

UC 11427 11F

College of Technology

# Memo

APPROVED DEC 07 2011

**To:** Undergraduate Committee  
**From:** Fred Lewallen, Associate Dean for Academic Affairs  
**Date:** 10/11/2011  
**Re:** Modification of Degree Plan- Biotechnology BS

RECEIVED OCT 14 2011

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Attached for your review and consideration are the modifications to the Biotechnology Bs degree plan.

Action: Replace BIOL 4319 with BTEC 4319 in the Biomanufacturing Track of the degree plan.

Action: Increase the number of approved electives on the degree plan to accommodate student needs.

Action: Move TELS 3363 from College and Departmental Requirements to Writing in the Discipline.

Action: Allow students to receive 3 hours of free elective credit to keep degree plan at 120 hours

# Biotechnology Major

The Bachelor of Science Program in Biotechnology is intended to provide students with strong core science concepts and an application-oriented undergraduate education. Strongly interdisciplinary, this innovative program draws faculty and courses from the College of Technology and the College of Natural Science and Mathematics. The program's objective is to prepare students for employment opportunities in the critically important and dynamic biotechnology industry. In addition, the curriculum will provide students with knowledge and core set of skills that span across basic sciences, technology, engineering, and mathematics (STEM) education. With an emphasis on environmental biotechnology, this is the first program in the state of Texas that integrates bioprocessing, nanobiotechnology, bioinformatics and environmental biotechnology into the undergraduate curriculum.

The program recognizes the need for cross-disciplinary training and fosters collaborative interactions that will strengthen undergraduate education.

The program is specifically designed to:

- Develop adaptable students with a strong foundation in skills that are relevant to the changing world of biotechnology.
- Provide students with practical training in the skills and techniques of biotechnology.
- Integrate the laboratory and lecture components of the program through the use of an experimental approach to learning.
- Uniquely combine practical, hands-on biotechnology training with cutting-edge biotechnology research and teaching.

Two curriculum tracks: 1) Bioprocessing, and 2) Bioinformatics give students the flexibility to tailor their degree based on their interest, educational background and career goals. These tracks, in combination with core courses, will provide our students with a broad exposure to the field of biotechnology. The presence of the Texas Medical Center in the greater Houston area and a growing biotechnology and pharmaceutical industry, places this program at the forefront of Biotechnology Education.

Students pursuing the Biotechnology major must complete the following requirements, in addition to university core and general college requirements.

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## Biotechnology Major Requirements

BCHS 3304, 3201. General Biochemistry I, Laboratory

BIOL 1362, 1162. Introduction to Biological Science, Laboratory

BIOL 3332,3132. Elementary Microbiology, Laboratory

BIOL 3301. Genetics

BIOL 4320. Molecular Biology

BTEC 1322. Introduction to Biotechnology

BTEC 2320. Biotechnology Regulatory Environment

BTEC 3321. Good Manufacturing Practices

BTEC 3100. Instrumentation and Measurement Laboratory

BTEC 3301. Principles of Genomics/Proteomics and Bioinformatics

BTEC 4350. Biotechnology Capstone Experience

CHEM 1332, 1112. Fundamentals of Chemistry, Laboratory

CHEM 3331, 3321. Fundamentals of Organic Chemistry, Laboratory

GPA for major will be calculated upon the following major requirements including Biomanufacturing or Bioinformatics track.

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## Biomanufacturing Track (13 SH Minimum)

BTEC 4319. Microbial Biotechnology

BTEC 3320. Introduction to Quality Control/Quality Assurance

BTEC 4101. Principles of Bioprocessing Laboratory

BTEC 4301. Principles of Bioprocessing

Approved Electives (3 SH)

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## Bioinformatics Track (12 SH Minimum)

BTEC 4300. Principles of Bioinformatics

CIS 3343. Information Systems Analysis and Design

CIS 3365. Database Management

Approved Elective (3 SH):

- BCCHS 4306: Nucleic Acids
- BCCHS 4324: Bioinformatics for Biologist
- BCCHS 4325: Molecular Microbiology
- BIOL 3306: Evolutionary Biology

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## Program Requirements

ELET 2300. Introduction to C++ Language Programming

CIS 2334. Information Systems Applications

TELS 3340. Organizational Decisions in Technology

**or**

HDCS 3300. Organizational Decisions in Technology

PHYS 1301, 1101. Introductory General Physics I, Laboratory

3 Hours of Free Elective

Degree awarded: Bachelor of Science

Major: Biotechnology

- BIOL 4310: Biostatistics
- BIOL 4323: Immunology
- BIOL 4365: Applied Evolution
- BIOL 4366: Molecular Evolution
- BIOL 4367: Evolutionary Ecology
- BIOL 4374: Cell Biology
- BTEC 3399:4399: Senior Honors Thesis
- TELS 4350: Industrial & Environmental Safety

## College Requirements

### Mathematics

(10 semester hours which includes university core)

Students are required to have credit for College Algebra through Math Placement Exam, CLEP, or completion of course.

