

500. Senior Studio Project

Salas/Oblinger

Four credits.

This course is taken the semester before the student plans to graduate. Students work in the area and medium of their expertise and pursue a concentrated, narrow studio research activity which is meaningfully related to their major area of interest in art. Students meet on a regular basis, receive critiques from the staff, and are expected to produce a significant body of work for the senior show. Field trips may be required.

541, 542. Independent Study in Art

Staff

Variable credit course, 1-4 credits.

Exceptional majors may propose independent projects to be carried out according to a written proposal approved and supervised by an instructor in the course of the semester. Field trips may be required. No more than twelve credit hours of independent study or internship may be taken, and no more than eight credit hours may be in one department. A registration form is required. *Prerequisites: junior or senior standing, consent of the department chair and a department project director, and 12 credits toward the major.*

551, 552. Internship

Staff

Variable credit course, 1-4 credits.

A supervised internship in an arts-related institution, office, studio, or agency. Students write a paper describing and critically analyzing their experience, and make a public presentation. The internship must be arranged by the student and approved by the chair of the department in advance. It may be repeated for up to eight credits, although no more than four can be counted toward completion of the major and two toward the minor. Field trips may be required. No more than twelve credit hours of independent study or internship may be taken, and no more than eight credit hours may be in one department. A registration form is required. *Prerequisites: junior or senior standing, consent of the department chair and a department project director, and 12 credits toward the major.*

570. Senior Seminar in Art

Nygard

Variable credit course, 2-4 credits.

In the year before graduation, seniors in the Department undertake individualized projects and professional development activities. Senior studio majors take the course for two credits, while art and art history majors enroll for four credits. All students present their work publicly. Field trips may be required.

Biology

Professors Robert L. Wallace, George H. Wittler (Chair);

Associate Professors Mark S. Kainz, Memuna Z. Khan;

Assistant Professor Barbara E. Sisson;

Biology Laboratory Coordinator Dana C. Moracco

Departmental Mission Statement: Biology is a vast discipline that begins with an understanding of the richness of the molecules of life — nucleic acids, proteins, carbohydrates, lipids — and culminates with an examination of the enormity of interactions of life within the biosphere. While professional biologists usually concentrate on a specific area within the broader field (e.g., human or veterinary medicine, molecular biology, forestry, or wildlife ecology), we believe that undergraduate biology students should begin by exploring as much of the subject as they can.

With this philosophy in mind, Ripon students completing a major in biology will explore the discipline by taking a variety of courses of their choosing. All biology majors take four courses, a foundational introductory course, BIO 121, a scientific writing course, and capstone courses BIO 501 and 502. BIO 121 introduces the central concepts of biology to majors and non-majors. In BIO 501 and 502 students prepare a portfolio of their past work, read and analyze papers from the primary literature, and design, carry out, and report on original research projects. In between these two experiences, majors take at least six subject specific courses in three different areas of biology. In all these courses, students develop skills as practicing scientists. That is, they learn firsthand by doing the science of biology. In our labs and discussions students come to know the discipline by posing problems that are meaningful to them, solving problems through observation and experimentation, and presenting their findings to their classmates and professors.

Communicating Plus - Biology: In accordance with the college's emphasis on enhancing our student's ability to communicate what they have learned, all our biology courses highlight the four skills embodied in the Communicating Plus program: written communication (esp. BIO 200), oral communication, critical thinking, and problem solving. The biology curriculum has three levels at which the Communicating Plus skills are addressed. Important skills are introduced in BIO 121 and further developed in the subject specific courses. Finally, students have opportunities to perfect and demonstrate their mastery of discipline specific content and the Communicating Plus skills in BIO 501 and 502.

Requirements for a major in biology: A total of thirty-five credits of biology including the following courses: BIO 121; BIO 200, 501 and 502; one course in cell and molecular biology (BIO 219, 314, 327, 328, 329); one course in zoology (BIO 206, 211, 215, 216); one course in botany (BIO 226, 227, 337); one course in ecology and evolution (BIO 206, 215, 216, 227, 247, 339, 450). Courses from the semester in environmental science (SES) at Woods Hole Oceanographic Institute in Massachusetts automatically transfer as Ripon College credit and will count toward the major; courses taken at other field stations must receive prior approval from the chair of the department. Students must complete at least two courses on the 300 level. (Students who have received a score of four or higher on the AP biology exam are not required to take BIO 121.)

MTH 120 or PSC 211 and CHM 111/112 are prerequisite to BIO 501 and 502 and must be completed before the senior year. No more than four credits of independent study (BIO 541, 542, 551, 552) may be counted toward the major. BIO 110, 310 and BIO 400 will not count towards any major or minor in biology.

