BIOCHEMISTRY  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Department</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BCH 404.1</td>
<td>Biochemistry</td>
<td>College of Agriculture and Natural Resources</td>
<td>3(3-0) BCH 451</td>
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<tr>
<td>BCH 404.2</td>
<td>Biochemistry</td>
<td>College of Human Medicine</td>
<td>3(3-0) BCH 451</td>
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<td>BCH 404.3</td>
<td>Biochemistry</td>
<td>College of Natural Science</td>
<td>3(3-0) BCH 451</td>
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<td>BCH 404.4</td>
<td>Biochemistry</td>
<td>College of Osteopathic Medicine</td>
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**100. Lectures in Biochemistry**  
Spring. 1(1-0) Biochemistry majors; others by approval of department.  
An introduction to modern biochemistry using an historical approach.

**200. Introduction to Biochemistry**  
Winter. 4(3-0) Biochemistry majors.  
Survey of biochemistry emphasizing the major metabolic activities of living organisms.

**400H. Honors Work**  
Fall, Winter, Spring. 1 to 4 credits.  
May enroll for a maximum of 12 credits.  
Approval of department.  
Assigned reading and experimentation.

**401. Basic Biochemistry**  
Fall, Winter, Summer. 5(5-0) Credit may not be earned in both BCH 200 and BCH 401.  
General chemistry; one term organic chemistry.  
Not acceptable for a B.S. degree in biochemistry.

**404. General Biochemistry Laboratory**  
Fall, Winter, Summer. 3(3-0) BCH 451.  
Experimental aspects of biochemistry.

**405. Biochemistry Laboratory**  
Fall, Winter, Spring. 3(3-0) BCH 451 or concurrent; BCH 404; undergraduate biochemistry majors or approval of department.  
Advanced undergraduate laboratory to illustrate modern biochemical methods and techniques.

**451. Biochemistry I**  
Fall. 3(3-0) Credit may not be earned in both BCH 401 and BCH 451.  
One year organic chemistry or CEM 242; not open to biochemistry majors.

**452. Biochemistry II**  
Winter. 3(3-0) BCH 451.  
Continuation of BCH 451, with emphasis on intermediary metabolism.

**453. Biochemistry III**  
Spring. 3(3-0) BCH 452.  
Continuation of BCH 452, with emphasis on the replication and expression of genetic information.
460. Principles of Biochemical Methods
Spring, 3(3-0) One year physical chemistry or CEM 453 concurrently, or BCH 401. Principles of biochemical methods with emphasis on electrophoresis, chromatography, immunological techniques, sedimentation, diffusion, viscosity, radiochemistry, and absorption and emission spectroscopy.

470. Biological Membranes
(IDC 470) Spring, 3(3-0) BCH 401. Interdepartmental with the departments of Microbiology and Public Health, and Physiology. Administered by the Department of Physiology. The chemistry, physics, and mathematics of the permeability, energy transduction and surface function of differentiated cell membranes and membranous organelles are compared. A brief discussion of theoretical and experimental models is included.

499. Research
Fall, Winter, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Undergraduates: approval of department. Participation in research projects.

501. Medical Biochemistry
Fall. 3(3-0) Open only to students in the professional programs of the College of Human Medicine and the College of Osteopathic Medicine. Basic biochemical principles and terminology of importance in medical biology.

502. Medical Biochemistry
Winter. 3(3-0) BCH 501 or approval of department. A continuation of BCH 501.

511. Medical Biochemistry I
Winter. 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of basic biochemistry or BCH 453; or approval of department. A course in fundamental genetics is strongly recommended. Limited to graduate students in biochemistry or other students needing a similar professional preparation.

512. Medical Biochemistry II
Spring, 4(4-0) BCH 511. Basic biochemical principles and processes pertinent to specific areas of human pathophysiology.

811. Nucleic Acid Structure and Function
Fall. 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of biochemistry or BCH 453; or approval of department. A course in fundamental genetics is strongly recommended. Limited to graduate students in biochemistry or other students needing a similar professional preparation.

