BIOTECHNOLOGY - B.S.

College of Arts and Sciences
Department of Chemistry
208 Williams Hall
Kent Campus
330-672-2032
chem@kent.edu
www.kent.edu/chemistry

Department of Biological Sciences
256 Cunningham Hall
Kent Campus
330-672-3613
kentbiology@kent.edu
www.kent.edu/biology

Description
The Bachelor of Science in Biotechnology is an interdisciplinary program that provides a strong academic foundation in biological sciences and chemistry, practical training in the various biotechnologies and a solid understanding of their application in industry and biomedicine. The science of biotechnology extends across many areas of biology and chemistry and provides cutting-edge technology tools for modern biology and biomedical research. The curriculum includes a research experience at Kent State and/or an internship at a biotechnology company.

Biotechnology graduates have employment opportunities in biomedical research and in the rapidly growing biotechnology and pharmaceutical industries.

Fully Offered At:
• Kent Campus

Admission Requirements
The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students who graduated from high school three or more years ago.

Freshman Students on the Kent Campus: The freshman admission policy on the Kent Campus is selective. Admission decisions are based upon the following: cumulative grade point average, ACT and/or SAT scores, strength of high school college preparatory curriculum and grade trends. The Admissions Office at the Kent Campus may defer the admission of students who do not meet admissions criteria but who demonstrate areas of promise for successful college study. Deferred applicants may begin their college coursework at one of seven regional campuses of Kent State University. For more information on admissions, including additional requirements for some academic programs, visit the admissions website for new freshmen.

Freshman Students on the Regional Campuses: Kent State campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Regional Academic Center in Twinsburg, have open enrollment admission for students who hold a high school diploma, GED or equivalent.

English Language Proficiency Requirements for International Students: All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score or minimum 48 PTE score, or by completing the ESL level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

Transfer, Transitioning and Former Students: For more information about admission criteria for transfer, transitioning and former students, please visit the admissions website.

Program Learning Outcomes
Graduates of this program will be able to:
1. Apply knowledge and information to complex issues in biotechnology
2. Use problem-solving and data-gathering skills to comprehend issues in biotechnology.
3. Develop inductive reasoning and technical communications skills in the context of working in a complex group environment.
4. Analyze scientific papers and expand skills for listening to and critiquing scientific seminars based on the literature or current research.
5. Effectively communicate scientific information.
6. Develop collaborative working relationships with research mentors and laboratory members.

University Requirements
All students in a bachelor’s degree program at Kent State University must complete the following university requirements for graduation.

NOTE: University requirements may be fulfilled in this program by specific course requirements. Please see Program Requirements for details.

Kent State University Catalog 2018-2019
Program Requirements

Major Requirements

[BS-BTEC]

