[redacted] Assoc Dean 25 April '06

UC 8868 065

Proposed Catalogue Language

RECEIVED APR 26 2006

APPROVED SEP 20 2006

Department of Biology and Biochemistry

Chair: Stuart E. Dryer

Professors Glenn D. Aumann, Stuart E. Dryer, Joseph Eichberg, Jr., Arnold Eskin, George E. Fox, Xiaolian Gao, Dan Graur, Peter Jurtshuk, B. Montgomery Pettitt, Michael Rea, Shiao-Chun Tu, Gerald M. Wellington, Dan E. Wells

Associate Professors James M. Briggs, Gregory M. Cahill, Costa M. Colbert, Blaine J. Cole, Anne Delcour, Kurt Krause, Alfred R. Loeblich III, Amy K. Sater, Philip Snider, Michael Travisano, William R. Widger, Diane C. Wiernasz

Assistant Professors Ricardo Azevedo, Masaya Fujita, Preethi Gunaratne, Glen Legge, Steven Pennings, Greg Roman, Hye-Jeong Yeo, Rebecca Zufall

The Department of Biology and Biochemistry offers Bachelor of Science (B.S.) and Bachelor of Arts (B.A.) degrees in Biology and in Biochemical and Biophysical Sciences. Students interested in a career in any aspect of the life sciences, including biomedical research, molecular and cellular biology, biotechnology, ecology and evolutionary biology, and field or conservation biology should consider a major in this department. Graduates with baccalaureate degrees may consider such careers as science journalism, pharmaceutical or scientific sales, laboratory management, or K-12 teaching. Teaching at the university level generally requires a doctorate.

A major in either biology or biochemical and biophysical sciences offers excellent preparation for medical, dental, optometry, or veterinary school as well as the allied health professions. Students who distinguish themselves in their undergraduate studies and earn a B.S. degree in biology or in biochemical and biophysical sciences are excellent candidates for graduate study in fields such as organismal biology, biochemistry, biophysics, cellular and molecular biology, neuroscience, pharmacology, physiology, developmental biology, immunology, microbiology, plant and animal sciences, public health, nutrition, and epidemiology.

Faculty research and teaching fields include biochemistry and biophysics; cell, molecular and developmental biology; neurobiology; and evolutionary biology and ecology. Undergraduate research opportunities may be available in faculty laboratories and participation is encouraged for students interested in pursuing advanced degrees.

Biochemical and Biophysical Sciences Major

Students must earn a minimum 2.00 grade point average in all courses in the major (required or elective) attempted at the university.

Students who choose to major in biochemical and biophysical sciences must meet the general degree requirements and the college requirements for a Natural Sciences and Mathematics Bachelor of Arts or Bachelor of Science degree:

Requirements	Hours
Biology	
BIOL 1161[1], 1162[1], 1361[1], 1362[1], and 3301	11
Chemistry	
CHEM 1111, 1112, 1331, 1332, 3221, 3222, 3331, and 3332	18
Mathematics/Statistics	
MATH 1431, 1432, and 2433 or BIOL 3407	12
Physics	
PHYS 1301, 1101, 1302, 1102, or 1321, 1121, 1322, and 1122	8
Physical Chemistry	
CHEM 4370 or 4373 (Completion of either CHEM 4370 or 4373 and the additional requirements in chemistry above may complete a minor in chemistry to meet the NSM Capstone requirements.)	3
Biochemical and Biophysical Sciences	
Twenty-nine semester hours which must include BCHS 3201, 3304, 3305, 4304, 4306, and 4311 and twelve additional semester hours of 4000-level BCHS courses. Senior Honors Thesis and Special Problems courses ordinarily will not apply toward this total.	29

Bachelor of Science in Biochemical and Biophysical Sciences Suggested Program

First Year

Fall Semester	Hours
ENGL 1303. Freshman Composition I[1]	3
CHEM 1331 and 1111. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
MATH 1330. Precalculus[2]	3
BIOL 1361 and 1161. Introduction to Biological Science and Introduction to Biological Science Laboratory	4
Total	14

Spring Semester	
ENGL 1304. Freshman Composition II1	3
CHEM 1332 and 1112. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
MATH 1431. Calculus I	4
BIOL 1362, 1162. Introduction to Biological Science and Introduction to Biological Science Laboratory	4
Total	15

Second Year

Fall Semester	Hours
Visual/Performing Arts Core Course	3
Chem 3331 and 3221. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
Math 1432. Calculus II	4
Biol 3301. Genetics	3
Total	15

Spring Semester	
Humanities Core Course	3
CHEM 3332 and 3222. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
BCHS 3304 and 3201. General Biochemistry I and Biochemistry Laboratory I	5
MATH 2433. Calculus III	4
Total	17

