 430 - Molecular Biology of the Gene (4 Credits)
Prerequisite: BIOL 260 and BIOL 341 (C- or better in each course). The study of gene structure and function at the molecular level. Laboratory emphasizes the use of molecular techniques to carry out original research on the characterization of a gene.

BIOL 431 - Research in RNA Technology (4 Credits)
Prerequisite: BIOL 260 and BIOL 341 (C- or better in each course). This course focuses on regulation of gene expression by RNA and how RNA Biology can be leveraged for development of research technologies. Laboratory emphasizes scientific investigation and development of research skills using RNA technology.

BIOL 432 - Virology (4 Credits)
Prerequisites: BIOL 260 and BIOL 341 (C-or better). The study of viruses and their replication cycles. Laboratory emphasizes scientific investigation and development of research skills in virology.

BIOL 435 - Plant Physiology (4 Credits)
Prerequisites: BIOL 340 and BIOL 341 (C- or better in each course). Experimental and theoretical treatment of the functional mechanisms in plants. Laboratory.

BIOL 439 - Developmental Biology (4 Credits)
Prerequisites: BIOL 260, BIOL 340 and BIOL 341 (C- or better in each course). An examination of the cellular and genetic mechanisms which control the formation of multicellular organisms during reproduction. Laboratory emphasizes inquiry based scientific investigation and development of research skills in Developmental Biology. Fulfills the Research Intensive requirement of the biology major.

BIOL 440 - Biology of Cancer (3 Credits)
Prerequisite: BIOL 340 (C- or better) and BIOL 341 (C- or better). Lectures and discussions focused on various aspects of cancer including epidemiology, cellular and molecular characteristics of cancer cells, carcinogenesis, treatment and prevention.

BIOL 441 - Immunology (4 Credits)
Prerequisites: BIOL 340 and BIOL 341 (C- or better in each course). Introduction to the principles and theories of host defense with emphasis on humoral and cell mediated responses. Laboratory.

BIOL 442 - Evolution (3 Credits)
Prerequisite: BIOL 341(C- or better). Lectures and discussion center around modern evolutionary theory and how evolutionary events are measured and documented.

BIOL 443 - The Biology and Biochemistry of Proteins (3 Credits)
Prerequisites: BIOL 340 (C- or better) and CHEM 211; or CHEM 317.
A study of the principles of protein structure and active site function, including a study of the structure and function of a select group of proteins representing major protein families. Students complete a research project involving the use of major protein databases and on-line analytical tools.

BIOL 444 - Bioinformatics (3 Credits)
Prerequisites: BIOL 340 and BIOL 341. An exploration of the rapidly growing genomics approach to biological problems. Areas of study include genome sequencing, comparative genomics, functional genomics, and diversity. Students complete three research projects based on primary literature and utilize bioinformatics approach to analyze original data. Class time is spent on discussions, on student presentations of research project results, and in collaborative work.

BIOL 445 - Research Practices in Aquatic Ecology (4 Credits)
Prerequisites: Grade of C- or better in BIOL 210 and BIOL 260. Students conduct field based collaborative research projects in aquatic ecosystems. Fulfills the Research Intensive (RI) requirement for the biology major.

BIOL 451 - Seminar (2 Credits)
Prerequisites: This course is open only to senior biology majors. Preparation and presentation of an oral report on a topic in the biological sciences. Each seminar section will focus on a particular area of biology.

BIOL 462 - Research Practices in Plant Ecology (4 Credits)
Prerequisite: BIOL 210 and BIOL 260 with a grade of C- or better in each. Collaborative investigation of field and ecology based problem. Requires a significant research project conducted in a small group. Fulfills the Research Intensive (RI) requirement of the biology major.

BIOL 465 - Plant Molecular Biology (4 Credits)
Prerequisite: BIOL 341 and BIOL 260 (C- or better in each course). A study of the molecular life processes of plants including water relations, stress response, and development as well as examine the potential of modern biotechnological methods for plant improvement. Requires design and implementation of a significant research projects in an area of plant molecular research.

BIOL 466 - Research in Endocrinology (4 Credits)
Prerequisite: BIOL 340; BIOL 260 (C- or better in each course). The study of endocrinology in vertebrates, through lecture, primary literature, and collaborative research. Students will work in small groups to design and complete a significant research project. Fulfills the Research Intensive requirement.

BIOL 467 - Research in Molecular Parasitology (4 Credits)
Prerequisite: BIOL 126 or 132 and BIOL 260 (C- or better in each course). This course focuses on cellular and molecular mechanisms through which protozoan parasites cause diseases. Labs emphasize the development of research skills through exploration of bioinformatics tools, genetic editing tools such as CRISPR-Cas9, fluorescence microscopy, and tissue culture. This course fulfills the Research Intensive requirement for the Biology and Biomedical majors.

BIOL 471 - Topics in Biology (2-4 Credits)
Prerequisites: BIOL 126 or 132 (C- or better in each course); additional prerequisites as appropriate to specific topic. Specialized topics not offered on a regular basis. Laboratory included with certain topics.

BIOL 472 - Research-Intensive Topics in Biology (4 Credits)
Prerequisites: BIOL 126 or 132 and BIOL 260 (C- or better in each course); additional prerequisites as appropriate to specific topic. Specialized topics not offered on a regular basis. Fulfills the Research Intensive requirement of the biology major. Laboratory.

BIOL 481 - Research Design & Proposal Development in Biology (1 Credits)
Prerequisites: BIOL 260 and permission of instructor. Students will be guided by a faculty member to read biological literature and develop a proposal for an independent research project.

BIOL 482 - Literature Research in Biology (1 Credits)
Prerequisites: BIOL 260 and Permission of Instructor. This individually mentored course allows students to practice scientific reasoning and analysis by reading, analyzing, discussing and writing about the primary literature in a specific topic area of biology. Students will then write a comprehensive synthesis paper detailing the state of knowledge in that particular field.

BIOL 491 - Special Problems in Biology (1-3 Credits)
Prerequisite: BIOL 260 and 481, and C- or better in all BIOL courses. Individual laboratory or field investigation supervised by a staff member. Open to junior and senior majors by permission of Department. No more than six credits of BIOL 491 may be counted toward the biology or biomedical sciences majors.

BIOL 499 - Internship (1-12 Credits)
Prerequisite: BIOL 210 or BIOL 260 or BIOL 340 or BIOL 341. Supervised internship, developed with departmental consultation. Junior/senior majors in good academic standing who have completed one of the major 200-level or above core classes at UMW. A maximum of 2 elective credits may be counted towards Biology, Biomedical Sciences, or Conservation Biology majors.

For more information about our biology majors, see Biology (https://catalog.umw.edu/undergraduate/majors/biology/), Biomedical Sciences (https://catalog.umw.edu/undergraduate/majors/biomedicalsciences/),

and Conservation Biology (https://catalog.umw.edu/undergraduate/majors/conservation-biology/).