MATH 1330. Precalculus

MATH 1431. Calculus I

TMTH 3360. Applied Technical Statistics or PSYC 3301. Introduction to Psychological Statistics

### Natural Sciences

(12 semester hours which includes university core)

BIOL 1361, 1161. Introduction to Biological Science, Laboratory

CHEM 1331, 1111. Fundamentals of Chemistry, Laboratory

### Writing in the Discipline

(3 semester hours) selected from core approved list.

TELS 3363. Technical Communications

### Humanities

PHIL 1305. Ethics (recommended)

**BIOTECHNOLOGY (BTEC)**

UNIVERSITY OF HOUSTON  
COLLEGE OF TECHNOLOGY

ENGINEERING TECHNOLOGY DEPARTMENT  
BACHELOR OF SCIENCE

NAME \_\_\_\_\_ PS \_\_\_\_\_

**UNIVERSITY CORE REQUIREMENTS (42 SH)**

	GR	SH	AH
<b><u>Communication (6 SH)</u></b>			
ENGL 1303 English Composition I	_____	_____	_____
ENGL 1304 English Composition II	_____	_____	_____
<b><u>Writing in the Discipline* (3 SH)</u></b>			
TELS 3363 Technical Communication	_____	_____	_____
<b><u>History/Government (12 SH)</u></b>			
HIST 1377 US History to 1867	_____	_____	_____
HIST 1379 US History since 1867	_____	_____	_____
POLS 1336 US & TX Const/Politics	_____	_____	_____
POLS 1337 US Government	_____	_____	_____
<b><u>Humanities* (3 SH)</u></b>			
PHIL 1305 Ethics (recommended)	_____	_____	_____
<b><u>Visual/Performing Arts* (3 SH)</u></b>			
_____	_____	_____	_____
<b><u>Social/Behavioral Science* (3 SH)</u></b>			
_____	_____	_____	_____
<b><u>Math Reasoning (10 SH)**</u></b>			
MATH 1330 Precalculus	_____	_____	_____
MATH 1431 Elements of Calculus	_____	_____	_____
TMTH 3360 Applied Tech Statistics or PSYC 3301	_____	_____	_____
** Students are required to have credit for College Algebra through the Math Placement Exam, CLEP or completion of the course.			
<b><u>Natural Sciences* ( 8 SH)</u></b>			
BIOL 1361/1161 Intro to Biological Science	_____	_____	_____
CHEM 1331/1111 Fund of Chem & Lab	_____	_____	_____

**COLLEGE AND DEPARTMENT REQUIREMENTS (13 SH)**

ELET 2300 Intro to C++ programming	_____	_____	_____
CIS 2334 Information Systems Apps	_____	_____	_____
PHYS 1301/1101 Intro to General Phy & Lab	_____	_____	_____
TELS 3340 Org Leadership & Suprv or HDCS 3300 Org Decisions in Tech	_____	_____	_____

**Free Elective (3 SH)**

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\*Refer to class schedule for lists of courses which satisfy University requirements.

**36 advanced** (3000- or 4000-level) semester hours must be completed.

Total hours required: 120-121 semester hours

Texas Success Initiative requirements must be met.

For graduation with Honors, see Undergraduate Catalog.

**MAJOR CORE REQUIREMENTS (42 SH)**

	GR	SH	AH
BIOL 1362 Intro to Biological Science	_____	_____	_____
BIOL 1162 Intro to Biological Science Lab	_____	_____	_____
CHEM 1332 Fund of Chem	_____	_____	_____
CHEM 1112 Fund of Chem Lab	_____	_____	_____
BIOL 3332 Elem Microbiology	_____	_____	_____
BIOL 3132 Elem Microbiology lab	_____	_____	_____
BTEC 1322 Intro to Biotechnology	_____	_____	_____
BTEC 2320 Biotechnology Regulatory Env	_____	_____	_____
BCHS 3304 Gen Biochemistry	_____	_____	_____
BCHS 3201 Gen Biochemistry Lab	_____	_____	_____
BIOL 3301 Genetics	_____	_____	_____
BTEC 3100 Biotech Research Methods/Apps	_____	_____	_____
BTEC 3301 Prin of Bioinform/Geon/Proteom	_____	_____	_____
BTEC 3321 Good Manufacturing Practices	_____	_____	_____
CHEM 3221 Organic Chemistry Lab	_____	_____	_____
CHEM 3331 Fund of Organic Chemistry	_____	_____	_____
BIOL 4320 Molecular Biology	_____	_____	_____
BTEC 4350 Capstone Experience	_____	_____	_____