Third Year

Fall Semester	Hours
PHYS 1301 and 1101. Introductory General Physics and General Physics Laboratory I	4
BCHS 3305. General Biochemistry II	3
POLS 1336. U.S. and Texas Constitutions and Politics or equivalent	3
HIST 1376 or 1377. The United States to 1877 or equivalent	3
Social Sciences Core Course	3
Total	16

Spring Semester	
PHYS 1302 and 1102. Introductory General Physics and General Physics Laboratory II	4
Biochemical and Biophysical Sciences Elective	3
POLS 1337. U.S. Government: Congress, President, and Courts or equivalent	3
HIST 1378 or 1379. The United States Since 1877 or equivalent	3
Electives	2
Total	15

Fourth Year

Fall Semester	Hours
CHEM 4373. Survey of Physical Chemistry, or CHEM 4370. Physical Chemistry I	3
BCHS 4306. Nucleic Acids[3]	3
Biochemical and Biophysical Sciences Electives	6
NSM Capstone Course	3
Total	15

Spring Semester	Hours
BCHS 4304. Physical Biochemistry[4]	3
BCHS 4311. Biochemistry Laboratory II[5]	3
Biochemical and Biophysical Sciences Elective	3
NSM Capstone Course	3
Social Sciences Writing Intensive Core Course	3
Total	15

All students are responsible for the completion of 36 advanced semester hours required for a University of Houston degree.

Courses: Biochemistry (BCHS)

[Note: the only proposed change is to delete BCHS 4302 and 4303. BCHS 4304 will later be added as a required course, but this course will not be official under fall 2007. It will be taught as a Selected Topics (BCHS 4397) in spring 2007. Footnotes 4 and 5 below are temporary]

4304: Physical Biochemistry[6] Cr. 3. (3-0). Prerequisites: PHYS 1302 or 1322, MATH 1432, BCHS 3304, and CHEM 4370 or 4373. Theoretical aspects and applications of physics and physical chemistry for the study of biological macromolecules.

[Footnotes: 1–3, 5 are the same]

[4]Only offered in the spring semesters. Will be offered as Selected Topics (BCHS 4397) in spring of 2007. CHEM 4373 or 4370 is a prerequisite.

[6] Will be offered as Selected Topics (BCHS 4397) in spring of 2007.

Biology Major

Students who choose to major in biology must meet the general degree requirements in addition to the special requirements for a Bachelor of Arts or Bachelor of Science degree.

Requirements	Hours
Biochemical and Biophysical Sciences	
BCHS 3304	3
Chemistry	
CHEM 1111, 1112, 1331, 1332, 3221, and 3331	13
Mathematics	
Math 1431, 1432, and BIOL 3407 or MATH 2433	12
Physics	
PHYS 1301, 1101, 1302 and1102 or 1321, 1121, 1322 and 1122	8
Biology	
37 hours (at least 26 advanced) which must include: BIOL 1161, 1162, 1361, 1362 or credit by examination, BIOL 3301, 3306, 4103, 4374, and the following laboratories: BIOL 3201 and one of BIOL 4206, 4272, or BCHS 3201. BIOL 3201 must be completed before enrollment in the second laboratory. Twelve hours of biology electives, at least nine of which must be advanced. Up to six hours of biochemical and biophysical sciences courses (including BCHS 3304) may be applied toward the biology major requirements	37

[Biology minor is unchanged]

Bachelor of Science in Biology
Suggested Program
First Year

Fall Semester	**Hours**
ENGL 1303. Freshman Composition I[1]	3
CHEM 1331 and 1111. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
MATH 1330. Precalculus[2]	3
BIOL 1361, 1161. Introduction to Biological Science and Introduction to Biological Science Laboratory	4
Total	14

Spring Semester	
Engl 1304. Freshman Composition II[1]	3
Chem 1332 and 1112. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
Math 1431. Calculus I	4
Biol 1362, 1162. . Introduction to Biological Science and Introduction to Biological Science Laboratory	4
Total	15

Second Year

Fall Semester	**Hours**
CHEM 3331 and 3221. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
BIOL 3301, 3201. Genetics and Genetics Laboratory	5
MATH 1432. Calculus II	4
Total	14

Spring Semester	
HIST 1376 or 1377. The United States to 1877 or equivalent	3
Electives (e.g., CHEM 3222 and 3332. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory)	5
BCHS 3304. General Biochemistry I	3
BIOL 3306. Evolutionary Biology	3
Total	14

Third Year

Fall Semester	**Hours**
POLS 1336. U.S. and Texas Constitutions and Politics or equivalent	3
PHYS 1301 and 1101. Introductory General Physics and General Physics Laboratory I	4
BIOL 3407 or MATH 2433	4
BIOL 4206 or 4272 or BCHS 3201	2

