BIOTECHNOLOGY - B.S.

College of Arts and Sciences
Department of Chemistry and Biochemistry
Department of Biological Sciences
www.kent.edu/chemistry

About This Program

Our Biotechnology program offers a thorough education on the principles and techniques of biotechnology, equipping you with the necessary skills for a diverse array of careers in academia, government and industry. With access to cutting-edge research facilities, experienced faculty and real-world opportunities, you will gain the skills and knowledge needed to make an impact in this exciting field. Read more...

Contact Information

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- Speak with an Advisor
- Chat with an Admissions Counselor

Program Delivery

- **Delivery:**
  - In person
- **Location:**
  - Kent Campus

Examples of Possible Careers and Salaries*

Secondary school teachers, except special and career/technical education

- 3.8% about as fast as the average
- 1,050,800 number of jobs
- $62,870 potential earnings

Biological technicians

- 4.9% about as fast as the average
- 87,500 number of jobs
- $46,340 potential earnings

Medical scientists, except epidemiologists

- 6.1% faster than the average
- 138,300 number of jobs
- $91,510 potential earnings

Biological scientists, all other

- 2.2% slower than the average
- 44,700 number of jobs
- $85,290 potential earnings

* Source of occupation titles and labor data comes from the U.S. Bureau of Labor Statistics' Occupational Outlook Handbook. Data comprises projected percent change in employment over the next 10 years; nation-wide employment numbers; and the yearly median wage at which half of the workers in the occupation earned more than that amount and half earned less.

Admission Requirements

The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students.

First-Year Students on the Kent Campus: First-year admission policy on the Kent Campus is selective. Admission decisions are based upon cumulative grade point average, strength of high school college preparatory curriculum and grade trends. Students not admissible to the Kent Campus may be administratively referred to one of the seven regional campuses to begin their college coursework. For more information, visit the admissions website for first-year students.

First-Year Students on the Regional Campuses: First-year admission to Kent State's campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, is open to anyone with a high school diploma or its equivalent. For more information on admissions, contact the Regional Campuses admissions offices.

International Students: All international students must provide proof of proficiency of the English language (unless they meet specific exceptions) through the submission of an English language proficiency test score or by completing English language classes at Kent State's English as a Second Language Center before entering their program. For more information, visit the admissions website for international students.

Former Students: Former Kent State students who have not attended another institution since Kent State and were not academically dismissed will complete the re-enrollment process through the Financial, Billing and Enrollment Center. Former students who attended another college or university since leaving Kent State must apply for admissions as a transfer or post-undergraduate student.

Transfer Students: Students who attended an educational institution after graduating from high school or earning their GED must apply as transfer students. For more information, visit the admissions website for transfer students.

Admission policies for undergraduate students may be found in the University Catalog's Academic Policies.

Students may be required to meet certain criteria to progress in their program. Any progression requirements will be listed on the program's Coursework tab

Program Requirements

Major Requirements

Code	Title	Credit Hours
Major Requirements (courses count in major GPA)		
BSCI 10120	BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
BSCI 30140	CELL BIOLOGY	4
BSCI 30156	ELEMENTS OF GENETICS	3
BSCI 30171	GENERAL MICROBIOLOGY	4
BSCI 40158	MOLECULAR BIOLOGY	3
BTEC 10210	INTRODUCTION TO BIOTECHNOLOGY	3

BTEC 40191	SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY	1
BTEC 40192	INTERNSHIP IN BIOTECHNOLOGY (ELR)	6-12
or BTEC 40196	INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR)	
BTEC 40210	CASE STUDIES IN BIOTECHNOLOGY (WIC) [1]	3
BTEC 40220	BIOINFORMATICS	3
BUS 10123	EXPLORING BUSINESS	3
CHEM 10060	GENERAL CHEMISTRY I (KBS)	4
CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
CHEM 20481	BASIC ORGANIC CHEMISTRY I	4
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
CHEM 40251	ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC) (min grade C) [1]	2
CHEM 40262	BIOCHEMISTRY: METABOLISM AND GENE EXPRESSION	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 30011	BASIC PROBABILITY AND STATISTICS	3
PHIL 30015	MEDICINE AND MORALITY	3
PHY 13001	GENERAL COLLEGE PHYSICS I (KBS)	4
PHY 13021	GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB)	1
Major Electives, choose from the following:		9
BSCI 30518	VERTEBRATE ANATOMY	
BSCI 40143	EUKARYOTIC CELL BIOLOGY	
BSCI 40159	MOLECULAR BIOLOGY LABORATORY (ELR) (WIC) [1]	
BSCI 40174	IMMUNOLOGY	
BSCI 40463	MEDICAL BIOTECHNOLOGY	
CHEM 30105	ANALYTICAL CHEMISTRY I	
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) [1]	
CHEM 30301	INORGANIC CHEMISTRY I	
CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	
CHEM 40109	BIOANALYTICAL CHEMISTRY	
CHEM 40365	BIOLOGICAL INORGANIC CHEMISTRY	
CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES	
PSYC 41363	BIOPSYCHOLOGY	
Any Upper-Division course (30000 or 40000 level) approved by program director		
Additional Requirements (courses do not count in major GPA)		
CS 10051	COMPUTER SCIENCE PRINCIPLES (KMCR)	4
PHIL 21001	INTRODUCTION TO ETHICS (DIVG) (KHUM)	3
UC 10001	FLASHES 101	1
Foreign Language (see Foreign Language College Requirement below)		8
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		6
Kent Core Social Sciences (must be from two disciplines)		6
General Elective (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		1
Minimum Total Credit Hours:		**120**

[1] A minimum C grade must be earned to fulfill the writing-intensive requirement.

Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.000	2.000

Foreign Language College Requirement, B.S.

- Students pursuing the Bachelor of Science degree in the College of Arts and Sciences must complete 8 credit hours of foreign language.[1]
- The following programs are exempt from this requirement: The Bachelor of Science in Cybercriminology and the Bachelor of Science in Medical Laboratory Science.[2]
- 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 start beyond the Elementary I level and will complete the requirement with fewer credit hours and courses. This may be accomplished by (1) passing a course beyond Elementary I through Intermediate II level; (2) receiving credit through one of the alternative credit programs offered by Kent State University; or (3) demonstrating language proficiency comparable to Elementary II of a foreign language. When students complete the requirement with fewer than 8 credit hours and two courses, they will complete remaining credit hours with general electives.

[2] The Bachelor of Science in Medical Laboratory Science exemption exists under another college policy (Three-Plus-One Programs). The Bachelor of Science in Cybercriminology exemption is due to its extensive collaboration with and contribution from the Information Technology program in the College of Applied and Technical Studies, which does not have a foreign language requirement.

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.

	Semester One		Credits
!	BSCI 10120	BIOLOGICAL FOUNDATIONS (ELR) (KBS) (KLAB)	4
!	CHEM 10060	GENERAL CHEMISTRY I (KBS)	4
!	CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10001	FLASHES 101	1
		Credit Hours	**15**
	Semester Two		
	BSCI 30140	CELL BIOLOGY	4
	BTEC 10210	INTRODUCTION TO BIOTECHNOLOGY	3
	CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
	CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
	Kent Core Requirement		3
		Credit Hours	**15**

Semester Three		
BSCI 30171	GENERAL MICROBIOLOGY	4
CHEM 20481	BASIC ORGANIC CHEMISTRY I	4
PHIL 21001	INTRODUCTION TO ETHICS (DIVG) (KHUM)	3
Foreign Language		4
	Credit Hours	**15**
Semester Four		
BSCI 30156	ELEMENTS OF GENETICS	3
CS 10051	COMPUTER SCIENCE PRINCIPLES (KMCR)	4
PHY 13001	GENERAL COLLEGE PHYSICS I (KBS)	4
PHY 13021	GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB)	1
Foreign Language		4
	Credit Hours	**16**
Semester Five		
BUS 10123	EXPLORING BUSINESS	3
MATH 30011	BASIC PROBABILITY AND STATISTICS	3
PHIL 30015	MEDICINE AND MORALITY	3
Kent Core Requirement		3
Kent Core Requirement		3
General Elective		1
	Credit Hours	**16**
Semester Six		
BSCI 40158	MOLECULAR BIOLOGY	3
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
Major Elective		3
Kent Core Requirement		3
Kent Core Requirement		3
	Credit Hours	**16**
Third Summer Term		
BTEC 40192 or BTEC 40196	INTERNSHIP IN BIOTECHNOLOGY (ELR) or INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR)	2-6
	Credit Hours	**2**
Semester Seven		
BTEC 40191	SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY	1
BTEC 40210	CASE STUDIES IN BIOTECHNOLOGY (WIC)	3
BTEC 40220	BIOINFORMATICS	3
Major Elective		3
Kent Core Requirement		3
	Credit Hours	**13**
Semester Eight		
BTEC 40192 or BTEC 40196	INTERNSHIP IN BIOTECHNOLOGY (ELR) or INDIVIDUAL INVESTIGATION IN BIOTECHNOLOGY (ELR)	4-6
CHEM 40251	ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC)	2
CHEM 40262	BIOCHEMISTRY: METABOLISM AND GENE EXPRESSION	3
Major Elective		3
	Credit Hours	**12**
	Minimum Total Credit Hours:	**120**

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.

Flashes 101 (UC 10001)	1 credit hour
Course is not required for students with 30+ transfer credits (excluding College Credit Plus) or age 21+ at time of admission.	
Diversity Domestic/Global (DIVD/DIVG)	2 courses
Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.	
Experiential Learning Requirement (ELR)	varies
Students must successfully complete one course or approved experience.	
Kent Core (see table below)	36-37 credit hours
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 credit hours
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate.	
Total Credit Hour Requirement	120 credit hours

Kent Core Requirements

Kent Core Composition (KCMP)	6
Kent Core Mathematics and Critical Reasoning (KMCR)	3
Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)	9
Kent Core Social Sciences (KSS) (must be from two disciplines)	6
Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)	6-7
Kent Core Additional (KADL)	6
Total Credit Hours:	**36-37**

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.

Program Policies

Foreign Language Requirements

In general, students may elect any foreign language taught through the Department of Modern and Classical Language Studies. However, certain majors, concentrations and minors require specific languages or limit the languages from which students may choose. In addition, students who plan to pursue graduate study may need particular languages for that

study. In such cases, students should seek the advice of the appropriate department before selecting a language.

Progress Toward Fulfillment

College of Arts and Sciences students are encouraged to begin meeting the foreign language requirement as early as possible in their program to ensure timely degree completion.

Mandatory Outcomes Assessment

In addition to the other General Requirements of the college, candidates for an undergraduate degree in the College of Arts and Sciences are required, as a condition of graduation, to participate in an outcomes assessment. These outcomes assessments are conducted by each undergraduate degree program in the College of Arts and Sciences.

Full Description

The Bachelor of Science degree 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.