BIOLOGICAL SCIENCES (BIO SCI)

BIO SCI 100 Survey of Zoology
3 cr. Undergraduate.
Survey of the animal kingdom, with emphasis on the importance of animals to humans. Study of phyla as represented by types, classification, structure, and life histories. Introduction to cytology, genetics, evolution, and ornithology. 2 hrs lec, 2 hrs lab.
Prerequisites: none.
Course Rules: Does not carry cr toward bio sci major.
General Education Requirements: NS+ 
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 101 General Survey of Microbiology
4 cr. Undergraduate.
The nature and activities of microorganisms, including surveys of bacteria, fungi, viruses, immunology, and disease applications. 3 hrs lec, 3 hrs lab.
Prerequisites: Chem 101(P) or 102(P).
Course Rules: Intended primarily for nursing students. Does not carry cr toward bio sci major.
General Education Requirements: NS+ 
Current Offerings: http://uwm.edu/schedule

BIO SCI 102 Elements of Biology
3 cr. Undergraduate.
Organization and function of living systems. 2 hrs lec, 2 hrs lab.
Prerequisites: none.
Course Rules: Intended for non-majors; does not carry cr toward bio sci major.
General Education Requirements: NS+ 
Current Offerings: http://uwm.edu/schedule

BIO SCI 103 Topics in Modern Biology
3 cr. Undergraduate.
How biological factors, processes, and reactions affect living systems. Emphasis on current issues in biology such as genetic engineering, bioethics, and population concerns.
Prerequisites: none, except as may be required for specific topics.
Course Rules: Intended for non-majors; does not carry cr toward bio sci major. May be retaken w/chg in topic to 9 cr max. Students w/ cr in Bio Sci 226 or 250 may not take 103 w/ those topics.
General Education Requirements: NS
Current Offerings: http://uwm.edu/schedule

BIO SCI 104 Plants in Today's World
3 cr. Undergraduate.
Introduction to major plant groups; principles of structure and function, ecology, and gardening. 2 hrs lec, 2 hrs lab.
Prerequisites: none.
General Education Requirements: NS+ 
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 150 Foundations of Biological Sciences I
4 cr. Undergraduate.
Fundamental principles of biology (ecology, evolution, genetics, molecular and cell biology) integrated through evolutionary framework. First of two-course sequence for bio sci, other science majors. 3 hrs lec, 3 hrs lab. Open to freshmen.
Prerequisites: Chem 100(P) or 102(P) or conc reg.
General Education Requirements: NS+ 
Current Offerings: http://uwm.edu/schedule

BIO SCI 152 Foundations of Biological Sciences II
4 cr. Undergraduate.
Organismal diversity, emphasizing structural and functional relationships in microorganisms, plants, and animals. Second of a two-course sequence for Bio Sci & other natural science majors. 3 hr lec, 3 hr lab.
Prerequisites: grade above C- in Bio Sci 150(P).
General Education Requirements: NS+ 
Current Offerings: http://uwm.edu/schedule

BIO SCI 194 First-Year Seminar:
3 cr. Undergraduate.
The specific topics are announced in the Schedule of Classes each time the class is offered.
Prerequisites: none.
Course Rules: Open only to freshmen. Students may earn cr in just one L&S First-Year Sem (course numbers 192, 193, 194).
General Education Requirements: NS
Last Taught: Fall 2015, Fall 2014, Fall 2012, Fall 2009.
Current Offerings: http://uwm.edu/schedule

BIO SCI 201 Human Structure and Function
3 cr. Undergraduate.
Brief introduction to human anatomy and physiology. 2 hrs lec; 3 hrs lab.
Prerequisites: none.
General Education Requirements: QLB, NS+ 
Current Offerings: http://uwm.edu/schedule

BIO SCI 202 Anatomy and Physiology I
4 cr. Undergraduate.
Anatomy and physiology of the human body including cell, tissues, skeletal, muscular, and nervous systems. 3 hrs lec, 3 hrs lab.
Prerequisites: none.
Course Rules: Required of students in nursing, med tech & med rec admin. Cannot be combined with Bio Sci 150 & 203 for more than 9 cr toward the bio sci major.
Current Offerings: http://uwm.edu/schedule
BIO SCI 203 Anatomy and Physiology II
4 cr. Undergraduate.
Anatomy and physiology of the human body including cardiovascular, respiratory, digestive, excretory, endocrine, and reproductive systems. 3 hrs lec, 3 hrs lab.
Prerequisites: C or better in either Bio Sci 202(P) or 315(P).
Course Rules: Cannot be combined with Bio Sci 150 & 202 for more than a total of 9 cr toward bio sci major. Cell & Molec Bio.
General Education Requirements: NS+
Current Offerings: http://uwm.edu/schedule

BIO SCI 206 Biology of Women
3 cr. Undergraduate.
An anatomical and physiological view of the human female life cycle with emphasis on women's health.
Prerequisites: course in biology.
General Education Requirements: NS
Current Offerings: http://uwm.edu/schedule

BIO SCI 210 Introduction to Fermentation Biology
3 cr. Undergraduate.
Principles and microbiology of fermentation in the production of food and beverages.
Prerequisites: none.
Current Offerings: http://uwm.edu/schedule

