832. *Speech and Hearing Evaluation and Therapy*
   A. Hearing Handicap
      Summer. 4(2-2)
      A theoretical approach to the study of the aural rehabilitative process.
   B. Cerebral Palsy
      Spring. 4(3-0)
      Etiology, symptomatology, structural and functional consideration of cerebral palsy. Therapeutic procedures for the speech of the cerebral palsy.
   C. Delayed Language Development
      Winter. 4(3-0)
      Evaluative techniques including audiology, psychometry, and case history as aids to the differential evaluation of delayed language development.
   D. Mental Retardation
      Summer. 4(3-0)
      Language behavior and speech development of the mentally retarded as related to all facets of personal social development and adjustment.
   E. Stuttering
      Fall. 4(3-0)
      Longitudinal studies of stuttering theories and the therapies accompanying them.
   F. Cleft Palate
      Summer. 4(3-1)
      Etiology, symptomatology, structural and functional consideration of cleft palate. Therapeutic procedures for the speech habilitation of cleft palate individuals.

833. *Specialized Clinical Audiology*
   A. Differential Audiology
      Fall. 4(3-0)
      Pure tone audiometric tests as an aid to the otologist in evaluating the pathology of hearing loss; including the development of norms. Consideration of nongenetic loss.
   B. Speech Audiology and Evaluation of Hearing Aids
      Fall. 4(4-0)
      Speech audiometry; principles and methods in the selection of hearing aids; physical characteristics of hearing aids.
   C. Industrial Audiology
      Spring. 4(2-2)
      Evaluation of the role of the audiologist in industry emphasizing identification procedures, damage-risk criteria, measurement and control of noise, conservation procedures, and medical-legal problems.
   D. Advanced Audiological Evaluation
      Winter. 4(3-1)
      Theory, administration and evaluation of selected tests including Bekesy, EDR, EEG, and advanced speech-audiometric tests.
   E. Pediatric Audiology
      Winter. 4(2-2)
      Evaluative procedures including play audiometry, language assessment, and case studies as aids to the differential diagnosis of auditory disorders in children; habilitative procedures for the acoustically handicapped child.

834. *Speech Perception: Theory and Measurement*
   Spring. 4(4-0) Approval of department.
   Evaluation and analysis of various theories of speech perception and their implications for speech and language pathologists, audiologists, and speech and hearing scientists.

854. *Psychophysics and Theories of Audition*
   Winter. 4(4-0) Approval of instructor.
   Nature of auditory stimuli and the results of psychophysical experimentation in audition.

874. *Speech and Hearing Problems in Public Schools*
   Summer. 4(3-0) May reenroll for a maximum of 16 credits.
   Graduate seminar in speech and hearing involving problems that arise in relation to speech and hearing therapy in the public schools.

875A. *Clinical Practicum in Speech and Language Pathology*
   Fall, Winter, Spring, Summer. 1 credit.
   ASC 474. May reenroll for a maximum of 8 credits.
   Directed diagnostic, therapeutic, and prognostic experience in speech and language pathology.

875B. *Clinical Practicum in Audiology*
   Fall, Winter, Spring, Summer. 1 credit.
   ASC 454. May reenroll for a maximum of 8 credits.
   Directed diagnostic, therapeutic and prognostic experience in audiology in various clinical settings.

876. *Communication Disorders: Neuroanatomy-Neuropathology*
   Fall. 4(3-1) Approval of department.
   Neuroanatomical and neurophysiological correlates of speech, language, and hearing.

880A. *Algorithms for Speech and Hearing Sciences*
   Fall. 4(4-0)
   A discussion of useful algorithms applicable to quantification of phenomena related to audiology and speech sciences.

880B. *Acoustic Phonetics*
   Winter. 4(2-2) ASC 880A or approval of department.
   An analytic study of the acoustics of speech.

880C. *Instruments and Electronics for Audiology and Speech Sciences*
   Spring. 4(3-2) ASC 880B or approval of department.
   A discussion of the electronic principles and instruments necessary to measure parameters related to hearing and speech processes.

880D. *Experimental Phonetics*
   Summer. 4(4-0) ASC 880C or approval of department.
   Critical review of the literature in experimental phonetics. Selected papers on acoustic and physiological phonetics and related fields are presented in seminar fashion.

899. *Research*
   Fall, Winter, Spring, Summer. Variable credit. Approval of department.

940. *Seminar in Audiology and Speech Sciences*
   Spring. 4(3-0) May reenroll for a maximum of 16 credits.

990. *Special Problems in Audiology and Speech Sciences*
   Fall, Winter, Spring. Summer. 1 to 6 credits.
   Special projects in audiology and speech sciences.

