Audiology and Speech Sciences—ASC

473  Phonological Disorders in Children  
Spring, 3(3-0)  P:M: (ASC 364)  
Phonological theory, speech perception and produc- 
tion, nature of normal and abnormal phonological 
development. Preparation of assessment and treat- 
ment 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 concur- 
rently)  
Administrative and regulatory aspects of school- 
based programs for persons with communication 
disorders.

490  Independent Study  
Fall, Spring, Summer. 1 to 4 credits.  A stu- 
dent may earn a maximum of 6 credits in all enroll- 
ments for this course. R: Approval of department. 
Individualized student activities in human communi- 
cation 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 enroll- 
ments for this course. P: M: (ASC394 and 
ASC463) RB: A minimum of 25 hours of ap- 
proved clinical observation. 
Supervised clinical experiences. Work with individu- 
als having speech, language and/or hearing disor- 
ders.

### BIOCHEMISTRY BMB AND MOLECULAR BIOLOGY

#### 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 stu- 
dents with credit in BMB 101. 
Contemporary biochemistry: its impact on environ- 
mental, 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 stu- 
dents 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 Bio- 
chemistry or in the Biochemis- 
y/Biotechnology major. SA: BCH 401 Not open 
to students with credit in BMB 200 or 
BMB 461. 
Structure and function of major biomolecules, me- 
tabolism, 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, bio- 
enetics, and intermediary metabolism.

462  Biochemistry II  
Spring, 3(4-0)  P:M: (BMB 461)  SA: BCH 
462  
Continuation of BMB 461 with emphasis on meta- 
bolic regulation and nucleic acid structure, replica- 
ation 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) 
and (BS 110 and CEM 262 and CEM 356 
and ASC 148H) 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 stu- 
dent may earn a maximum of 8 credits in all enroll- 
ments 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 pro- 
jects.

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

499  Senior Thesis  
Fall, Spring, Summer. 1 to 8 credits.  A stu- 
dent may earn a maximum of 8 credits in all enroll- 
ments for this course. R: Open only to students in the Biochemistry or the Bio- 
chemistry/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 BS SCIENCE

#### 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. Princi- 
ples 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; 
biological processes; development; principles of 
genetics.

111L  Cell and Molecular Biology Laboratory  
Fall, Spring, Summer. 2(1-3)  Interdepart- 
mental with Microbiology and Molecular 
Genetics; Plant Biology; Zoology. P: M: 
(ASC111 or concurrently) Not open to stu- 
dents with credit in LBS 159H. 
Principles and applications of common techniques 
used in cell and molecular biology.

148H  Honors Organismal Biology  
Fall, Spring, 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 interac- 
tions, and the evolutionary process. Historical ap- 
proach 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 physiochemical and molecular 
anatomy of cells as the unifying framework for 
genetics, evolution, and the social relevance of 
biology.

158H  Honors Organismal Biology Laboratory  
Fall, Spring, 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 meth- 
ods. 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 
148H concurrently. 
Basic techniques of cellular and molecular biology 
including experimental design and hypothesis for-
mulation. Student-initiated projects to test hypothe-
sis-driven projects in biochemistry, molecular biol- 
ogy or genetics.