BIO SCI 289 Internship in Biological Sciences, Lower Division
1-6 cr. Undergraduate.
Application of basic principles of biological sciences in a business, organizational, educational, political, or other appropriate setting.
Prerequisites: intro course in Bio Sci; 2.50 gpa; cons supervising faculty member.
Course Rules: Specific topics may satisfy major area req; consult dept. One cr earned for academic work based on 40 hrs in internship. May be retaken to 6 cr max; combined limit of 3 cr in Bio Sci 289 & 489 counts toward Bio Sci major.
Last Taught: Spring 2016, Fall 2015, Summer 2015, Fall 2010.
Current Offerings: http://uwm.edu/schedule

BIO SCI 290 Independent Study and Research:
1-3 cr. Undergraduate.
Directed library or laboratory/field research in biological sciences.
Prerequisites: 2.5 gpa; writ cons instr, dept chair, & asst dean for SAS.
Course Rules: Specific topics may satisfy major area req; consult dept. May be retaken to 6 cr max. Does not count as a Bio Sci lab course.
Last Taught: Spring 2018, Spring 2016, Spring 2013, Fall 2012.
Current Offerings: http://uwm.edu/schedule

BIO SCI 296 UROP Apprenticeship
1-3 cr. Undergraduate.
Undergraduate research participation in a project developed with a supervising member of the faculty or staff. One credit for 45 hrs research.
Prerequisites: acceptance to UROP; prior or conc reg in UROP seminar.
Course Rules: May be retaken to 9 cr max in any combination of UROP Apprenticeship courses. Not open to jrs and srs.
Current Offerings: http://uwm.edu/schedule

BIO SCI 297 Study Abroad:
1-12 cr. Undergraduate.
Designed to enroll students in UWM-sponsored program before course work level, content, and credits are determined and/or in specially-prepared program course work.
Prerequisites: acceptance for Study Abroad Prog.
Course Rules: May be retaken w/chg in topic.
Last Taught: Fall 2013, Spring 2013, Fall 2012, Spring 2012.
Current Offerings: http://uwm.edu/schedule

BIO SCI 299 Ad Hoc:
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add’l sem.
Prerequisites: none; add’l prereqs may be assigned to specific topic.
Course Rules: Specific topics may satisfy major area req; consult dept. May be retaken w/chg in topic.
Current Offerings: http://uwm.edu/schedule