**Choose either the Biomufacturing or Bioinformatics Track.**

**Biomufacturing Track (13 SH Minimum)**

BTEC 3320 Intro QA/QC Drugs & Biologies	_____	_____	_____
BTEC 4319 Microbial Biotechnology	_____	_____	_____
BTEC 4301 Principles of Bioprocessing	_____	_____	_____
BTEC 4101 Principles of Bioprocessing Lab	_____	_____	_____
**Approved Elective(3SH)	_____	_____	_____

**Bioinformatics Track (12 SH Minimum)**

CIS 3343 System Analysis & Design	_____	_____	_____
CIS 3365 Database Design	_____	_____	_____
BTEC 4300 Prin of Bioinformatics	_____	_____	_____
**Approved Elective (3SH)	_____	_____	_____

**\*\*Electives to be chosen from approved list.**

**Approved Electives:**

BTEC 3399, 4399
BCHS 4306, 4324, 4325
BIOL 3306, 4310, 4323 4365, 4366, 4367, 4374
TELS 4350

**APPROVALS:**

_____ Student Signature	_____ Date
_____ Advisor	_____ Date
_____ Department Chair	_____ Date

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COLLEGE OF TECHNOLOGY

ENGINEERING TECHNOLOGY DEPARTMENT  
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COMM 1302 or HDCS 1300	_____	_____	_____
<b><u>History/Government (12 SH)</u></b>			
HIST 1377 US History to 1867	_____	_____	_____
HIST 1379 US History since 1867	_____	_____	_____
POLS 1336 US & TX Const/Politics	_____	_____	_____
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PHIL 1305 Ethics (recommended)	_____	_____	_____
<b><u>Visual/Performing Arts* (3 SH)</u></b>			
_____	_____	_____	_____
<b><u>Social/Behavioral Science* (3 SH)</u></b>			
_____	_____	_____	_____
<b><u>Math Reasoning (10 SH)**</u></b>			
MATH 1330 Precalculus	_____	_____	_____
MATH 1431 Elements of Calculus	_____	_____	_____
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\*\* Students are required to have credit for College Algebra through the Math Placement Exam, CLEP or completion of the course.

**Natural Sciences\* ( 8 SH)**

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\*Refer to class schedule for lists of courses which satisfy University requirements.

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BIOL 1362 Intro to Biological Science	_____	_____	_____
BIOL 1162 Intro to Biological Science Lab	_____	_____	_____
CHEM 1332 Fund of Chem	_____	_____	_____
CHEM 1112 Fund of Chem Lab	_____	_____	_____
BIOL 3332 Elem Microbiology	_____	_____	_____
BIOL 3132 Elem Microbiology lab	_____	_____	_____
BTEC 1322 Intro to Biotechnology	_____	_____	_____
BTEC 2320 Biotechnology Regulatory Env	_____	_____	_____
BTEC 2321 Good Manufacturing Practices	_____	_____	_____
BCHS 3304 Gen Biochemistry	_____	_____	_____
BCHS 3201 Gen Biochemistry Lab	_____	_____	_____
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BTEC 3100 Biotech Research Methods/Apps	_____	_____	_____
BTEC 3301 Prin of Bioinform/Geon/Proteom	_____	_____	_____
CHEM 3221 Organic Chemistry Lab	_____	_____	_____
CHEM 3331 Fund of Organic Chemistry	_____	_____	_____
BIOL 4320 Molecular Biology	_____	_____	_____
BTEC 4350 Capstone Experience	_____	_____	_____

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**Biomufacturing Track (13 SH Minimum)**

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BIOL 4319 Microbial Genetics	_____	_____	_____
BTEC 4301 Principles of Bioprocessing	_____	_____	_____
BTEC 4101 Principles of Bioprocessing Lab	_____	_____	_____

\*\*Approved Elective(3SH) \_\_\_\_\_

**Bioinformatics Track (12 SH Minimum)**

CIS 3343 System Analysis & Design	_____	_____	_____
CIS 3365 Database Design	_____	_____	_____
BTEC 4300 Prin of Bioinformatics	_____	_____	_____

\*\*Approved Elective (3SH) \_\_\_\_\_

**\*\*Electives to be chosen from approved list.**

**Approved Electives:**

- BCHS 4306 Nucleic Acid
- BIOL 4323 Immunology
- BIOL 4374 Cell Biology
- TELS 4350 Industrial & Environmental Safety

**APPROVALS:**

Student Signature _____	Date _____
Advisor _____	Date _____
Department Chair _____	Date _____