473 Phonological Disorders in Children
Spring. 3(3-0) P:M: (ASC 364)
Phonological theory, speech perception and production, nature of normal and abnormal phonological development. Preparation of assessment and treatment plans. Application of treatment principles to different populations and cultural groups. Practice with narrow phonetic transcription of speech and phonological process-analysis.

483 School-Based Communication Disorders Programs
Spring. 3(3-0) P:M: (ASC 463 or concurrently)
Administrative and regulatory aspects of school-based programs for persons with communication disorders.

490 Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.
Individualized student activities in human communication sciences and disorders.

494 Clinical Practicum in Communication Disorders
Fall, Spring, Summer. 2(0-4) A student may earn a maximum of 4 credits in all enrollments for this course. P:M: (ASC394 and ASC463) RB: A minimum of 25 hours of approved clinical observation.
Supervised clinical experiences. Work with individuals having speech, language and/or hearing disorders.

BIOCHEMISTRY AND MOLECULAR BIOLOGY BMB

Department of Biochemistry and Molecular Biology
College of Natural Science

100 Current Issues in Biochemistry
Spring. 1(1-0) R: Open only to freshmen or sophomores. SA: BCH 100 Not open to students with credit in BMB 101.
Contemporary biochemistry: its impact on environmental, medical, and social sciences.

101 Frontiers in Biochemistry
Fall. 1(1-0) R: Open only to freshmen or sophomores. SA: BCH 101 Not open to students with credit in BMB 100.
Description of topics in biochemistry research.

200 Introduction to Biochemistry
Fall. 4(4-0) P:M: (CEM 143) SA: BCH 200 Not open to students with credit in BMB 401 or BMB 461.
Basic structures of major classes of biologically important molecules and metabolic activities of major importance in living organisms.

401 Basic Biochemistry
Fall, Spring. 4(4-0) P:M: (CEM 252 or CEM 352) R: Not open to students in the Biochemistry or in the Biochemistry/Biotechnology major. SA: BCH 401 Not open to students with credit in BMB 200 or BMB 461.
Structure and function of major biomolecules, metabolism, and regulation. Examples emphasize the mammalian organism.

461 Biochemistry I
Fall. 3(4-0) P:M: (CEM 252 or CEM 352) and (BS 110) and (MTH 124 or MTH 132 or MTH 152H or LBS 118) and (BS 111L or LBS 145 or LBS 158H or LBS 159H) SA: BCH 461 Not open to students with credit in BMB 200 or BMB 401.
Protein structure and function, enzymology, bioenergetics, and intermediary metabolism.

462 Biochemistry II
Spring. 3(4-0) P:M: (BMB 461) SA: BCH 462
Continuation of BMB 461 with emphasis on metabolic regulation and nucleic acid structure, replication and protein synthesis.

471 Biochemistry Laboratory (W)
Spring. 3(0-9) P:M: (BMB 401 or BMB 461) and (BS 110 and CEM 262 and CEM 356 and CSE 101) and (MTH 124 or MTH 132 or MTH 152H or LBS 118) and (BS 111L or LBS 145 or LBS 158H or LBS 159H) and completion of Tier I writing requirement. SA: BCH 471
Biochemical methods and principles used in the study of enzymes (proteins), carbohydrates, lipids, and cell organelles.

472 Biochemistry Laboratory
Fall. 3(0-9) P:M: (BMB 462 and CEM 262) R: Open only to Biochemistry or Biochemistry/Biotechnology majors or approval of department. SA: BCH 472
Methods of molecular biology and the underlying principles on which these methods are based.

490 Biochemistry Research
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Total credits in BMB 490 and BMB 499 may not exceed 8. Approval of department. SA: BCH 490
Participation in laboratory or library research projects.

495 Undergraduate Seminar
Spring. 2(2-0) P:M: (BMB 462 or concurrently) R: Open only to students in the Biochemistry or Biochemistry/Biotechnology majors. SA: BCH 495
Extension and synthesis of concepts of biochemistry. Relationships to societal issues.

499 Senior Thesis
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to students in the Biochemistry or the Biochemistry/Biotechnology major. Total credits in BMB 490 and BMB 499 may not exceed 8. Approval of department. SA: BCH 499
Laboratory research culminating in a thesis.

BIOLOGICAL SCIENCE BS

College of Natural Science

110 Organisms and Populations
Fall, Spring. 4(3-3) Not open to students with credit in LBS 144 or LBS 148H.
Biological diversity and organismal biology. Principles of evolution, population biology, and community structure.

111 Cells and Molecules
Fall, Spring, Summer. 3(3-0) P:M: (CEM 141 or CEM 151 or LBS 171 or CEM 181H) Not open to students with credit in LBS 145 or LBS 149H.
Macromolecular synthesis; energy metabolism; molecular aspects of development; principles of genetics.

111L Cell and Molecular Biology Laboratory
Fall, Spring, Summer. 2(1-3) Interdepartmental with Microbiology and Molecular Genetics; Plant Biology; Zoology. P:M: (BS111 or concurrently) Not open to students with credit in LBS 159H.
Principles and applications of common techniques used in cell and molecular biology.

148H Honors Organismal Biology
Fall. 3(3-0) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. R: Honors College student or approval of school. Not open to students with credit in BS 110 or LBS 144.
Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.

149H Honors Cell and Molecular Biology
Spring. 3(3-0) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. P:M: (CEM 141 or concurrently or CEM 151 or concurrently or CEM 181H or concurrently or LBS 171 or concurrently) R: Honors College student or approval of school. Not open to students with credit in BS 111 or LBS 145.
Exploration of the physicochemical and molecular organization of cells as the unifying framework for genetics, evolution, and the social relevance of biology.

158H Honors Organismal Biology Laboratory
Fall. 2(1-3) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. Not open to students with credit in BS 110 or LBS 144. C: LBS 148H concurrently.
Basic procedures used by organismal biologists, including experimental design and statistical methods. Development and implementation of research projects to test hypotheses in genetics, ecology, and evolution.

159H Honors Cell and Molecular Biology Laboratory
Spring. 2(1-3) Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School. Not open to students with credit in BS 111L or LBS 145. C: LBS 149H concurrently.
Basic techniques of cellular and molecular biology including experimental design and hypothesis formulation. Student-initiated projects to test hypothesis-driven projects in biochemistry, molecular biology or genetics.