BIO SCI 310 General Ecology
4 cr. Undergraduate.
Complex interrelationships between organisms and their environment. Physiological and behavioral adaptations, populations, biotic communities, ecosystems. 3 hrs lec, 3 hrs lab, field work.
Prerequisites: grade of C or better in Bio Sci 152(P).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 315 Cell Biology
3 cr. Undergraduate.
Cell structure and function at the molecular level. Flow of material, energy, and information within prokaryotic and eukaryotic cells. 3 hrs lec.
Prerequisites: grades of C or better in both Bio Sci 152(P) & Chem 104(P).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 316 Laboratory in Genetics and Cell Biology
2 cr. Undergraduate.
Laboratory studies in genetics and cell biology using microorganisms, plants, and animals. Hypothesis testing, data collection, computer and literature analyses, and writing of scientific papers. 1 hr dis, 3 hr lab.
Prerequisites: grades of C or better in both Bio Sci 152(P) & Chem 104(P); Bio Sci 315(C) or 325(C).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 325 Genetics
4 cr. Undergraduate.
Principles of inheritance. Fundamental concepts of genetics. 3 hrs lec, 2 hrs dis.
Prerequisites: grade of C or better in Bio Sci 150(P); Bio Sci 152(C) or 203(P); Chem 104(C).
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule
BIO SCI 350 Human Parasitology  
4 cr. Undergraduate.  
Biology, diagnosis and epidemiology of human parasitic diseases. For life  
science and clinical lab science students interested in public health. 3 hrs  
lec, 3 hrs lab.  
Prerequisites: jr st; Bio Sci 310(C) or Bio Sci 325(C) or cons instr.  
Last Taught: Fall 2014, Fall 2013, Fall 2012, Fall 2011.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 354 Introduction to Neuroscience I: From Neuron to Brain  
3 cr. Undergraduate.  
Basic principles of cellular, molecular, and developmental neuroscience;  
structure/function of neurons and glia, chemical and electrical signaling,  rain development, and neurological diseases.  
Prerequisites: C or better in Bio Sci 315(P) or in Psych 254(P).  
Course Rules: Cell & Molec Bio. Bio Sci/Psych 354 & 355 may be taken  
in either order. Bio Sci 354 & Psych 354 are jointly offered; they count as  
repeats of one another.  
Last Taught: Fall 2015, Fall 2014, Fall 2013, Fall 2012.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 355 Introduction to Neuroscience II: From Brain to Behavior  
3 cr. Undergraduate.  
Basic principles of neural systems and behavior; analysis of systems for  
sensation and perception, learning and memory, emotion, and motion.  
Prerequisites: BioSci 152(P) & 315(C), or Psych 254(P).  
Course Rules: Bio Sci/Psych 354 & 355 may be taken in either order. Bio  
Sci 355 & Psych 355 are jointly offered; they count as repeats of one  
another.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 356 Developmental Biology  
3 cr. Undergraduate.  
Development of living organisms at the molecular, cellular, and  
organismal levels. 3 hrs lec.  
Prerequisites: grade of C or better in either Bio Sci 315(P) or 325(P) or  
cons instr.  
Course Rules: Cell & Molec Bio.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 358 Birds of Wisconsin  
2 cr. Undergraduate.  
Bird taxonomy and ecology, including the identification of Wisconsin  
birds. 4 hrs lab & field work.  
Prerequisites: jr st; Bio Sci 150(P).  
Course Rules: Field trip schedules (if any) and fees will be announced in  
class.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 370 Animal Physiology  
3 cr. Undergraduate.  
Cellular and organ system physiology and comparative aspects of  
structure-function relationships.  
Prerequisites: Bio Sci 315(P) or cons instr.  
Course Rules: Cell & Molec Bio.  
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 372 Animal Physiology and Neurobiology Laboratory  
1 cr. Undergraduate.  
Neural integration of animal cells and organ systems. Comparative  
experimental approach examining structure-function relationships. 3 hrs  
lab.  
Prerequisites: Bio Sci 370(C) or Bio Sci/Psych 354(C) or 355(C).  
Course Rules: Cell & Molec Bio.  
Last Taught: Fall 2017, Fall 2015, Fall 2014, Fall 2013.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 380 Honors Seminar  
3 cr. Undergraduate.  
Selected topics in modern and traditional biology and their relation to  
society.  
Prerequisites: soph st; Honors 200(P); cons Honors College dir.  
Course Rules: Specific topics may satisfy major area req; consult dept.  
May be retaken w/chg in topic to 9 cr max.  
General Education Requirements: NS  
Last Taught: Spring 2018, Spring 2017, Fall 2016, Fall 2015.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 383 General Microbiology  
4 cr. Undergraduate.  
Nature and properties of microorganisms. Molecular biology and genetics  
of bacteria and viruses. Major groups, ecological relationships, and  
taxonomy. 3 hrs lec, 4 hrs lab.  
Prerequisites: grade of C or better in Bio Sci 325(P) or cons instr; Chem  
341(C) or 343(C).  
Course Rules: Cell & Molec Bio; Microbio.  
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 401 Immunology  
3 cr. Undergraduate/Graduate.  
Fundamentals of the immune response, including cellular, physiological  
and molecular aspects. 3 hrs lec.  
Prerequisites: jr st; grade of C or better in Bio Sci 315(P) or 325(P); Chem  
341(P) or 343(P); or cons instr.  
Course Rules: Cell & Molec Bio; Microbio.  
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 402 Immunological Techniques  
3 cr. Undergraduate.  
Modern methods and protocols in immunology. 6 hrs lab.  
Prerequisites: jr st; Bio Sci 401(P).  
Course Rules: Cell & Molec Bio; Microbio.  
Current Offerings: http://uwm.edu/schedule

BIO SCI 405 General Virology  
3 cr. Undergraduate/Graduate.  
Basic course in nature of viruses: bacterial, plant, and animal. The use of  
viruses in model systems for molecular biology and agents of disease.  
Prerequisites: jr st; Bio Sci 325(P); Bio Sci 315(P) or 383(P); Chem 501(R).  
Course Rules: Cell & Molec Bio; Microbio.  
Current Offerings: http://uwm.edu/schedule
BIO SCI 406 Marine Biology
3 cr. Undergraduate/Graduate.
Marine biology with a strong ecological focus; physical and chemical constraints that marine environments impose on organisms; specialized adaptations of marine organisms in response. 3 hrs lec, 1 hr dis.
Prerequisites: jr st; grades of C or better in Bio Sci 152(P) & 310(C) or consent of instructor.
Last Taught: Spring 2018, Fall 2016, Fall 2014, Spring 2013.
Current Offerings: http://uwm.edu/schedule

BIO SCI 407 Plant Systematics and Evolution
3 cr. Undergraduate/Graduate.
Survey of important plant families; plant systematic theory, current techniques in data collection and analysis. 2 hrs lec/dis; 4 hrs lab.
Prerequisites: jr st; Bio Sci 152(P), Bio Sci 310(C) or 325(C); or grad st; or cons instr.
Current Offerings: http://uwm.edu/schedule

BIO SCI 430 Animal Behavior-Ethology
3 cr. Undergraduate/Graduate.
Animal behavior from the biologist’s point of view, relating species-characteristic behavior to environment, internal function, ontogeny, and evolution. 3 hrs lec/dis.
Prerequisites: jr st; Bio Sci 310(P) or 316(C).
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.
Current Offerings: http://uwm.edu/schedule

BIO SCI 440 Ecology and Evolution of Amphibians and Reptiles
3 cr. Undergraduate/Graduate.
Evolutionary history of amphibians and reptiles; their patterns of biological diversity, morphology, life history, ecology, and behavior. For upper-level undergrad and grad students. 3 hrs lec.
Prerequisites: jr st; Bio Sci 310 (P).
Current Offerings: http://uwm.edu/schedule