BIOL 4374. Cell Biology	3
Total	16

Spring Semester

HIST 1378 or 1379. The United States Since 1877 or equivalent	3
POLS 1337. U.S. Government: Congress, President and Courts or equivalent	3
PHYS 1302 and 1102. Introductory General Physics and General Physics Laboratory II	4
Biology Electives	4
Social Sciences Core Course	3
Total	17

Fourth Year

Fall Semester	**Hours**
Biology Electives	4
Electives	4
Humanities Core Course	3
NSM Capstone Course	3
Social Sciences Writing Intensive Core Course	3
Total	17

Spring Semester

BIOL 4103. Integration of Biological Knowledge[3]	1
Biology Electives	4
NSM Capstone Course	3
Visual/Performing Arts Core Course	3
Electives	4-5
Total	15–16

All students are responsible for the completion of 36 advanced semester hours required for a University of Houston degree.

Courses: Biology (BIOL)

[Note: Only change is to add BIOL 4103. BIOL 4103 will later be added as a required course, but this course will not be official under fall 2007. It will be taught as Selected Topics (BIOL 4197) in spring 2007.]

4103: Integration of Biological Knowledge[3] Cr.1. (1-0). Prerequisites: senior standing, BIOL 3201, 3301, BCHS 3304, and credit for or concurrent enrollment in BIOL 3306 and 4374. Review of major disciplines in biology in preparation for required exit examination.

[Footnotes: 1 and 2 remain the same.]

[3]Will be offered as Selected Topics (BIOL4197) in spring 2007.

Current Catalogue Language

Sections to be changed highlighted with explanation/justification. Actual changes shown in proposed language (separate document).

Department of Biology and Biochemistry
Chair: Stuart E. Dryer
Professors Glenn D. Aumann, Stuart E. Dryer, Joseph Eichberg, Jr., Arnold Eskin, George E. Fox, Dan Graur, Horace B. Gray, Jr., Paul E. Hardin, Peter Jurtshuk, B. Montgomery Pettitt, Michael Rea, Shiao-Chun Tu, Arthur C. Vailas, Gerald M. Wellington, Dan E. Wells
Associate Professors James M. Briggs, Gregory M. Cahill, Blaine J. Cole, Costa M. Colbert, Anne Delcour, Susan H. Hardin, Kurt Krause, Alfred R. Loeblich III, Amy K. Sater, Philip Snider, William R. Widger, Diane C. Wiernasz
Assistant Professors Ricardo Azevedo, Werner Hoch, Glen Legge, Steven Pennings, Christos Stathopoulos, Michael Travisano, Hye-Jeong Yeo

[CHANGE: Updated for arrivals, departures, and changes in rank]

The Department of Biology and Biochemistry offers Bachelor of Science (B.S.) and Bachelor of Arts (B.A.) degrees in Biology and in Biochemical and Biophysical Sciences.

Students interested in a career in any aspect of the life sciences, including biomedical research, molecular and cellular biology, biotechnology, ecology and evolutionary biology, and field or conservation biology should consider a major in this department. Graduates with baccalaureate degrees may consider such careers as science journalism, pharmaceutical or scientific sales, laboratory management, or K-12 teaching. Teaching at the university level generally requires a doctorate.

A major in either biology or biochemical and biophysical sciences offers excellent preparation for medical, dental, optometry, or veterinary school as well as the allied health professions. Students who distinguish themselves in their undergraduate studies and earn a B.S. degree in biology or in biochemical and biophysical sciences are excellent candidates for graduate study in fields such as organismal biology, biochemistry, biophysics, cellular and molecular biology, neuroscience, pharmacology, physiology, developmental biology, immunology, microbiology, plant and animal sciences, public health, nutrition, and epidemiology.

Faculty research and teaching fields include biochemistry and biophysics; cell, molecular and developmental biology; neurobiology; and evolutionary biology and ecology. Undergraduate research opportunities may be available in faculty laboratories and participation is encouraged for students interested in pursuing advanced degrees.

Biochemical and Biophysical
Sciences Major

Students must earn a minimum 2.00 grade point average in all courses in the major (required or elective) attempted at the university.

Students who choose to major in biochemical and biophysical sciences must meet the general degree requirements and the college requirements for a Natural Sciences and Mathematics Bachelor of Arts or Bachelor of Science degree:

Requirements	Hours
Biology	
Biol 1161[1], 1162[1], 1361[1], 1362[1], and 3301	11
Chemistry	
Chem 1111, 1112, 1331, 1332, 3221, 3222, 3331, and 3332	18
Mathematics/Statistics	
Math 1431, 1432, and 2433 or 3338 or Biol 3407	12

[CHANGE: MATH 3338 removed. Problems with failure to achieve the 12 hours of formal science required by NSM (it is a three-hour course) and poor performance in this course by the very few students who attempt it.]