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 10120</td>
<td>BIOLOGICAL FOUNDATIONS (KBS) (KLAB)</td>
<td>4</td>
</tr>
<tr>
<td>BSCI 30140</td>
<td>CELL BIOLOGY</td>
<td>4</td>
</tr>
<tr>
<td>BSCI 30156</td>
<td>ELEMENTS OF GENETICS</td>
<td>3</td>
</tr>
<tr>
<td>BSCI 30171</td>
<td>GENERAL MICROBIOLOGY</td>
<td>4</td>
</tr>
<tr>
<td>BSCI 40158</td>
<td>MOLECULAR BIOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>BTEC 10210</td>
<td>INTRODUCTION TO BIOTECHNOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>BTEC 40191</td>
<td>SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY</td>
<td>1</td>
</tr>
<tr>
<td>BTEC 40192 or BTEC 40196</td>
<td>INTERNSHIP IN BIOTECHNOLOGY or INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR)</td>
<td>6-12</td>
</tr>
<tr>
<td>BTEC 40210</td>
<td>CASE STUDIES IN BIOTECHNOLOGY (WIC)</td>
<td>3</td>
</tr>
<tr>
<td>BTEC 40220</td>
<td>BIOINFORMATICS</td>
<td>3</td>
</tr>
<tr>
<td>BUS 10123</td>
<td>EXPLORING BUSINESS</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 10060</td>
<td>GENERAL CHEMISTRY I (KBS)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 10061</td>
<td>GENERAL CHEMISTRY II (KBS)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 10062</td>
<td>GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 10063</td>
<td>GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 20481</td>
<td>BASIC ORGANIC CHEMISTRY I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 30284</td>
<td>INTRODUCTORY BIOLOGICAL CHEMISTRY</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 40248</td>
<td>ADVANCED BIOLOGICAL CHEMISTRY</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 40251</td>
<td>ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC) (min grade C)</td>
<td>2</td>
</tr>
<tr>
<td>MATH 12002</td>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMCR)</td>
<td>5</td>
</tr>
<tr>
<td>MATH 30011</td>
<td>BASIC PROBABILITY AND STATISTICS</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 30015</td>
<td>MEDICINE AND MORALITY</td>
<td>3</td>
</tr>
<tr>
<td>PHY 13001</td>
<td>GENERAL COLLEGE PHYSICS I (KBS)</td>
<td>4</td>
</tr>
<tr>
<td>PHY 13021</td>
<td>GENERAL COLLEGE PHYSICS I (KBS) (KLAB)</td>
<td>1</td>
</tr>
</tbody>
</table>

Major Electives, choose from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 30518</td>
<td>VERTEBRATE ANATOMY</td>
<td>1</td>
</tr>
<tr>
<td>BSCI 40143</td>
<td>EUKARYOTIC CELL BIOLOGY</td>
<td>4</td>
</tr>
<tr>
<td>BSCI 40159</td>
<td>MOLECULAR BIOLOGY LABORATORY (ELR) (WIC)</td>
<td>3</td>
</tr>
<tr>
<td>BSCI 40174</td>
<td>IMMUNOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 30105</td>
<td>ANALYTICAL CHEMISTRY I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 30107</td>
<td>ANALYTICAL CHEMISTRY LABORATORY I (WIC)</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 30301</td>
<td>INORGANIC CHEMISTRY I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 30475</td>
<td>ORGANIC CHEMISTRY LABORATORY I (ELR)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 40567</td>
<td>PHYSICAL CHEMISTRY FOR LIFE SCIENCES</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 41363</td>
<td>BIOPSYCHOLOGY</td>
<td>4</td>
</tr>
</tbody>
</table>

Upper-Division Electives (30000 or 40000 level) approved by program director

Additional Requirements (courses do not count in major GPA)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 10051</td>
<td>INTRODUCTION TO COMPUTER SCIENCE (KMCR)</td>
<td>4</td>
</tr>
<tr>
<td>PHIL 21001</td>
<td>INTRODUCTION TO ETHICS (DIVG) (KHUM)</td>
<td>3</td>
</tr>
<tr>
<td>UC 10097</td>
<td>DESTINATION KENT STATE: FIRST YEAR EXPERIENCE</td>
<td>1</td>
</tr>
</tbody>
</table>

Foreign Language College Requirement

- Students pursuing the Bachelor of Science degree in the College of Arts and Sciences must complete 8 credit hours of foreign language.\(^1\)
- Minimum Elementary I and II of the same language

\(^1\) All students with prior foreign language experience should take the foreign language placement test to determine the appropriate level at which to start. Some students may begin their university foreign language experience beyond the Elementary I level and will complete the requirement with fewer credit hours and fewer courses. This may be accomplished by: (1) passing a course beyond the Elementary I through Intermediate II level or (2) receiving credit through Credit by Exam (CBE), the College Level Examination Program (CLEP), the Advanced Placement (AP) exam or credit through the International Baccalaureate (IB) program; or (3) being designated a "native speaker" of a non-English language (consult with the College of Arts and Sciences Advising Office for additional Information). When students complete the requirement with fewer than 8 credit hours and two courses, they will complete the remaining hours with general electives.