BIO SCI 451 Field Methods in Conservation
3 cr. Undergraduate/Graduate.
Introduction to methods, techniques and tools for natural area management, including plant/animal surveys, vegetation/habitat description, and incorporating hands-on experience. 2 hr lec, 3 hrs lab.
Prerequisites: jr st; Bio Sci 310(P) or equiv or cons instr.
Course Rules: Jointly offered with & counts as repeat of CES 451.
Last Taught: Fall 2017.
Current Offerings: http://uwm.edu/schedule

BIO SCI 455 Cellular, Molecular and Developmental Neurobiology
3 cr. Undergraduate/Graduate.
Nervous systems from cellular, molecular, and developmental perspectives; from basic biophysical properties of neurons to cellular and molecular basis of nervous system development and function.
Prerequisites: jr st, grade of C or better in Bio Sci 315(P); or grad st.
Current Offerings: http://uwm.edu/schedule

BIO SCI 458 Community Ecology
3 cr. Undergraduate/Graduate.
Theories and models in community ecology. Analysis of biological communities emphasizing the origin, maintenance and consequences of species diversity within local communities.
Prerequisites: jr st; Bio Sci 152(P) & 310(P) or cons instr; or grad st.
Last Taught: Spring 2018, Fall 2013, Fall 2012, Fall 2011.
Current Offerings: http://uwm.edu/schedule

BIO SCI 465 Biostatistics
3 cr. Undergraduate/Graduate.
Simple distribution; statistical inference; simple regression theory; experimental design; analysis of variance and covariance as they relate to biology.
Prerequisites: jr st; Bio Sci 150(P); Math 105(P).
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 469 Genomic Data Analysis
2 cr. Undergraduate/Graduate.
Methods for the analysis of large-scale genomic data sets, including whole-genome association studies and transcriptomics.
Prerequisites: jr st; Bio Sci 325(P) & 465(P) or equiv; or cons instr.
Current Offerings: http://uwm.edu/schedule

BIO SCI 475 Tropical Biology:
3 cr. Undergraduate/Graduate.
Ecology and biogeography of various types of tropical forests, including required field trip to area being studied.
Prerequisites: jr st; Bio Sci 310(P); cons instr.
Course Rules: Required field trip at participants’ expense. May be retaken w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 480 Ecological Genetics
3 cr. Undergraduate/Graduate.
Origin and maintenance of genetic variation within and among populations. Fundamental theory and application to ecology and conservation.
Prerequisites: jr st, Bio Sci 310(P) & 325(P); or equiv.
Course Rules: 3 hrs lec/dis.
Last Taught: Fall 2017, Fall 2015, Fall 2013, Fall 2012.
Current Offerings: http://uwm.edu/schedule

BIO SCI 489 Internship in Biological Sciences, Upper Division
1-6 cr. Undergraduate.
Application of advanced principles of biological sciences in a business, organizational, educational, political, or other appropriate setting.
Prerequisites: jr st; 300-level or above course in Bio Sci; 2.50 gpa; cons supervising faculty member.
Course Rules: Specific topics may satisfy major area req; consult dept.
One cr earned for academic work based on 40 hrs in internship. May be retaken to 6 cr max; combined limit of 3 cr in Bio Sci 289 & 489 counts toward Bio Sci major.
Current Offerings: http://uwm.edu/schedule
BIO SCI 490 Molecular Genetics
3 cr. Undergraduate/Graduate.
Molecular mechanisms of higher organisms and model systems. Topics include gene structure, genetic and genomic analysis, gene expression and regulation. 2 hrs lec, 1 hr dis.
Prerequisites: jr st; Bio Sci 325(P); Bio Sci 315(C) & 316(C).
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 495 Internship in Biotechnology, Upper Division
3-6 cr. Undergraduate.
Application of advanced principles in microbiology and biotechnology in appropriate settings.
Prerequisites: jr st; Bio Sci 383(303)(P) & 529(650)(P); declared microbio major; 2.5 gpa; cons supervising faculty member.
Course Rules: One cr earned for academic work based on 40 hrs in internship. May be retaken to 6 cr max.
Last Taught: Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 496 UROP Apprenticeship, Upper-Level
1-3 cr. Undergraduate.
Undergraduate research participation in a project developed with a supervising member of the faculty or staff. One credit for 45 hrs research.
Prerequisites: jr st; acceptance to UROP; prior or conc reg in UROP seminar.
Course Rules: May be retaken to 9 cr max in any combination of UROP apprenticeship courses.
Last Taught: Spring 2017, Fall 2016, Fall 2015, Summer 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 497 Study Abroad:
1-12 cr. Undergraduate/Graduate.
Designed to enroll students in UWM-sponsored program before course work level, content, and credits are determined and/or in specially-prepared course work.
Prerequisites: jr st; acceptance for Study Abroad Prog.
Course Rules: May be retaken w/chg in topic.
Last Taught: Fall 2016, Fall 2014, Fall 2013, Spring 2013.
Current Offerings: http://uwm.edu/schedule