Students planning on graduate work in biology or a health care delivery field should consider additional courses in chemistry, one year of physics, mathematics through calculus, and computer science. For further information on preparing for a career in the health professions consult Professor Marl Kainz.

Requirements for a minor in biology: BIO 121 plus 19 additional credits in biology courses approved by the department.

Requirements for a minor in environmental biology: ENV 120, BIO 121 and 247, plus 11 additional credits in biology courses approved by the department.

Courses taken at the SES may be used to fulfill certain requirements for the major and minor. For further information regarding the SES consult Professor Robert Wallace.

Requirements for a teaching major in biology: Thirty-five credits of biology with the following courses being required for a major: BIO 121, 200, 219, 226 or 227, 247, 501, 502 and one course from each of the following areas: zoology (215, 216); physiology (211, 314, 327); MTH 120 and one year of college chemistry. Majors must elect a minimum of two courses at the 300 or 400 level. BIO 400 is required for teacher licensure, but it will not count toward the major. Students planning to take the Praxis II exam are advised that they will need knowledge of chemistry, physics and geology. For further information consult Professor George Wittler.

Requirements for a teaching minor in biology: ENV 120; BIO 121, 211, 219, 226 or 227, 247, and either 215 or 216. BIO 400 is required for teacher licensure, but it will not count toward the minor. For further information consult Professor George Wittler.

Requirements for a teaching minor in environmental biology: ENV 120; twenty-one credits of biology, with the following courses required for a minor: BIO 121, 247 and one course from each of the following groups: BIO 226 or 227, BIO 215 or 216; and BIO 337, 338, or 450. Semester in Environmental Science at Woods Hole Oceanographic Institution may substitute within the appropriate group above. Note that BIO 400 must be taken for teacher licensure but it will not count toward this minor.

110. Topics in Biology

Staff

Variable credit course, 2-4 credits. May be offered as a half-semester course.

Designed to acquaint the student with some of the historical and present-day biological topics that relate to humans and their environment. Students can repeat the course for credit when the topics change. Please see the pertinent Schedule of Courses for the listing of topics courses. Lecture, reading, discussion, laboratory, required field trips depending on the nature of the topic.

116. Advanced First-Year Tutorial

Staff

One credit.

A laboratory opportunity for highly motivated students to design and carry out an individual investigative project of their own choosing on some aspect of the life sciences. Registrants in this program will choose a biology faculty member who will act as tutor for the study. Available by invitation only, based on student performance during a semester in BIO 121. *Prerequisites: consent of the department chair and the designated tutor.*

121. Introductory Biology

Staff

Four credits. Offered in the fall semesters.

Three basic concepts of biology are explored, emphasizing laboratory work and exploration. The major topic areas of the course are cell biology, genetics, and evolution. Laboratory class size will be small to facilitate discussion and analysis of laboratory work. Lecture, reading, discussion, laboratory, required field trips. This course is a prerequisite for all biology courses numbered 200 and above.

200. Scientific Writing and Communication**Staff**

Three credits.

The writing of scientific papers in a biological context. Consideration of the historic and modern role of writing primarily for an audience of scientists is examined in a variety of ways. Proper format, data interpretation and presentation, writing style, and methods of literature review will be covered. A review paper and a research paper will be written in a style acceptable for publication in professional journals. Application of the use of computers in writing papers and visual presentation of data in the form of tables and figures for both papers and poster presentation will be covered. Formal papers written for biology courses will follow this style. Lecture, discussion. *Prerequisites: BIO 121; ENG 110; sophomore standing; or consent of the instructor.*

206. Ornithology**Khan**

Four credits.

Study of the biology of birds including their evolution, unique morphology, physiological adaptations, migratory behavior and mating systems. Laboratories will include examining preserved specimens, identifying local bird species by sight and sound and becoming acquainted with ornithological field methods. Lecture, laboratory, required field trips. *Prerequisite: BIO 121 or consent of instructor.*

**210. Human Form and Function:
Support, Movement, and Integration****Staff**

Four credits.

Introduction to the structure and function of the human body with an emphasis on the integumentary, skeletal, muscular, cardiovascular, and nervous systems. This course examines these systems on the organ and organismal levels. Correlations between structure and function is emphasized. An integrated laboratory includes study of general physiology, muscle contraction, nerve transmission, the special senses, and gross anatomy of the skeletal, muscle and nervous systems. Lecture, laboratory, discussion. This course will not count toward majors in biology, psychobiology, and chemistry-biology. *Prerequisite: BIO 121.*

**211. Human Anatomy and Physiology I:
Support, Movement, and Integration****Staff**

Four credits.

