

- 978. Seminar in Biochemistry**
Fall, Winter, Spring. 0 or 1(1-0)
Presentation and discussion of reports by graduate students on biochemical topics of current interest.
- 999. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

BIOLOGICAL SCIENCE B S

College of Natural Science

- 202. Foundations of Biological Science**
Fall, Winter, Spring. 4(3-3) N S 193.
Primarily for elementary education majors. Fundamental principles of biology.
- 211. General Biology**
Fall, Winter, Spring. 5(4-3) Organic chemistry or concurrently.
Integrated course emphasizing cell structure and function, genetics, comparative morphology and physiology of living organisms and their developmental and community relationships.
- 212. General Biology**
Fall, Winter, Spring. 5(4-3) 211.
Continuation of 211.
- 401. Biological Science for Teachers**
Fall. 4(3-3) Bachelor's degree.
Designed to show the nature of biological science in both its empirical and conceptual aspects. Emphasis is placed on life processes. The theories of the gene and of evolution are stressed. Macromorphology and micromorphology are covered as well as the topics of reproduction, metabolism, physiology, nutrition, enzymes, taxonomy and ecology. Quantitative developments are included whenever possible.
- 402. Biological Science for Teachers**
Fall, Winter. 4(3-3) 401.
Continuation of 401.
- 403. Biological Science for Teachers**
Spring. 4(3-3) 402.
Continuation of 402.
- 410. Biotic and Environmental Relationships**
Summer. 6 credits. Approval of department. Given at W. K. Kellogg Biological Station.
Interrelationship of the biota with its environment. Factors determining distribution and abundance. Interaction of organisms.
- 420. Seminar in Recent Advances in Biological Science**
Fall, Winter, Spring, Summer. 3(3-0)
May re-enroll for a maximum of 6 credits if different topic is taken. Approval of department.
A series of lectures by senior faculty of topics on the history, development, the most recent advances and the possible future and limits of the Biological Sciences.
- 421. Seminar on Man, "The Human Organism"**
Fall, Winter, Spring, Summer. 3(3-0)
Approval of department.
The importance of new discoveries in biology for our understanding of the human organism with emphasis from the fields of genetics, molecular biology, behavior, developmental biology, physiology, and ecology.

- 800. Problems in Biological Science**
Fall, Winter, Spring. Variable credit.
B.S. degree in biological science.
- 999. Research**
Fall, Winter, Spring. Variable credit.
M.S. degree in biological science or equivalent.
Research in some phase of biological science, data to form the basis for the thesis required for the doctoral degree in biological science.

BIOPHYSICS BPY

**College of Human Medicine
College of Natural Science**

- 402. Introduction to Biophysics**
Spring. 5(5-0) PHY 259, MTH 113,
1 year organic chemistry and 1 year biology.
Salient features of biophysics, methods and principles. Structure and organization of biological materials, bioenergetics, radiation biophysics, bioelectric phenomena, biomechanics and psychophysics.
- 804. Experimental Biophysics**
Fall of odd-numbered years. 3 credits.
Approval of department.
Neuro-electric properties of cells, organs and animals, and methods of processing information in humans.
- 805. Experimental Biophysics**
Winter of even-numbered years. 3 credits. Approval of department.
Electrical and physical properties of significant biological molecules and structures.
- 806. Experimental Biophysics**
Spring of even-numbered years. 3 credits. Approval of department.
Interaction of protons and high energy particles with biological molecules and structures.
- 811. Principles of Biophysics**
Fall of even-numbered years. 5(5-0)
Approval of department.
Intensive lecture course treating biophysical characterization of biological materials, quantum biology, information theory, properties of biological systems.
- 812. Principles of Biophysics**
Winter of odd-numbered years. 5(5-0)
Approval of department.
Biophysical investigations of exciton theory, charge migration, radiation biophysics, primary photophysical processes in photosynthesis, surface chemistry and interfacial phenomena.
- 813. Principles of Biophysics**
Spring of odd-numbered years. 5(5-0)
Approval of department.
Consideration of membrane characteristics, the initiation and propagation of bioelectrical signals, sensory mechanisms, information processing in humans, invertebrate and vertebrate central nervous system functions, psychophysics, and cybernetics.
- 880. Special Topics in Biophysics**
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 15 credits.
Special topics within the five subdivisions of biophysics: structure, organization and function of biological phenomena, sensory perception, and psychophysics and biomechanics.

- 890. Readings in Biophysics**
Fall, Winter, Spring. 3 to 6 credits.
Approval of department.
Reading course in special topics adapted to the individual preparation and needs of the student.
- 899. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 990. Biophysics Seminar**
Fall, Winter, Spring, Summer. 1 credit. May re-enroll for a maximum of 3 credits. Approval of department.
- 999. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**BOTANY AND
PLANT PATHOLOGY BOT**

College of Natural Science

- 200. Resource Ecology and Man**
For course description, see Interdisciplinary Courses.
- 301. Elementary Plant Physiology**
Fall, Winter, Spring. 4(2-4) B S 212
or one course in botany. Not open to majors.
Processes concerned in plant life.
- 302. Introductory Morphology**
Fall, Winter. 4(2-4) B S 212 or approval of department.
Structures and life cycles of representative plant groups showing progressive evolutionary developments.
- 304. Plant World**
(432.) Fall, Winter, Spring, Summer. 4(2-6) N S 191 or approval of department.
Basic plant science and its use in teaching. Lectures cover basic subject matter necessary to understanding plant kingdom, evidence and trends of evolution, economic uses and importance, basic principles of ecology. Laboratories give students opportunity to expand subject matter in one of several types of special projects: greenhouse, trees and shrubs, spring or summer flora, what plants do for man.
- 305. Poisonous Plants**
Spring. 2(0-4) N S 193. Primarily for Veterinary Medicine students.
Plants poisonous to livestock and human beings, particularly those occurring in Michigan.
- 318. Introductory Plant Taxonomy**
Spring. 3(2-3) 302 or B S 212 or approval of department.
Principles of identification, classification, nomenclature, and evolutionary relationships of vascular plants.
- 336. Economic Plants**
Fall. 3(3-0)
Histories, characteristics, and origins of plants used in industrial processes, drug manufacture, and agriculture. Nontechnical to broaden student's cultural interest in plants.
- 400. Aquatic Plants**
Spring. 3(1-4) One year of botany and zoology or approval of department.
Aquatic plants, their classification, ecology and economic importance. Relationships to problems in fisheries, in wildlife management, and to role in limnology. Experience for student in plant ecology, aquatic biology, and water sanitation.