BIO SCI 498 Developmental Genetics
3 cr. Undergraduate/Graduate.
How genetic model organisms contribute to our knowledge of biology and how this knowledge impacts human health.
Prerequisites: jr st; grade of C or better in Bio Sci 325(P).
Course Rules: Cell & Molec Bio.
Last Taught: Fall 2017, Fall 2016, Fall 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 499 Ad Hoc:
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.
Prerequisites: jr st; add'l prereqs may be assigned to specific topic.
Course Rules: Specific topics may satisfy major area req; consult dept. May be retaken w/chg in topic.
Current Offerings: http://uwm.edu/schedule

BIO SCI 500 Plant Physiology
3 cr. Undergraduate/Graduate.
Major biological activities of plants; including growth, development, and metabolism. 3 hrs lec/dis.
Prerequisites: jr st; Bio Sci 325(P); Bio Sci 310(P) or 315(P) or cons instr.
Course Rules: Cell & Molec Bio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 501 Plant and Aquatic Ecophysiology Laboratory
3 cr. Undergraduate/Graduate.
Hands-on examination of ecophysiological activities in plants and aquatic ecosystems using diverse field and lab experimental methods. 1 hr lec, 1 hr dis. 2 hrs lab.
Prerequisites: jr st; Bio Sci 325(P) or 310(P).
Course Rules: Cell & Molec Bio.
Last Taught: Fall 2016, Fall 1987, Fall 1986.
Current Offerings: http://uwm.edu/schedule

BIO SCI 502 Introduction to Programming and Modeling in Ecology and Evolution
3 cr. Undergraduate/Graduate.
Using R statistical language to teach script programming to address data manipulation, statistical modeling, and simple simulations in an ecological and evolutionary context.
Prerequisites: jr st; intro stats (e.g., Bio Sci 465).
Course Rules: Counts as repeat of Bio Sci 599 w/similar topic.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Spring 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 505 Conservation Biology
3 cr. Undergraduate/Graduate.
Genetic and ecological approaches to the conservation of biological diversity. Topics include biology of rare plants and animals, design of nature reserves, and restoration ecology. 3 hrs lec.
Prerequisites: jr st; Bio Sci 152(P) & 325(260)(P).
Last Taught: Fall 2017, Fall 2016, Fall 2015, Spring 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 507 Environmental Microbiology
3 cr. Undergraduate/Graduate.
Bacteria from the environment; emphasis on aquatic systems; biogeochemical cycles, bioremediation, and environmental control of gene expression.
Prerequisites: jr st; Bio Sci 383(P).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Fall 2013, Fall 2011, Fall 2010, Spring 2004.
Current Offerings: http://uwm.edu/schedule

BIO SCI 511 Ichthyology
3 cr. Undergraduate/Graduate.
The diverse biology of fishes focusing on behavioral, biomechanical, genetic, and physiological adaptations to diverse ecological systems.
Prerequisites: jr st; grade of C or better in Bio Sci 310(P); or cons instr.
Course Rules: Bio Sci 511 & FrshWtr 511 are jointly offered; they count as repeats of one another.
Current Offerings: http://uwm.edu/schedule
BIO SCI 512 Limnology I
3 cr. Undergraduate/Graduate.
The ecology of freshwater ecosystems as influenced by physical and chemical processes.
Prerequisites: jr st; Bio Sci 150(P) & 152(P), course in chem; or cons instr.
Last Taught: Fall 2017, Fall 2015, Fall 2013, Fall 2010.
Current Offerings: http://uwm.edu/schedule

BIO SCI 523 Evolution and Ecology of Birds
3 cr. Undergraduate/Graduate.
Study of the origin and maintenance of diversity in birds. Topics include systematics, biogeography, life-history behavior, and conservation. 3 hrs lec.
Prerequisites: jr st; Bio Sci 152(P) & 310(P).
Current Offerings: http://uwm.edu/schedule

BIO SCI 529 Molecular Biology of Microorganisms
3 cr. Undergraduate/Graduate.
Molecular analysis of microbial genetic systems of bacteria, phage, fungi, and yeast. 2 hrs lec, 1 hr dis.
Prerequisites: jr st; Bio Sci 383(P).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.
Current Offerings: http://uwm.edu/schedule

BIO SCI 532 Behavioral Ecology
3 cr. Undergraduate/Graduate.
Behavioral adaptations of organisms in relation to their environment, including social organization, territoriality, cooperation and conflict, parental care, breeding strategies, foraging.
Prerequisites: jr st; Bio Sci 310(P).
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 535 Bacterial Pathogenesis
3 cr. Undergraduate/Graduate.
Structural and physiological characteristics of important bacteria causing human and animal diseases. Interactions between pathogen and host, including host defense mechanisms.
Prerequisites: jr st; Bio Sci 383(P).
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 536 Applied Microbiology and Biotechnology
3 cr. Undergraduate/Graduate.
Real-world application of natural and genetically-engineered microorganisms to bioremediation, waste treatment, agriculture and production of food, beverages, chemicals, fuels, enzymes, vaccines and pharmaceuticals. 3 hrs lec.
Prerequisites: jr st; Bio Sci 383(P) or cons instr.
Course Rules: Cell and Molec Bio; Microbio.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Spring 2004.
Current Offerings: http://uwm.edu/schedule