Introduction to the structure and function of the human body with an emphasis on the integumentary, skeletal, muscular, nervous, and endocrine systems. This course examines these systems from cellular to organismal levels, emphasizing correlations between structure and function. Anatomical and physiological changes occurring in diseased states also are discussed. An integrated laboratory includes study of general physiology, muscle contraction, nerve transmission, the special senses, and gross anatomy of relevant structures. Lecture, laboratory, discussion. *Prerequisite: BIO 121.*

215. Invertebrate Zoology**Wallace**

Four credits.

Comprehensive study of the biology of invertebrate animals. Ecology and systematics of the invertebrate fauna from local habitats are emphasized on field trips. Live, preserved, and fossilized specimens are studied in the laboratory; emphasis is given to parasitic forms and species of significant economic and ecological importance. A collection trip to fossil-bearing strata is conducted. Lecture, laboratory, discussion, required field trips. *Prerequisite: BIO 121.*

216. Vertebrate Zoology**Khan**

Four credits.

Study of vertebrate diversity in morphology and physiology as a result of these organisms' evolutionary history, biogeography and ecology. This course will acquaint the student with anatomy, systematics, life history and adaptive strategies of the vertebrate groups. Laboratories include dissections of selected vertebrate groups and identification and field study of local species. Lecture, laboratory, discussion, required field trips. *Prerequisite: BIO 121.*

219. Genetics**Kainz**

Four credits.

Study of heredity, structure, and function of genes. Classical, molecular, and population genetics are discussed in lecture. Laboratories include mapping and study of gene interaction in eukaryotes, an introduction to recombinant DNA techniques, mutagenesis and approaches to screening and selecting mutants. Lecture, laboratory. *Prerequisites: BIO 121 and CHM 111.*

220. Department Seminar**Staff**

One credit.

Selected topics in the biological sciences presented by faculty, Ripon College seniors, and visiting scholars. This course is open to first and second-year students. Grading is S-U. *Prerequisites: BIO 121.*

226. Plant Anatomy and Physiology**Wittler**

Four credits.

The anatomy of flowering plants as it relates to the physiological phenomena of nutrition, water relations, photosynthesis, development, and physiological ecology. Lecture, laboratory, discussion, and required field trips. *Prerequisite: BIO 121.*

227. The Biology of Plants**Wittler**

Four credits.

A comprehensive study of the kingdom Plantae. Emphasis on the morphology, reproduction, and evolution of the algae, bryophytes, ferns, and seed plants. Lecture, laboratory, discussion, and required field trips. *Prerequisite: BIO 121.*

247. General Ecology**Wallace**

Four Credits

Interaction of aquatic and terrestrial plants and animals with their environment. Emphasis is placed on community structure, energy flow, nutrient cycling, competition, niche development, population dynamics, and the concept of ecosystem services. Lecture, laboratory, discussion, required field trips. Same as ENV 247. *Prerequisite: BIO 121.*

300. Departmental Studies**Staff**

Variable credit course, 2-4 credits. Offered on demand.

Special subjects in biology not covered by regular courses. This course may be repeated for credit when topics change. Please see the pertinent Schedule of Courses for the listing of topics courses. *Prerequisites: BIO 121 and consent of the instructor.*

303. Parasitology**Wallace**

Four credits.

Comprehensive study of the biology of parasitic invertebrates. Lecture, discussion, laboratory, student presentations. *Prerequisite: BIO 121 and four credits in biology above BIO 210.*

304. Immunology**Staff**

Three credits.

Basic concepts of the vertebrate lymphoid system and immune response mechanisms. Topics include immunochemistry, inflammation, immunoglobulin structure, antigen-antibody reactions, complement, hypersensitivity, autoimmunity, and immuno/tissue transplant problems. Lecture, discussion. *Prerequisites: BIO 121; CHM 111 and 112.*

305. The Biology of Cancer**Sisson**

Three credits.

Study of the nature and causes of cancer from a biological viewpoint. Lectures and discussion will examine what happens within cells to cause them to become cancerous and why the consequences are so often disastrous, as well as how cancer can be prevented, detected, and treated. A student project is included, as are opportunities for service learning. *Prerequisites: BIO 121 and one course in organismal or cell biology.*

310. Laboratory Assistant**Staff**

One credit.

