Courses

| Description — Audiology and Speech Sciences of Courses | 800. Introduction to Biochemistry | Winter, Summer. 5(5-0) Credit may not be earned in both BCH 260 and BCH 401. General chemistry; one term organic chemistry. Not acceptable for a B.S. degree in biochemistry. Survey of biochemistry emphasizing the major metabolic activities of living organisms.  
801. Honors Work | Fall, Winter, Spring, 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department. Assigned reading and experimentation.  
804. Biochemistry Laboratory | Winter, 2(2-0) BCH 162; BCH 452 or BCH 453. Modern biochemical techniques to study protein (enzymes), lipids, and cell organelles.  
806. Communication Disorders |  
808. Master’s Thesis Research | Fall, Winter, Spring, Summer. Variable credit. Approval of department.  
809. Seminar in Audiology and Speech Sciences | Fall, Winter, Spring, Summer. Variable credit. Approval of department.  
810. Special Problems in Audiology and Speech Sciences | Fall, Winter, Spring, Summer. 1 to 6 credits. Special projects in audiology and speech sciences.  
811. Doctoral Dissertation Research | Fall, Winter, Spring, Summer. Variable credit. Approval of department.  

BIOCHEMISTRY

BCH

College of Agriculture and Natural Resources  
College of Human Medicine  
College of Natural Science  
College of Osteopathic Medicine

100. Lectures in Biochemistry | Spring, 1(1-0) Biochemistry majors; others by approval of department. An introduction to modern biochemistry using an historical approach.

101. Principles of Biochemical Methods | Winter, 3(3-0) BCH 451. Continuation of BCH 451, with emphasis on intermediary metabolism.  
103. Biochemistry I | Fall, 3(3-0) BCH 452. Credit may not be earned in both BCH 401 and BCH 451. One year organic chemistry or CEM 242. A comprehensive survey of biochemistry, with emphasis on protein structure and function, enzyme kinetics, and bioenergetics.  
104. Biochemistry Laboratory | Winter, 3(3-0) BCH 453. One term presentation of biochemistry emphasizing structure and function of major nucleic acids and proteins. Metabolism and regulation. Examples used for illustrative purposes will emphasize the mammalian organism.  
105. Biochemistry Laboratory | Spring, 3(3-0) BCH 453 or concurrently; undergraduate biochemistry majors or approval of department. Modern biochemical techniques to study nucleic acid structure and function.  
106. Biochemistry II | Winter, 3(3-0) BCH 451. A continuation of BCH 451, with emphasis on intermediary metabolism.  
107. Biochemistry II | Winter, 3(3-0) BCH 451. Continuation of BCH 451, with emphasis on intermediary metabolism.  
108. Biochemistry III | Spring, 3(3-0) BCH 452. Continuation of BCH 452, with emphasis on the replication and expression of genetic information.  
109. Principles of Biochemical Methods | Winter, 3(3-0) One year of physical chemistry or CEM 385 concurrently; BCH 453 or BCH 491. Principles of biochemical methods with emphasis on electrophoresis, chromatography, immunological techniques, sedimentation, diffusion, viscosity, radioactivity, and absorption and emission spectroscopy.  
110. Biological Membranes | (IDC 476) 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 functions of differentiated cell membranes and membranous organelles are compared. A brief discussion of theoretical and experimental models is included.

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

501. Medical Biochemistry | Fall, 3(3-0) Open only to students in the professional programs in 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.

504. Biochemistry Laboratory | Winter, 2(2-0) BCH 162; BCH 452 or BCH 453. Modern biochemical techniques to study protein (enzymes), lipids, and cell organelles.  
505. Biochemistry Laboratory | Spring, 3(3-0) BCH 453 or concurrently; undergraduate biochemistry majors or approval of department. Modern biochemical techniques to study nucleic acid structure and function.  
506. 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. A comprehensive survey of biochemistry, with emphasis on protein structure and function, enzyme kinetics, and bioenergetics.  
507. Biochemistry II | Winter, 3(3-0) BCH 451. A continuation of BCH 451, with emphasis on intermediary metabolism.  
508. Biochemistry III | Spring, 3(3-0) BCH 452. Continuation of BCH 452, with emphasis on the replication and expression of genetic information.  
509. Research | Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Undergraduate; approval of department. Participation in research projects.  
511. Medical Biochemistry I | Winter, 3(3-0) 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 pathophysicsiology.  

514. 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. A comprehensive survey of biochemistry, with emphasis on protein structure and function, enzyme kinetics, and bioenergetics.  
515. Biochemistry II | Winter, 3(3-0) BCH 451. Continuation of BCH 451, with emphasis on intermediary metabolism.  
516. Biochemistry III | Spring, 3(3-0) BCH 452. Continuation of BCH 452, with emphasis on the replication and expression of genetic information.  
517. Principles of Biochemical Methods | Winter, 3(3-0) One year of physical chemistry or CEM 385 concurrently; BCH 453 or BCH 491. Principles of biochemical methods with emphasis on electrophoresis, chromatography, immunological techniques, sedimentation, diffusion, viscosity, radioactivity, and absorption and emission spectroscopy.  
518. Biological Membranes | (IDC 476) 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 functions of differentiated cell membranes and membranous organelles are compared. A brief discussion of theoretical and experimental models is included.