BIO SCI 537 Industrial Microbiology and Biochemistry Laboratory
2 cr. Undergraduate/Graduate.
Experiments using industrial fermentation approaches for isolation of biologically-relevant molecules, e.g., antibiotics; analysis of their function and activity using microbiological and biochemical techniques.
Prerequisites: Bio Sci 383(P), Chem 501(P).
Course Rules: Bio Sci 537 & Chem 537 are jointly offered; they count as repeats of one another. Cell & Molec Bio; Microbio.
Last Taught: Fall 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 539 Laboratory Techniques in Molecular Biology
4 cr. Undergraduate/Graduate.
Molecular biological techniques, including cell cultures, RNA and DNA isolation, cloning and sequencing of genes; use of expression vectors; protein electrophoresis. 2 hrs lec/dis, 6 hrs lab.
Prerequisites: jr st; Bio Sci 315(P), 316(P), & 325(P).
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.
Current Offerings: http://uwm.edu/schedule

BIO SCI 540 Microbial Diversity and Physiology
3 cr. Undergraduate/Graduate.
Physiology, ecology, and diversity of microorganisms. 3 hrs lec.
Prerequisites: jr st; Bio Sci 383(P).
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 542 Biological Electron Microscopy
3 cr. Undergraduate/Graduate.
Theory, design, and operating principles of scanning and transmission electron microscopes; preparation of biological specimens.
Prerequisites: jr st; Bio Sci 315(P) & 316(P), or cons instr.
Course Rules: Cell & Molec Bio; Microbio.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.
Current Offerings: http://uwm.edu/schedule

BIO SCI 543 Scanning Electron Microscopy Laboratory
2 cr. Undergraduate/Graduate.
Lab/dis with an emphasis on 'hands-on' exercises including biological specimen prep, microscope operation and photography.
Prerequisites: jr st; Bio Sci 542(C) & cons instr.
Course Rules: Cell & Molec Bio.
Last Taught: Fall 2017, Fall 2016, Fall 2015, Fall 2014.
Current Offerings: http://uwm.edu/schedule

BIO SCI 544 Transmission Electron Microscopy Laboratory
3 cr. Undergraduate/Graduate.
Lab/dis with an emphasis on 'hands-on' exercises including fixation and sectioning of biological specimens, microscope operation and photography.
Prerequisites: jr st; 3 cr in Bio Sci 542(C); cons instr.
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule
### BIO SCI 545 Physiology of Reproduction
3 cr. Undergraduate/Graduate.

Mammalian reproductive physiology with emphasis on humans; neuroendocrine control of reproductive cycles, pregnancy, and lactation; clinical implications; biological aspects of human population control.

**Prerequisites:** jr st; Chem 103(P) or 341(P) or 343(P); Bio Sci 315(P); or cons instr.

**Course Rules:** Cell & Molec Bio.

**Last Taught:** Spring 2016, Spring 2015, Spring 2014, Spring 2013.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 556 Developmental Neurobiology
3-4 cr. Undergraduate/Graduate.

The mechanisms involved in the genesis and maintenance of nervous system organization. 3 hrs lec, 1 hr dis.

**Prerequisites:** jr st; Bio Sci 354(P) or 356(P) or cons instr.

**Course Rules:** Cell & Molec Bio. Grad students enroll in lec & dis for 4 cr. Undergrads may enroll in lec only for 3 cr or lec & dis for 4 cr.

**Last Taught:** Fall 2013, Fall 2011, Fall 2009, Fall 2007.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 566 Cell Biology of Human Disease
3 cr. Undergraduate/Graduate.

Cellular and molecular mechanisms of human developmental diseases; cell signaling in the treatment and prevention of diseases and genetic syndromes.

**Prerequisites:** jr st, BioSci 315(P); or grad st.

**Course Rules:** Cell & Molec Bio.

**Last Taught:** Spring 2018, Fall 2016, Fall 2015, Fall 2013.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 572 Functional Genomics
3 cr. Undergraduate/Graduate.

Organization, function, and analysis of genes, proteins, and genomes using internet databases and bioinformatic tools; current knowledge of genomes in various organisms; transcriptomics and proteomics. 2 hrs lec, 1 hr dis.

**Prerequisites:** jr st; Bio Sci 325(260)(P).

**Course Rules:** Cell & Molec Bio; Microbio.

**Last Taught:** Spring 2018, Fall 2016, Spring 2012, Fall 2007.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 573 Cellular Evolution
3 cr. Undergraduate/Graduate.

Theories concerning the origin of life on Earth and the evolution of cellular structure and function, culminating in the emergence of the multicellular kingdoms. 2 hrs lec, 1 hr dis.

**Prerequisites:** sr st; Bio Sci 315(P) or 325(P); Bio Sci 316(P); Chem 341/342(P) or 343/344/345(P), or cons instr; Bio Sci 383(R) or 490(R) or Chem 501(R) or 601(R).