Participation as a laboratory assistant for the department of biology. Selection for positions will be determined by the biology staff and will depend on prior performance in classes and/or as an assistant. Duties will vary depending on the semester and experience of the student. A limited number of credits may be counted toward graduation. Will not count toward fulfilling major requirements. Grading is Pass-Fail. *Prerequisite: consent of the department chair.*

**312. Human Anatomy and Physiology II:
Maintenance and Continuity****Staff**

Four credits.

Introduction to the structure and function of the human body with an emphasis on the respiratory, digestive, cardiovascular, immune, urinary, and reproductive systems. This course examines these systems from cellular to organismal levels, emphasizing correlations between structure and function. Anatomical and physiological changes occurring in diseased states also are discussed. An integrated laboratory includes study of respiration, digestion, blood, circulation, the heart, metabolism, urine formation, and gross anatomy of relevant structures. Lecture, laboratory, discussion. *Prerequisites: BIO 211 and CHM 111. Prerequisite or corequisite: CHM 112.*

314. Microbiology**Kainz**

Four credits.

Morphology and physiology of viruses, bacteria, and other microorganisms. Current research on pathogenic forms involved in infectious diseases, recent advances in microbial genetics, and microbes of economic significance are stressed. Aseptic technique, safety, culture methods, microbial metabolism, and bacterial identification are emphasized in laboratory. Lecture, laboratory. *Prerequisites: BIO 121 and CHM 111. Prerequisite or corequisite: CHM 112.*

327. Cell Biology**Sisson**

Four credits.

Study of the structure and function of cells, particularly of the cytoplasmic structures of eukaryotic cells. Topics include enzymatic function, structure and function of membranes, motility, cell division, signaling, and cancer as a cellular disease. Laboratories introduce important techniques such as phase, interference contrast microscopy, spectrophotometry, protein electrophoresis, cell fractionation, cell culture and immunocytology. Lecture, laboratory. *Prerequisites: BIO 121 and CHM 111.*

328. Molecular Biology and Bioinformatics**Kainz**

Four credits

Study of the principles of molecular biology including the organization of genomes, DNA replication, transcription, translation, and regulation of gene expression. Use of the primary scientific literature and the critical evaluation of experiments and their results are emphasized in lecture. Laboratories focus on the use of modern molecular techniques to address open questions in molecular biology. Lecture, discussion, and laboratory. *Prerequisites: BIO 219 and CHM 111.*

329. Developmental Biology**Staff**

Four credits. Offered in 2014-15 and alternate years.

Study of biological systems that change in structure or function. Lectures include descriptive accounts of embryological development of plants and animals. Concepts of determination, differentiation, long term regulation of genes, and pattern formation are discussed as well as recent studies on the effects of developmental processes on evolution. Laboratory exercises may include experimental manipulation of a variety of developing systems from the algae, fungi, vascular plants, invertebrates, and vertebrates. Lecture, laboratory and discussion. *Prerequisites: BIO 216 or 219; CHM 111 and 112.*

337. Terrestrial Ecology**Wittler**

Four credits. Offered in 2014-15 and alternate years.

Study of the ecology of the terrestrial ecosystems of central Wisconsin. Emphasis will be placed on the natural history of plant communities of the natural areas near Ripon. Field trips to prairies, savannas, woodlands, and forests will demonstrate firsthand the range of communities in this part of Wisconsin. Lecture, laboratory, required field trips. *Prerequisite: BIO 247.*

338. Aquatic Ecology**Wallace**

Four credits. Offered in 2015-16 and alternate years.

Study of the ecology of aquatic ecosystems, both inland waters (lotic and lentic) and of the world's oceans and estuaries. Topics include the following: plate tectonics, basin origin and morphology, properties of drainage systems, physical and chemical properties, flora and fauna, lake aging, cultural eutrophication, fisheries biology, aquaculture, abuse of the environment. Lecture, laboratory, required field trips. (This course is designed as a prerequisite to BIO 450 and must be taken prior to the Maymester field trip for that course.) *Prerequisite: BIO 247 and a college-level course covering inorganic chemistry.*

339. Behavioral Ecology**Khan**

Four credits.

Study of the reproductive and survival consequences of animal behavior. We will examine the diversity of behavioral tactics used by animals to improve their chances of survival and reproduction within the context of their ecology (where they live, what they eat, and what

eats them). Lecture topics include foraging behavior, predator-prey interactions, group living, mating systems, parental behavior, and cooperative behavior. Laboratories consist of conducting short field and lab experiments to illustrate principles covered in the text. Lecture, discussion, laboratory, and required field trips. *Prerequisites: BIO 121 and 200.*

400. The Teaching of Biology

Staff

Two credits. Offered on demand.