Physics	
Phys 1101, 1102, 1301, and 1302 or 1321, 1121, 1322, and 1122	8

[CHANGE: Reordered courses to show lecture and corresponding lab pairs.]

Physical Chemistry or Thermal Physics	
Chem 4370 or 4373 or Phys 3327	3
(Completion of either Chem 4370 or 4373 and the additional requirements in chemistry above will complete a minor in chemistry to meet the NSM Capstone requirements.)	

[CHANGE: Remove PHYS 3327. Has prerequisites that BCHS majors would not take. Change "will complete" to "may complete" because of upper division hours problem with students who transfer organic chemistry.]

Biochemical and Biophysical Sciences	
Twenty-nine semester hours which must include Bchs 3201, 3304, 3305, 4302, 4303, 4306, and 4311 and nine additional semester hours of 4000-level Bchs courses. Senior Honors Thesis and Special Problems courses ordinarily will not apply toward this total.	29

[CHANGE: Delete BIOL 4302 and 4303 as Dr. Gray will not be here to teach them and department consensus is not to continue a two-semester physical biochemistry series. Replace with a one-semester physical biochemistry course (BCHS 4304) with physical chemistry as a prerequisite.]

Biochemical and Biophysical
Sciences Minor
Students who choose to minor in biochemical and biophysical sciences must complete the general requirements for a minor as well as the following:

Requirements	Hours
Biochemical and Biophysical Sciences	
Bchs 3201, 3304, and 3305	8
Nine semester hours of 4000-level Bchs courses, excluding Senior Honors Thesis and Special Problems courses.	9

Students should consult the Academic Regulations and Degree Requirements section of this catalog for general information on the requirements for minors. Students must earn a 2.00 minimum cumulative grade point average on all courses attempted in the minor discipline at the University of Houston. Courses which by catalog statement cannot be applied toward a degree in Natural Sciences and Mathematics, or which have other relevant catalog restrictions, will not be included in the minor grade point average.

Bachelor of Science in Biochemical and Biophysical Sciences Suggested Program

First Year	
Fall Semester	Hours
Engl 1303. Freshman Composition I1	3
Chem 1331 and 1111. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
Math 1330. Precalculus[2]	3
Biol 1361, 1161. Introduction to Biological Science, Laboratory	4
Total 14	
Spring Semester	
Engl 1304. Freshman Composition II1	3
Chem 1332 and 1112. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
Math 1431. Calculus I	4
Biol 1362, 1162. Introduction to Biological Science, Laboratory	4
Total	15
Second Year	
Fall Semester	Hours
Visual/Performing Arts Core Course	3
Chem 3331 and 3221. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
Math 1432. Calculus II	4
Biol 3301. Genetics	3
Total 15	

[CHANGE: Use lecture and lab titles as done for other lectures with associated labs]

Spring Semester

Humanities Core Course	3
Chem 3332 and 3222. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
Bchs 3304 and 3201. General Biochemistry I and Biochemistry Laboratory I	5
Math 2433. Calculus III	4
Total 17	

Third Year

Fall Semester	Hours
Phys 1301 and 1101. Introductory General Physics and General Physics Laboratory I	4
Bchs 3305. General Biochemistry II	3
Pols 1336. U.S. and Texas Constitutions and Politics or equivalent	3
Hist 1376 or 1377. The United States to 1877 or equivalent	3
Social Sciences Core Course	3
Total 16	

Spring Semester

Phys 1302 and 1102. Introductory General Physics and General Physics Laboratory II	4
Biochemical and Biophysical Sciences Elective	3
Pols 1337. U.S. Government: Congress, President, and Courts or equivalent	3
Hist 1378 or 1379. The United States Since 1877 or equivalent	3
Electives 2	
Total 15	

Fourth Year

Fall Semester	Hours
Chem 4373. Survey of Physical Chemistry, or Chem 4370. Physical Chemistry I, or Phys 3327. Thermal Physics	3

[CHANGE: Remove PHYS 3327 as above]

Bchs 4302. Physical Biochemistry I[3]	3

[CHANGE: Remove BCHS 4302 as above. Add three hours BCHS elective.]

Bchs 4306. Nucleic Acids3	3
Biochemical and Biophysical Sciences Elective	3
NSM Capstone Course	3
Total 15	

Spring Semester	Hours
Bchs 4303. Physical Biochemistry II[4]	3

[CHANGE: Remove BCHS 4303, add BCHS 4304 as above.]