519. Research | Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Undergraduate; approval of department. Participation in research projects.

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

521. Medical Biochemistry | Spring, 4(4-0) BCH 511. Basic biochemical principles and processes pertinent to specific areas of human pathophysicsiology.  

523. Medical Biochemistry I | Winter, 3(3-0) 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.  
524. Medical Biochemistry II | Spring, 4(4-0) BCH 511. Basic biochemical principles and processes pertinent to specific areas of human pathophysicsiology.  

526. Medical Biochemistry I | Winter, 3(3-0) 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.  
527. Medical Biochemistry II | Spring, 4(4-0) BCH 511. Basic biochemical principles and processes pertinent to specific areas of human pathophysicsiology.  

529. Research | Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Undergraduate; approval of department. Participation in research projects.

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

531. Medical Biochemistry | Spring, 4(4-0) BCH 511. Basic biochemical principles and processes pertinent to specific areas of human pathophysicsiology.  
825. Cell Structure and Function
Spring. 4(4-0) BCH 451 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.
Physiology, 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, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.
Consideration of current problems.

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

564. Plant Biochemistry
Spring. 4(4-0) BCH 401, BOT 301 or approval of department. Interdepartmental with the Department of Botany and Plant Pathology.
Metabolism of nitrogen-compounds, carbohydrates, and lipids unique to plants' cell organelles; photosynthesis, photospiration; dark respiration; cell wall, lectin, nitrogen cycle including nitrogen fixation; sulfur cycle.

588. Laboratory Rotation
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 18 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.

599. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

600. Selected Topics in Biochemistry
Fall, Winter, Spring. 1 to 3 credits. May reenroll for a maximum of 10 credits if different topics are taken. Approval of department.
Topics will be selected from the areas of biochemical genetics, biochemistry of development, biochemical evolution, complex proteins, lipid metabolism, immunology, hormones, control mechanisms and structure of biological macromolecules.

961. Selected Topics in Biochemistry
Fall, Winter, Spring. 1 to 3 credits. May reenroll for a maximum of 10 credits if different topics are taken. Approval of department.
Topics will be selected from the areas of bioenergetics, bioinstrumentation, complex carbohydrates, mechanisms of enzyme action, natural products, carbohydrate metabolism, mass spectrometry and biochemistry of isopenoid compounds.

975. Seminar in Biochemistry
Fall, Winter, Spring. 1(1-0). May reenroll for a maximum of 8 credits. Approval of department.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

BIological SCIENCE B.S.

College of Natural Science
The content of courses 402 and 405, as well as the research and problems courses 499, 500 and 599, 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. The 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. Appropriate preparation for pre-service elementary teachers.

210. General Biology
Fall, Spring. 4(4-2) Not open to students with credit in LBS 141.
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 242.
Principles of biological regulation and integration: genetics, development, and selected physiological topics.

212. General Biology
Winter, Spring, Summer. 4(4-2) Not open to students with credit in LBS 140.
Principles of biological diversity; taxonomy and systematics, comparative physiology, and ecology.

400. Biological Science for Teachers
Fall, Winter, Spring. 1 to 6 credits. May reenroll for a maximum of 12 credits. Teacher certification with science major or minor.
A course for in-service teachers, topics will be selected from actual classroom problems of the participants. Stress will be placed on field, laboratory and inquiry teaching.

405. Topics in Biological Science
Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 3 credits if different topics are taken. Approval of department.
Presentation of single topics from the biological sciences by senior faculty and guest lecturers. Topics are selected to facilitate development of strong biological science programs in schools.

418. Field Biology for Teachers
Fall, Winter, Spring, Summer. 4 credits. Biology course or approval of department.
Field investigation and interpretation of prairie, desert, forest and wetland communities. An ecosystem approach to ecological concepts. Natural history and identification of key species. Field trips required.

460. Ornithology for Teachers
Summer. 3 credits. A course in biology or approval of department. Not open to Zoology majors. Given at W. K. Kellogg Biological Station. Interdepartmental with and administered by the Department of Zoology.
Distribution, breeding cycles, migration, food and feeding habits, voice and other important areas of avian biology. Emphasis on field identification and natural history.

499. Research
Fall, Winter, Spring. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of director of biological science program and student's advisor.
Undergraduates are invited on an individual basis into research laboratories of faculty in biological departments of the college. After three terms of research, a presentation in thesis form is produced and defended.

800. Problems in Biological Science
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 18 credits. B.S. degree in biological science.

805. Outdoor Environmental Studies
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits if different topics are taken. B.S 415 or ZOL 460 or approval of department.
Emphasis on environmental understanding. Development of educational materials through team research and testing. Trials of materials with elementary, middle, secondary school or college students.

899. Master's Thesis Research
Fall, Winter, Spring. Variable credit. Approval of department.

BIOMECHANICS

BIM
College of Osteopathic Medicine

500. Basic Concepts in Biomechanics
Winter. 2(2-0) Admission to a college of medicine or approval of department. Interdepartmental with the College of Osteopathic Medicine.
Basic concepts of biomechanics and their relationship to functional anatomy and osteopathic manipulative therapy.

590. Special Problems in Biomechanics
Fall, Winter, Spring. 1 to 8 credits. May reenroll for a maximum of 32 credits. Approval of department.
Each student will work under direction of a faculty member on an experimental, theoretical or applied problem.