### Descriptions — Biochemistry of Courses

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, Spring, 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 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.

864. **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 plant cells. Photosynthesis; photoreproduction; dark respiration; cell wall; lectin; nitrogen cycle including nitrogen fixation; sulfur cycle.

888. **Laboratory Rotation**  
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 15 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.

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

948. **Seminar in Biochemistry**  
Fall, Winter, Spring. 1 to 3 credits. 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 400, 405, and 420, as well as the research and problems courses 499, 800, and 899, 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. 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 149.  
Principles of biological diversity: taxonomy and systematics, comparative physiology, and ecology.

400. **Biological Science for Teachers**  
Fall, Winter, Spring, Summer. 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, Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits if different topic is 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.

### Biomechanics B.M.

#### College of Osteopathic Medicine

506. **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.
561. Clinical Craniosacral Manipulative Therapy
Spring. 1 to 3 credits. Approval of department.
Basic concepts of the craniosacral system, clinical applications.

590. Special Problems in Biomechanics
Fall, Winter, Spring, Summer. 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.

601. Osteopathic Manipulative Medicine Clerkship
Fall, Winter, Spring, Summer. 6 credits. May reenroll for a maximum of 12 credits. Grade P in all courses offered in terms 1 through 8.
Advanced training in the diagnosis of musculoskeletal dysfunctions and application of osteopathic manipulative techniques in patient care.

620. Directed Studies
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 24 credits. Approval of department.
Individual or group work on special problems related to biomechanics, neuromusculoskeletal system primarily.

800. Special Topics
Fall, Winter, Spring. Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits. Approval of department.
Independent study in topics of biomechanics.

870. Biokinematics
Fall. 3(3-0). Approval of department.
Motion of the human body including detailed studies of body joint and linkage motion.

871. Biokinetics
Winter. 3(3-0). BIM 810.
Application of Newtonian mechanics to problems of force transmission and related motions in the musculoskeletal system.

812. Theory of Tissue Mechanics
Spring. 3(3-0). Approval of department.
Introduces the concepts of stress and strain in tissue and the dependency of mechanical parameters on biological factors.

850. Research Seminar
Fall, Winter, Spring. 1(1-0). May reenroll for a maximum of 3 credits. Approval of department.
Discussion of current research topics in biomechanics with strong clinical application.

890. Independent Study
Fall, Winter, Spring. Sumner. 1 to 8 credits. May reenroll for a maximum of 32 credits. Approval of department.
Individual or group work related to biomechanics and/or neuromusculoskeletal system.

899. Master's Thesis Research
Fall, Winter, Spring. Summer. Variable credit. May reenroll for a maximum of 12 credits. Approval of department.
Conduct research for master's thesis.

BOTANY AND PLANT PATHOLOGY

College of Agriculture and Natural Resources
College of Natural Science

201. Plants, People and the Environment (N)
Fall, Spring. 3(3-0)
Relevance of plants to modern society. Basic botanical concepts and socially significant groups of plants. Natural resource exploitation. Plants as they relate to human population growth, food production, and energy resource depletion.

205. Plant Biology
Fall. 3(3-0) High school chemistry and high school algebra
An introduction to plant science for students seeking a general knowledge of the principles of plant biology as well as for prospective plant science majors.

301. Introductory Plant Physiology
Winter. Spring. 4(2-4). CEM 141 or CEM 151; CEM 181; BOT 205 or B S 210 or LBS 141. Introductory organic chemistry recommended.
General principles of plant physiology relating plant structure to function. Topics include cell physiology, water relations, effects of light and temperature, respiration, photosynthesis, mineral nutrition, and hormone action.

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.

318. Introductory Plant Systematics
Spring. 4(2-3). BOT 302 or B S 212 or approval of department.
Plant diversity with emphasis on identification, classification, nomenclature, and evolutionary relationships of vascular plants.

335. Fossil Plants, Their History and Paleocology
Spring. 3(3-0)
One course in geology or botany or biology or approval of department. Interdepartmental with and administered by the Department of Geology.
History of plants through geologic time; their form and evolution; how and where found, identified and reconstructed; their use in determining ancient geographic patterns, paleoenvironments, palaeoecology and community structure. Field trip.

336. Economic Plants
Spring. 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
Fall. 3(2-3) BOT 318 or BOT 320. Students may not receive credit in both BOT 400 and BOT 433.
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.

400H. Honors Work
Fall, Winter, Spring. 3(0-6) Approval of department; Seniors.