Bchs 4311. Biochemistry Laboratory II[5]	3
Biochemical and Biophysical Sciences Elective	3
NSM Capstone Course	3
Social Sciences Writing Intensive Core Course	3
Total	15

All students are responsible for the completion of 36 advanced semester hours required for a University of Houston degree.

Courses: Biochemistry (Bchs)
3201: Biochemistry Laboratory I Cr. 2. (0-6). Prerequisite: credit for or concurrent enrollment in Bchs 3304 or equivalent. Experimental study of basic principles and methods of biochemistry.
3304: General Biochemistry I Cr. 3. (3-0). Prerequisites: Chem 3221 and 3331. Credit may not be received for both Bchs 3304 and Chem 4336. Nature of the chemical constituents of living organisms, including carbohydrates, lipids, nucleic acids, and enzymes.
3305: General Biochemistry II Cr. 3. (3-0). Prerequisite: Bchs 3304. Credit may not be received for both Bchs 3305 and Chem 4336. The integration and control of the metabolism of cellular constituents.
3396-4396: Senior Research Project Cr. 3. (3-0). Prerequisite: approval of the chair. Directed research project culminating in a departmentally approved report.
3399-4399: Senior Honors Thesis Cr. 3 per semester. Prerequisite: approval of chair.
4198:4298:4398:4498: Special Problems Cr. 1-4 per semester. Prerequisites: senior standing and approval of chair. May be taken for a maximum of four semester hours.
4302: Physical Biochemistry I Cr. 3. (3-0). Prerequisites: Phys 1302 or 1322, Math 1432, and Bchs 3304. Theoretical aspects and applications of physics and physical chemistry for the study of biological macromolecules. Equilibrium and non-equilibrium methods.
4303: Physical Biochemistry II Cr. 3. (3-0). Prerequisite: Bchs 4302. Theoretical aspects of physics and physical chemistry for the study of biological macromolecules. Non-equilibrium and spectroscopic methods.
4306: Nucleic Acids Cr. 3. (3-0). Prerequisite: Bchs 3304. Structure, metabolism, and functions of nucleotides and nucleic acids.
4307: Proteins Cr. 3. (3-0). Prerequisite: Bchs 3304. Structure and functions of proteins.
4311: Biochemistry Laboratory II Cr. 3. (1-6). Prerequisites: Bchs 3201 and either credit for or concurrent enrollment in Bchs 3305. Experimental study of contemporary techniques in
biochemistry and molecular biology.
4312: Molecular Modeling of Biological Macromolecules Cr. 3. (2-2). Prerequisites: Bchs 3304 and Chem 4370 or 4373 or equivalent. Computer-based molecular modeling methods, with emphasis on their practical aspects and limitations. Individual research projects using UNIX-based Silicon Graphics computers.

4313: Cell Biochemistry (also Biol 4374) Cr. 3. (3-0). Prerequisites: Biol 1162/1362 and 3301 and Bchs 3304. Cellular organization of biochemical mechanisms. Composition and function of cells at the molecular level.
4314: Biochemistry of Lipids and Carbohydrates Cr. 3. (3-0). Prerequisite: Bchs 3305 or consent of instructor. Structure,
metabolism and function of carbohydrates, glycoconjugates and simple and complex lipids.
4317: Principles of Biotechnology (also Biol 4317) Cr. 3. (3-0). Prerequisite: Biol 3301. Survey of molecular methods used in modern biotechnology. Guest presentations on legal, ethical, medical, and business aspects of biotechnology.
4319: Microbial Genetics (also Biol 4319) Cr. 3. (3-0). Prerequisites: Biol 3301 and Bchs 3304. Molecular genetics of bacteria. Structure and function of genes, gene expression and regulation, mutation, transposable elements, plasmids, and bacteriophage.
4361: Clinical Biochemistry Cr. 3. (3-0). Prerequisite: Bchs 3304. Etiology, diagnosis, and treatment of metabolic disorders.
4397: Selected Topics in Biochemical and Biophysical Sciences Cr. 3 per semester. (3-0). Prerequisite: approval of chair. May be repeated for credit when topics vary, with a maximum enrollment of three semester hours in a single semester.

[CHANGE: Remove BCHS 4302 and 4303, add BCHS 4304 as noted.]

Biology Major
Students who choose to major in biology must meet the general degree requirements in addition to the special requirements for a Bachelor of Arts or Bachelor of Science degree.