Designed to acquaint the prospective teacher with special techniques, procedures, and resources useful in teaching biology at the secondary level. Students interested in a biology major or minor for teaching certification should consult the chair of the department. Lecture, discussion, laboratory rotation, required field trips. Will not count towards the major or minor. *Prerequisites or corequisites: BIO 121, EDU 344, and sophomore standing or higher.*

410. Advanced Seminar in Biology

Staff

Variable credit course, 2-3 credits.

Journal readings and discussions on issues of current interest in the biological sciences. Seminar topics will vary. Can be repeated for credit. *Prerequisite: BIO 121, sophomore standing, and consent of the instructor.*

450. Intensive Field Studies

Staff

Variable credit depending on topic.

Offered on a rotational basis as an *In Focus* (formerly Maymester) course. An extensive field trip off campus to one of several study regions. Topics will vary from year to year, but may include the following: Desert and Montane Field Ecology; Field Geology and Physical Geography of Wisconsin; Field Ornithology; Marine Field Ecology; Plant Evolution and Systematics. This course is highly selective; selection to participate is based, in part, on performance in other courses taken at Ripon. *Prerequisites: variable depending on the topics, but always requiring consent of the instructors. It is also recommended that courses in botany (BIO 226, 227), invertebrate zoology (BIO 215), vertebrate zoology (BIO 216), or ecology (BIO 247) be taken prior to this course.*

501, 502. Senior Studies

Staff

Two credits per semester.

Will emphasize the importance of reading, writing, and oral communication in biological research. A senior thesis will be researched and written, then presented as a talk at a spring symposium. During the fall semester students will begin their research projects and work on completing their portfolio. Under certain circumstances students may register for BIO 501 or 502 without the necessary prerequisites, but will not receive credit for either course until all prerequisite courses have been completed successfully. *Prerequisites: 20 credits in biology; BIO 200, MTH 120 or PSC 211; and CHM 111 and 112.*

541, 542. Independent Study

Staff

Variable credit course, 1-4 credits each semester.

Individual investigation of some aspect of biological science of special interest to the student. The study is carried on under the supervision of a staff member. No more than twelve credit hours of independent study or internship may be taken, and no more than eight credit hours may be in one department. A registration form is required. *Prerequisites: junior or senior standing, consent of the department chair and a department project director, and 12 credits toward the major.*

551, 552. Independent Study: Internship**Staff**

Variable credit course, 1-5 credits each semester.

Supervised field study combining scholarly achievement and practical experience with an industry, government agency, or other institution providing a specific direction that relates to a career in the life sciences. A paper is required. No more than twelve credit hours of independent study or internship may be taken, and no more than eight credit hours may be in one department. A registration form is required. *Prerequisites: junior or senior standing, consent of the department chair and a department project director, and 12 credits toward the major.*

Business Management

Professor Mary Avery (Director);

Associate Professors Peng Huang, Dmytro Zhosan;

Instructor Thomas M. Keuler;

Adjunct Instructors Thomas A. Avery, David Sakrison

Departmental Mission Statement: The business management program prepares students for socially responsible business leadership in careers and volunteer settings. The traditional liberal arts, combined with service learning, internship, and small group and community interactions produce creative, globally aware, articulate and ethical managers.

Communicating Plus - Business Management: Students completing a major in business management develop skills in the four Communicating Plus areas — written communication, oral communication, critical thinking and problem solving — in required and elective course work in the discipline. The Communicating Plus Student Learning Goals are laced through all of the core courses and elective courses in economics and business. Since the business management program is an interdisciplinary program, students are exposed to the communication techniques, analytic tools, and modes of thinking of other fields of study. The senior seminar in business management provides students with an opportunity to integrate the skills they have developed throughout their course work in the completion of a project that requires research, data analysis, critical thinking, and oral and written presentations of information and ideas.

Requirements for a major in business management: MTH 120, or PSC 211 and 212; MTH 143, 201 or another mathematics course approved by the major advisor (students interested in graduate school are advised to take calculus); BSA 131, ECO 211, 212 and 350; PHL 202, 241, or 245; ECO 313 (same as BSA 313); BSA 452. Individual focus (electives): Completion of an integrated set of at least four courses from at least two departments totaling at least 12 credits.

- No more than one of these courses may be at the 100 level, and no more than two may be at the 200 level or below
- No more than four credits of these courses may be from courses listed in business management, and no more than four credits of these courses may be from economics.
- At least three of these courses must be taken after declaration of the major and approval by the program director or other business management advisor of a proposal written by the student. The proposal explains how the courses selected serve the student's business study goals and form a cohesive whole.
- An appropriate semester of off-campus study may be counted as one of these courses (four credits).