812. Protein Structure and Function
Winter. 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of biochemistry; or approval of department. Limited to graduate students in biochemistry or other students needing a similar professional preparation. Protein structure and function relationships, macromolecule-ligand interactions, enzyme kinetics and principles of methods used in enzymology.

813. Metabolism and Its Regulation
Spring, 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of biochemistry; or approval of department. Limited to graduate students in biochemistry or other students needing a similar professional preparation. Molecular basis of metabolic regulation, compartmentalization and interrelationships of metabolic cycles involving carbohydrates, proteins, lipids, and nucleic acids.

821. Biochemical Mechanisms and Structure
Fall. 4(4-0) One year of organic chemistry, introductory biochemistry, and physical chemistry or concurrently. Structures, methods of structural analysis, synthesis, and reaction mechanisms of biological substances including proteins, carbohydrates, lipids, vitamins, purines, nucleotides, and nucleic acids.

825. Cell Structure and Function
Winter. 4(4-0) BCH 453 or BCH 401 or approval of instructor. Interdepartmental with the departments of Microbiology and Public Health, and Physiology. Molecular basis of structure and function of cells. Fundamental properties of cells: reproduction, dynamic organization, integration, programmed and interactive information transfer considered through original investigations in all five kingdoms.

831. Physiological Biochemistry I
Winter. 3(3-0) BCH 401. Physiological biochemistry, with emphasis on metabolic interpretation of normal and altered physiological states of the human organism and appropriate animal models.

832. Physiological Biochemistry II
Spring, 3(3-0) BCH 831. Continuation of BCH 831.

855. Special Problems
Fall, Winter, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department. Consideration of current problems.

856. Plant Genetics and Molecular Biology
Spring of even-numbered years. 3(3-0) Approval of department. Interdepartmental with Genetics and the Department of Botany and Plant Pathology. Administered by the Department of Plant and Animal Biology. Recent advances in genetics and molecular biology of higher plants.

861. Nuclear Acid Structure and Function
Fall. 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of basic biochemistry or BCH 453; or approval of department. A course in fundamental genetics is strongly recommended. Limited to graduate students in biochemistry or other students needing a similar professional preparation.

862. Protein Structure and Function
Winter. 4(4-0) One year of organic chemistry, one year of physical chemistry, and one year of basic biochemistry; or approval of department. Limited to graduate students in biochemistry or other students needing a similar professional preparation. Protein structure and function relationships, macromolecule-ligand interactions, enzyme kinetics and principles of methods used in enzymology.

881. Laboratory Rotation
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Graduate student majors: approval of department. Participation in research laboratories to learn experimental techniques and research approaches, broaden research experience, and assess research interests prior to selecting a thesis adviser.

999. Seminar in Biochemistry
Fall, Winter, Spring. 1(0-0). May reenroll for a maximum of 4 credits. Approval of department.

999. Seminar in Biochemistry
Fall, Winter, Spring. 1(0-0). May reenroll for a maximum of 4 credits. Approval of department.

BIOLOGICAL SCIENCE

College of Natural Science

The content of courses 400, 405, and 430, as well as the research and problems courses 496, 500, and 509, may vary from term to term. Brochures giving detailed information about individual courses are available in the office of the Assistant Dean for Lifelong Education in the College of Natural Science. These courses are primarily designed for in-service teachers and interested adults and are offered in off-campus locations.

202. Introductory Biology for Non-Science Majors
Fall, Winter, Spring, Summer. 4(3-3) 12 credits in general education natural science courses. Concepts, procedures, and perspectives appropriate to developing a basic literacy in biology with emphasis on fundamental biological principles and their relation to world society. Approved preparation for pre-service elementary teachers.

210. General Biology
Fall, Spring. 4(4-2) Not open to students with credit in LBS 246. Principles of biological organization: scientific method, biochemistry, cell biology, and evolution.

211. General Biology
Fall, Winter, Summer. 4(4-2) CEM 140 or high school chemistry. Not open to students with credit in LBS 246. Principles of biological regulation and integration: genetics, development, and selected physiological topics.