Requirements	Hours
Biochemical and Biophysical Sciences	
Bchs 3304	3
Chemistry	
Chem 1111, 1112, 1331, 1332, 3221, and 3331	13
(Completion of Chem 3222 and 3332 and either Chem 4373 or 4370 will complete a minor in chemistry to meet the NSM Capstone requirement.)	
Mathematics	
Math 1431 and 1432, and one of the following:	
Biol 3407, Math 2433 or 3338	12
Physics	
Phys 1101, 1102, 1301, 1302 or 1321, 1121, 1322, 1122	8
Biology	
36 hours (at least 25 advanced) which must include:	
Biol 1161, 1162, 1361, 1362 or exemption by examination,	
Biol 3301, 3306, 4374, and the following laboratories: Biol 3201	

and one of Biol 4206, 4272, or Bchs 3201. Biol 3201 must
be completed before enrollment in the second laboratory.
Twelve hours of biology electives, at least nine of which must be advanced.
Up to six hours of biochemical and biophysical sciences courses
(including Bchs 3304) may be applied toward the biology major

requirements 36

[CHANGE: Remove language pertaining to getting the minor in chemistry. Students have perceived this as only route to complete NSM capstone. MATH 3338 removed as justified for biochemistry program. Change "exemption" to "credit." Add one required hour (BIOL 4103) to the biology major. This is a required course to prepare students for the required Major Field Test, scores on which will comprise part of the course grade, as part of an effort to improve the program as assayed by a standardized exam.]

Biology Minor
Students who choose to minor in biology must complete the general requirements for a minor as well as the following:

Requirements	Hours
Biology	
Biol 1161, 1162, 1361, 1362, and 3301	11
Biology electives (six advanced hours)	6

Biochemical and Biophysical Sciences courses may not apply toward the minor. Students should consult the Academic Regulations and Degree Requirements section of this catalog for general information on the requirements for minors. Students must earn a 2.00 minimum cumulative grade point average on all courses attempted in the minor discipline at the University of Houston. Courses which by catalog statement cannot be applied toward a degree in Natural Sciences and Mathematics, or which have other relevant catalog restrictions, will not be included in the minor grade point average.

Bachelor of Science in Biology
Suggested Program
First Year

Fall Semester	Hours
Engl 1303. Freshman Composition I1	3
Chem 1331 and 1111. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
Math 1330. Precalculus2	3
Biol 1361, 1161. Introduction to Biological Science, Laboratory	4
Total 14	
Spring Semester	
Engl 1304. Freshman Composition II1	3
Chem 1332 and 1112. Fundamentals of Chemistry and Fundamentals of Chemistry Laboratory	4
Math 1431. Calculus I	4
Biol 1362, 1162. Introduction to Biological Science, Laboratory	4
Total	15

[CHANGE: Use lecture and lab titles as done for other lectures with associated labs]

Second Year

Fall Semester	Hours
Chem 3331 and 3221. Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	5
Biol 3301, 3201. Genetics, Genetics Laboratory	5
Math 1432. Calculus II	4
Total 14	
Spring Semester	
Electives (e.g., Chem 3222 and 3332, Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory)	5
Bchs 3304. General Biochemistry I	3
Biol 3407, Math 2433, or Math 3338	3–4
Biol 3306. Evolutionary Biology	3
Total	14–15

[CHANGE: Use lecture and lab titles as done for other lectures with associated labs. Remove MATH 3338 as formal science option as above. Rearrange suggested program so that BIOL 3407 appears in a fall semesters, as that is when it has been taught for some years.]

Third Year

Fall Semester	Hours
Hist 1376 or 1377. The United States to 1877 or equivalent	3
Pols 1336. U.S. and Texas Constitutions and Politics or equivalent	3
Phys 1301 and 1101. Introductory General Physics and General Physics Laboratory I	4
Biol 4206 or 4272 or Bchs 3201	2
Biol 4374. Cell Biology	3
Total	15

Spring Semester	
Hist 1378 or 1379. The United States Since 1877 or equivalent	3
Pols 1337. U.S. Government: Congress, President and Courts or equivalent	3
Phys 1302 and 1102. Introductory General Physics and General Physics Laboratory II	4
Biology Electives	4
Social Sciences Core Course	3
Total 17	

Fourth Year

Fall Semester	Hours
Biology Electives	4
Electives 4	
Humanities Core Course	3

NSM Capstone Course	3
Social Sciences Writing Intensive Core Course	3
Total 17	

Spring Semester	
Biology Electives	4
NSM Capstone Course	3
Visual/Performing Arts Core Course	3
Electives	5-6
Total	15–16

[CHANGE: (spring semester) Add BIOL 4103 as above. Change electives hours to keep total number of required hours at present number.]

All students are responsible for the completion of
36 advanced semester hours required for a University of Houston degree.