Graduation Requirements

Minimum Major GPA: 2.000
Minimum Overall GPA: 2.000

Roadmap

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>! BSCI 10120</td>
<td>BIOLOGICAL FOUNDATIONS (KBS) (KLAB)</td>
<td>4</td>
</tr>
<tr>
<td>! CHEM 10060</td>
<td>GENERAL CHEMISTRY I (KBS)</td>
<td>4</td>
</tr>
<tr>
<td>! CHEM 10062</td>
<td>GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)</td>
<td>1</td>
</tr>
<tr>
<td>MATH 12002</td>
<td>ANALYTIC GEOMETRY AND CALCULUS I (KMCR)</td>
<td>5</td>
</tr>
<tr>
<td>UC 10097</td>
<td>DESTINATION KENT STATE: FIRST YEAR EXPERIENCE</td>
<td>1</td>
</tr>
</tbody>
</table>

Credit Hours 15
<table>
<thead>
<tr>
<th>Semester Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 30140</td>
<td>CELL BIOLOGY 4</td>
</tr>
<tr>
<td>BTEC 10210</td>
<td>INTRODUCTION TO BIOTECHNOLOGY 3</td>
</tr>
<tr>
<td>CHEM 10061</td>
<td>GENERAL CHEMISTRY II (KBS) 4</td>
</tr>
<tr>
<td>CHEM 10063</td>
<td>GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB) 1</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Three</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 30171</td>
<td>GENERAL MICROBIOLOGY 4</td>
</tr>
<tr>
<td>CHEM 20481</td>
<td>BASIC ORGANIC CHEMISTRY I 4</td>
</tr>
<tr>
<td>PHIL 21001</td>
<td>INTRODUCTION TO ETHICS (DIVG) (KHUM) 3</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Four</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 30156</td>
<td>ELEMENTS OF GENETICS 3</td>
</tr>
<tr>
<td>CS 10051</td>
<td>INTRODUCTION TO COMPUTER SCIENCE (KMCR) 4</td>
</tr>
<tr>
<td>PHY 13001</td>
<td>GENERAL COLLEGE PHYSICS I (KBS) 4</td>
</tr>
<tr>
<td>PHY 13021</td>
<td>GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB) 1</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Five</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCI 40158</td>
<td>MOLECULAR BIOLOGY 3</td>
</tr>
<tr>
<td>BUS 10123</td>
<td>EXPLORING BUSINESS 3</td>
</tr>
<tr>
<td>MATH 30011</td>
<td>BASIC PROBABILITY AND STATISTICS 3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
<td>1</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Six</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 30284</td>
<td>INTRODUCTORY BIOLOGICAL CHEMISTRY 4</td>
</tr>
<tr>
<td>PHIL 30015</td>
<td>MEDICINE AND MORALITY 3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Summer Term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BTEC 40192 or BTEC 40196</td>
<td>INTERNSHIP IN BIOTECHNOLOGY or INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR) 2-6</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Seven</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BTEC 40191</td>
<td>SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY 1</td>
</tr>
<tr>
<td>BTEC 40210</td>
<td>CASE STUDIES IN BIOTECHNOLOGY (WIC) 3</td>
</tr>
<tr>
<td>BTEC 40220</td>
<td>BIOINFORMATICS 3</td>
</tr>
<tr>
<td>CHEM 40248</td>
<td>ADVANCED BIOLOGICAL CHEMISTRY 3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>3</td>
</tr>
<tr>
<td>Kent Core Requirement</td>
<td>3</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Eight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BTEC 40192 or BTEC 40196</td>
<td>INTERNSHIP IN BIOTECHNOLOGY or INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR) 4-6</td>
</tr>
<tr>
<td>CHEM 40251</td>
<td>ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC) 2</td>
</tr>
</tbody>
</table>

| Major Elective | 3 |
| Credit Hours | 9 |

Minimum Total Credit Hours: 120