999. *Research*
   Fall, Winter, Spring. Summer. Variable credit. Approval of department.
502. Medical Biochemistry
Fall. 3(2-0) Three credits in BCH 501. Not open to students with five credits in BCH 591. A continuation of BCH 501.

501. Biochemical Research Methods
Fall. 1(0-3) One year of organic chemistry or CEM 242; BCH 451 or BCH 811, or concurrently. Discussions and demonstrations of selected experimental techniques of wide application in biochemistry.

504. Advanced Biochemistry Laboratory
Winter. 3(0-8) BCH 801 and BCH 811, or concurrently; biochemistry majors or approval of department. Experiments to be selected from a representative group illustrating modern biochemical research.

505. Advanced Biochemistry Laboratory
Spring. 3(0-8) BCH 805; BCH 812 or concurrently; biochemistry majors or approval of department. Experiments to be selected from a representative group illustrating modern biochemical research.

511. Advanced Biochemistry
Fall. 4(4-0) One year of organic chemistry, one year of physical chemistry, one term of introductory biochemistry, BCH 801 taken previously or concurrently, or approval of department. Limited to graduate students in biochemistry or other students needing a professional preparation. The structure and function of biomolecules, energy transformations and chemical reactions in living cells, regulation of cell reactions, and the replication of living organisms.

512. Advanced Biochemistry
Winter. 4(4-0) BCH 811. Continuation of BCH 811.

513. Advanced Biochemistry
Spring. 4(4-0) BCH 812. Continuation of BCH 812.

555. Special Problems
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 12 credits. Approval of department. Consideration of current problems.

599. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

552. Plant Physiology and Biochemistry I
Winter of odd-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. Selected topics concerning photosynthesis and related processes.

555. Plant Physiology and Biochemistry II
Winter of even-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. Metabolic pathways of significant importance to plants.

560. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0). May reenroll for a maximum of 6 credits if a different topic is 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.

561. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0). May reenroll for a maximum of 6 credits if a different topic is taken. Approval of department. Topics will be selected from the areas of biogenic carbon and nitrogen, biometabolism, carbohydrate metabolism, mass spectrometry and biochemistry of isoprenoid compounds.

787. Seminar in Biochemistry
Fall, Winter, Spring. 0 or 1(1-0). Presentation and discussion of papers by graduate students on biochemical topics of current interest.

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

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555. Plant Physiology and Biochemistry I
Winter of odd-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. Selected topics concerning photosynthesis and related processes.

555. Plant Physiology and Biochemistry II
Winter of even-numbered years. 3(3-0) Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. Metabolic pathways of significant importance to plants.

560. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0). May reenroll for a maximum of 6 credits if a different topic is 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.

561. Selected Topics in Biochemistry
Fall, Winter, Spring, Summer. 1(1-0) or 2(2-0). May reenroll for a maximum of 6 credits if a different topic is taken. Approval of department. Topics will be selected from the areas of biogenic carbon and nitrogen, biometabolism, carbohydrate metabolism, mass spectrometry and biochemistry of isoprenoid compounds.

787. Seminar in Biochemistry
Fall, Winter, Spring. 0 or 1(1-0). Presentation and discussion of papers by graduate students on biochemical topics of current interest.

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

400. Biological Science for Teachers
Fall, Winter, Spring, Summer. 3 to 4 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 3 credits. May reenroll for a maximum of 6 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.

406. Freshwater Ecology
Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the departments of Zoology and Botany and Plant Pathology. The ecology of freshwater ecosystems, their biotic structure, and the functional interrelationships of environmental variables regulating population dynamics, productivity and community structure. Extensive field investigations.

410. Terrestrial Ecology
Summer. 6 credits. B S 212 or approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the departments of Zoology and Botany and Plant Pathology. Factors determining distribution and abundance of plant and animal communities. Interaction of plants, animals, and environment. Extensive field investigations of several types of terrestrial communities in light of current theory.

420. Seminar in Recent Advances in Biological Science
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 6 credits if different topic is taken. Approval of department. A series of lectures by senior faculty on topics of the current research, development, the most recent advances and the possible future and limits of the Biological Sciences.

For prerequisite purposes, the introductory biology sequence in Lyceum Briggs College, LBC 140, LBC 141, LBC 242, may be used instead of this sequence.

210. General Biology
Fall, Spring. 4(4-2) Not open to students with credit in LBC 141. Concepts relating to basic attributes and diversity of living things.

211. General Biology
Fall, Winter. 4(4-2) CEM 130 or high school chemistry. Not open to students with credit in LBC 242. The structure and behavior of cells and their organelles, interactions of tissues, genetics, and the development, history and relations of organisms.

212. General Biology
Winter, Spring. 4(4-2) Not open to students with credit in LBC 140. Continuation of 211.