Courses: Biology (Biol)

1134: Human Anatomy and Physiology Laboratory I Cr. 1. (0-3). Prerequisite: credit for or concurrent enrollment in Biol 1334. May not apply toward a major in natural sciences and mathematics. Laboratory studies of the structure and functions of the human body.

1144: Human Anatomy and Physiology Laboratory II Cr. 1. (0-3). Prerequisite: credit for or concurrent enrollment in Biol 1344. May not apply toward a major in natural sciences and mathematics. Laboratory studies of the structure and functions of the human body.

1153: Prenursing Microbiology Laboratory Cr. 1. (0-3). May not receive credit until Biol 1353 is successfully completed. May not apply toward a major in natural sciences and mathematics.
Fundamental principles of microbiology; survey of pathogenic microorganisms and the diseases they cause.

1161:1162: Introduction to Biological Science Laboratory Cr. 1. (0-3). Prerequisite: credit for or concurrent enrollment in Biol 1361:1362. Designed for science majors and preprofessional students. Laboratory experience in introductory biological science, including biochemistry, cellular and molecular biology, genetics, physiology, ecology, and evolution.

1198:1398: Special Problems Cr. 1-3 per semester. Prerequisite: approval of department chair or designate.

1309: Human Genetics and Society Cr. 3. (3-0). Prerequisite: Math 1310 or 1311 or equivalent. Introduction to modern principles of human genetics and the impact of their application on society. Includes fetal development and prenatal screening, mutations, cloning, human origins, gene therapy, and biotechnology.

1310:1320: [biol 1308:1309] General Biology Cr. 3 per semester. (3-0). Prerequisite: Math 1310 or 1311. Credit may not be received for both Biol 1161,1361:1162, 1362 and 1310:1320. Designed for nonscience majors; does not satisfy requirements for biology majors and preprofessional students. Introduction to general principles of biology with special orientation toward man and the natural world.

1334;1344: [biol 2301:2302] Human Anatomy and Physiology Cr. 3 per semester. (3-0). May not apply toward a major in natural sciences and mathematics. Structure and function of the human body.
1353: Prenursing Microbiology Cr. 3. (3-0). May not apply to a degree until Biol 1153 is successfully completed. May not apply toward a major in natural sciences and mathematics. Fundamental principles of microbiology; survey of pathogenic microorganisms and the diseases they cause.
1361:1362: [biol 1406:1407] Introduction to Biological Science (formerly Biol 1431:1432) Cr. 3 per semester. (3-0). Prerequisite: Math 1310 or equivalent. Credit may not be received for both Biol 1361:1362 and 1310:1320. Designed for science majors and preprofessional students. Introduction to biological science, including biochemistry, cellular and molecular biology, genetics, physiology, ecology, evolution, and behavior.
2133: Elementary Microbiology Laboratory Cr. 1. (0-3). Prerequisite: credit for or concurrent enrollment in Biol 2333.
2333: Elementary Microbiology Cr. 3. (3-0). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Chem 1331 and 1332 or equivalents. May not apply toward degree until Biol 2133 is successfully completed. Basic concepts in microbiology with focus on microbial diversity and pathogenesis. Includes survey of infectious diseases.
2335: Plant Anatomy Cr. 3. (3-0). Prerequisites: Biol 1162 and 1362. Analysis of cells and tissues of plants as related to their physiology.
2337: Marine Biology Cr. 3. (3-0). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Chem 1331 and 1332 or equivalents. Biological and physical processes that influence patterns of distribution and abundance of marine organisms. Biogeography, physical oceanography, trophic interactions, larval recruitment, and influence of human activities on marine resources.
3124: Human Physiology Laboratory Cr. 1. (0-3). Prerequisite: credit for or concurrent enrollment in Biol 3324. Demonstrations and experiments in organismal bodily function.
3201: Genetics Laboratory Cr. 2. (0-6). Prerequisite: credit for or concurrent enrollment in Biol 3301. Experimental aspects of basic Mendelian, molecular, and microbial genetics.
3301: Genetics Cr. 3. (3-0). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Chem 1331 and 1332 or equivalents. Basic concepts of Mendelian, molecular, and population genetics.
3305: Biodiversity Cr. 3. (3-0). Prerequisites: Biol 1161, 1162, 1361, and 1362, and three hours in biology at the 2000-level or higher. Causes, consequences, importance, and preservation of biological diversity.
3306: Evolutionary Biology Cr. 3. (3-0). Prerequisite: Biol 3301. Origins and maintenance of biological diversity and the mechanisms of phenotypic change.
3324: Human Physiology Cr. 3. (3-0). Prerequisites: eleven semester hours in biology, including Biol 1161, 1361, 1162 and 1362, and Chem 3331 or consent of instructor. Integrated treatment of bodily function from molecular to organismic levels.
3341: Human Genetics Cr. 3. (3-0). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Chem 1331 and 1332 or equivalents. Clinical and applied aspects of human genetics. Common and severe hereditary diseases: prevention, diagnosis, and therapy, including molecular aspects.