**Course Rules:** Cell & Molec Bio; Microbio.

**Last Taught:** Spring 2016, Spring 2014, Spring 2013, Spring 2012.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 575 Evolutionary Biology
3 cr. Undergraduate/Graduate.

Evolutionary processes in natural populations. Topics include mating patterns, speciation, gene flow, natural selection, and genetic approaches to conservation. 3 hrs lec.

**Prerequisites:** jr st; Bio Sci 152(P) & 325(260)(P).

**Course Rules:** Grad students must reg conc in Bio Sci 776.

**Last Taught:** Spring 2017, Spring 2016, Spring 2014, Spring 2013.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 580 Experimental Microbiology
4 cr. Undergraduate/Graduate.

Modern experimental approaches to study of microbial physiology and genetics. 2 hrs lec/6 hrs lab.

**Prerequisites:** jr st; Bio Sci 383(P).

**Course Rules:** Cell & Molec Bio; Microbio.

**Last Taught:** Spring 2018, Spring 2017, Spring 2016, Spring 2015.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 596 Neuropharmacology
3 cr. Undergraduate/Graduate.

Cellular and molecular mechanisms of drug action on the nervous system. Topic include drug affects on neurotransmitters, receptors, cell signaling, and neurological disease/disorders.

**Prerequisites:** jr st; BioSci/Psych 354(P) or 355(P) or Psych 654(P) or cons instr.

**Course Rules:** Cell & Molec Bio; Microbio.

**Last Taught:** Spring 2016, Spring 2015, Spring 2014, Spring 2013.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)

### BIO SCI 565 Eukaryotic Gene Regulation
3 cr. Undergraduate/Graduate.

Molecular mechanism by which genes are regulated in higher eukaryotes, including humans. Role of gene regulation during normal development and disease in eukaryotes.

**Prerequisites:** jr st, Bio Sci 315(P) or 325(P); or grad st.

**Course Rules:** Cell & Molec Bio.

**Last Taught:** Fall 2017, Spring 2017, Spring 2016, Spring 2014.

**Current Offerings:** [http://uwm.edu/schedule](http://uwm.edu/schedule)
BIO SCI 597 RNA Structure, Function, and Metabolism
3 cr. Undergraduate/Graduate.
Structural and functional complexity of RNA. RNA as genetic material, enzymes and regulators; micro RNAs as potential therapeutics.
Prerequisites: jr st; Bio Sci 325(P) or cons instr.
Course Rules: Cell & Molec Bio; Microbio.
Current Offerings: http://uwm.edu/schedule

BIO SCI 599 Special Topics in Biological Sciences
1-3 cr. Undergraduate/Graduate.
In-depth examination of important subjects in one or more areas of the biological sciences. Specific credits and add'l prereqs announced in Schedule of Classes each time course offered.
Prerequisites: jr st.
Course Rules: May be retaken w/chg in topic to 6 cr max.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 611 Seminar on Recent Advances in Limnology and Oceanography
2 cr. Undergraduate/Graduate.
Lectures and discussion of current issues in limnology and oceanography; focus on a specific issue or research topic.
Prerequisites: jr st; Bio Sci 512(P) or cons instr.
Course Rules: May be retaken w/chg in topic to 6 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 670 Senior Seminar in Biological Sciences
1 cr. Undergraduate.
Examination of biological literature and preparation, presentation, and discussion of oral reports by individual students.
Prerequisites: sr st; Bio Sci lab course numbered 300-349; declared Bio Sci major.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 671 Undergraduate Seminar in Microbiology
1 cr. Undergraduate.
Examination of microbiological literature; preparation, presentation, and discussion of oral reports by individual students.
Prerequisites: sr st; Bio Sci 383(P).
Last Taught: Fall 2017, Spring 2017, Spring 2016, Fall 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 672 Undergraduate Seminar in Cell and Molecular Biology
1 cr. Undergraduate.
Examination of cell and molecular biology literature; preparation, presentation, and discussion of oral reports by individual students.
Prerequisites: sr st; Bio Sci 315(P) & 316(P).
Current Offerings: http://uwm.edu/schedule

BIO SCI 695 Independent Study in Freshwater Sciences for Biological Sciences Students
1-3 cr. Undergraduate.
Independent and original research on a topic not available as a regular course; conducted under the direction of faculty or staff scientist from the School of Freshwater Science.
Prerequisites: jr st; Bio Sci 325(P) & 316(P); 2.5 gpa; writ cons instr, dept chair, & asst dean for SAS.
Course Rules: May be retaken to 6 cr max. Satisfies Bio Sci research req; does not count as a Bio Sci lab course.
Last Taught: Fall 2017, Fall 2015, Spring 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 697 Independent Study in Cell and Molecular Biology
1-3 cr. Undergraduate.
Independent and original research conducted under the direction of a cell/molecular biology faculty or staff member.
Prerequisites: jr st; Bio Sci 315(P) & 316(P); 2.5 gpa; writ cons instr, dept chair, & asst dean for SAS.
Course Rules: May be retaken to 6 cr max. Satisfies Bio Sci research req; does not count as a Bio Sci lab course.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 698 Independent Study in Microbiology
1-3 cr. Undergraduate.
Introduction to research. Independent and original study conducted under the direction of a faculty or staff member.
Prerequisites: jr st; Bio Sci 383(P); 2.5 gpa; writ cons instr, dept chair, & asst dean for SAS.
Course Rules: May be retaken to 6 cr max. Satisfies Bio Sci research req; does not count as a Bio Sci lab course.
Current Offerings: http://uwm.edu/schedule