3396-4396: Senior Research Project Cr. 3 per semester. Prerequisite: approval of chair. Directed research culminating in a departmentally approved report.
3399-4399: Senior Honors Thesis Cr. 3 per semester. Prerequisite: approval of chair.
3407: Introductory Biometrics Cr. 4. (3-3). Prerequisites: Biol 1161, 1361, 1162, and 1362, and three semester hours in biology at the 2000-level or higher, Chem 1331 and 1332, and Math 1432 or equivalents. Statistics in biological research.
3445: Plant Physiology Cr. 4. (3-3). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Chem 3221 and 3331 or equivalents. Discussion and laboratory sessions on respiration, photosynthesis, nutrition, transport, and development in flowering plants.
4198:4298:4398:4498: Special Problems Cr. 1-4 per semester. Prerequisites: senior standing, major in biology with honor average in science, consent of special problems committee, and approval of an advisor and chair. May be taken for a maximum of four semester hours.
4206: Population Biology Laboratory Cr. 2. (0-6). Prerequisites: Biol 3306 and 3407. Field and laboratory exercises illustrating concepts in evolution, ecology, and animal behavior.
4272: Cellular and Developmental Biology Laboratory Cr. 2. (0-6). Prerequisite: credit for or concurrent enrollment in Biol 4374 or Bchs 4313. Experimental aspects of cellular and developmental biology, using techniques at both the molecular and cellular levels.
4315: Neuroscience Cr. 3. (3-0). Prerequisites: Biol 1161, 1361, 1162, and 1362, and Bchs 3304 or consent of instructor. Molecular, cellular, and behavioral principles of nervous system function, including aspects of development, learning and memory, and evolution.
4317: Principles of Biotechnology (also Bchs 4317) Cr. 3. (3-0). Prerequisite: Biol 3301. Survey of molecular methods used in modern biotechnology. Guest presentations on legal, ethical, medical, and business aspects of biotechnology.
4318: Biology of the Algae Cr. 3. (3-0). Prerequisites: 1161, 1361, 1162, and 1362, and three semester hours of biology at the 2000- level or higher, and Chem 1331 and 1332 or equivalents. The systematics and structure of the algae.
4319: Microbial Genetics (also Bchs 4319) Cr. 3. (3-0). Prerequisites: Biol 3301 and Bchs 3304. Molecular genetics of bacteria. Structure and function of genes, gene expression and regulation, mutation, transposable elements, plasmids, and bacteriophages.
4320: Molecular Biology Cr. 3. (3-0). Prerequisite: Biol 3301. Molecular processes involved in biological systems and methods for their study, including recombinant DNA techniques and other modern research applications.
4323: Immunology (formerly Biol 4423) Cr. 3. (3-0). Prerequisite: Biol 3301. Structural and functional aspects of the immune system. Antigens, antibodies, and antigen-antibody and cellular reactions.
4347: Animal Behavior Cr. 3. (3-0). Prerequisite: Biol 3306.
Animal behavior, with a comparison of different approaches to the subject.
4354: Endocrinology Cr. 3. (3-0). Prerequisites: Biol 4374 or Bchs 3304 and 3305, or consent of instructor. The regulation and integration of bodily functions by hormones in the normal and diseased animal.

ORIGINAL

4368: Ecology Cr. 3. (3-0). Prerequisites: Biol 3301 and 3306 or consent of instructor. Current concepts of the interrelationships between organisms and the environment.
4369: Evolution of Infectious Disease Cr. 3. (3-0). Prerequisites: Biol 3306 and 3407. Origins, maintenance, and evolution of infectious disease. Rare and emerging diseases. Plagues.
4373: Microbial Physiology Cr. 3. (3-0). Prerequisites: Biol 2133, 2333, and Bchs 3304. The structure, growth, metabolic activities, and morphogenesis of microorganisms.
4374: Cell Biology (also Bchs 4313) Cr. 3. (3-0). Prerequisites: Biol 3301 and Bchs 3304. Composition, organization, and function of cells at the molecular level.
4384: Developmental Biology Cr. 3. (3-0). Prerequisite: Biol 3301. Cellular differentiation, growth, and morphogenesis of developing biological systems.
4397: Selected Topics in Biology Cr. 3 per semester. Prerequisites: consent of instructor. May be repeated for credit, with a maximum enrollment of three semester hours in a single semester.

[CHANGE: Add BIOL 4103 as above]

ORIGINAL