BIO SCI 699 Independent Study
1-3 cr. Undergraduate.
Independent study on a topic not available as a regular course; conducted under the supervision of a faculty member. Requires submission of a formal study proposal.
Prerequisites: jr st; Bio Sci 325(260)(P); Bio Sci 310(P) or Bio Sci 315(P) & 316(P); 2.5 gpa; writ cons instr, dept chair, & asst dean for SAS.
Course Rules: May be retaken to 6 cr max. Satisfies Bio Sci research req; does not count as a Bio Sci lab course.
Current Offerings: http://uwm.edu/schedule

BIO SCI 725 Recent Advances in Molecular Microbiology and Immunology
3 cr. Graduate.
Current developments and research in molecular microbiology and/or immunology. 3 hrs lec.
Prerequisites: grad st or cons instr.
Course Rules: Retakable w/chg in topic to 9 cr max.
Last Taught: Spring 2011, Spring 2010, Fall 2007, Fall 2006.
Current Offerings: http://uwm.edu/schedule
BIO SCI 750 Scientific Writing
2 cr. Graduate.
Writing techniques for the sciences, including proposal writing, submission of papers to journals. Writing and editing research proposals, scientific papers, and review papers. Critique of published papers.
Prerequisites: grad st.
Current Offerings: http://uwm.edu/schedule

BIO SCI 800 Graduate Capstone in Biological Sciences:
2 cr. Graduate.
Capstone Seminar involving extensive research and evaluation of the scientific literature on a specific topic. Group and individual oral presentations required. Not re-takable for credit.
Prerequisites: Open only to MS students in non-thesis track; cons instr.
Current Offerings: http://uwm.edu/schedule

BIO SCI 899 Advanced Independent Studies
1-3 cr. Graduate.
Special studies at the graduate level involving independent reading, library research, and/or field for laboratory study other than thesis research.
Prerequisites: grad st; cons instr.
Course Rules: Retakable w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 900 Biology Colloquium
1 cr. Graduate.
Talks by invited speakers and faculty members on topics of biological interest.
Prerequisites: grad st.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 925 Seminar: Molecular and Cell Biology
1-2 cr. Graduate.
Carries 1 cr when offered once weekly; carries 2 cr when offered twice weekly.
Prerequisites: grad st
Course Rules: Retakable w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 927 Seminar: Population and Community Ecology
1-2 cr. Graduate.
Carries 1 cr when offered once weekly; carries 2 cr when offered twice weekly.
Prerequisites: grad st
Course Rules: Retakable w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 928 Seminar: Aquatic Biology
1-2 cr. Graduate.
Carries 1 cr when offered once weekly; carries 2 cr when offered twice weekly.
Prerequisites: grad st
Course Rules: Retakable w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 929 Seminar: Behavioral Biology
1-2 cr. Graduate.
Current topics in behavioral biology examined in a seminar format.
Prerequisites: grad st.
Course Rules: Retakable w/chg in topic to 9 cr max.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 931 Seminar in Systematic Biology and Evolution:
1-2 cr. Graduate.
Current topics in systemic biology and evolution explored in a seminar format.
Prerequisites: grad st.
Course Rules: Retakable w/chg in topic to 9 cr max.
Current Offerings: http://uwm.edu/schedule

BIO SCI 933 Seminar in Neuroscience
2 cr. Graduate.
Student oral and poster presentations in cellular, molecular, behavioral, and cognitive neuroscience. Students will also write evaluations and summaries of external presentations.
Prerequisites: grad st in Psych, Bio Sci, or Ed Psych or cons instr
Course Rules: Retakable to 8 cr max. Bio Sci 933 & Psych 933 are jointly offered; students may enroll under only one of the curricular areas in any single semester.
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2015.
Current Offerings: http://uwm.edu/schedule

BIO SCI 934 Research Advances in Cell and Molecular Biology
1-10 cr. Graduate.
Presentation and discussion of original research and current topics in cell and molecular biology. Retakable to 10 cr max.
Prerequisites: grad st
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 935 Research Advances in Evolution, Ecology, and Behavior
1-10 cr. Graduate.
Presentation and discussion of original research and current topics in evolution, ecology, and behavior. Retakable to 10 cr max.
Prerequisites: grad st
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 936 Research Advances in Microbiology
1-10 cr. Graduate.
Presentation and discussion of original research and current topics in microbiology. Retakable to 10 cr max.
Prerequisites: grad st
Last Taught: Spring 2018, Fall 2017, Spring 2017, Fall 2016.
Current Offerings: http://uwm.edu/schedule

BIO SCI 990 Research
1-8 cr. Graduate.
Mentored research in partial fulfillment of thesis requirements.
Prerequisites: grad st.
Current Offerings: http://uwm.edu/schedule