

# CHEMISTRY - B.S.

## College of Arts and Sciences

Department of Chemistry and Biochemistry

[www.kent.edu/chemistry](http://www.kent.edu/chemistry)

## Contact Information

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- Speak with an Advisor
- Chat with an Admissions Counselor

## Fully Offered

- Kent Campus

## Examples of Possible Careers\*

### Chemical technicians

- 2.8% slower than the average
- 68,100 number of jobs
- \$49,820 potential earnings

### Chemistry teachers, postsecondary

- 4.3% about as fast as the average
- 26,400 number of jobs
- \$80,400 potential earnings

### Chemists

- 4.7% about as fast as the average
- 86,700 number of jobs
- \$79,300 potential earnings

### Food scientists and technologists

- 4.4% about as fast as the average
- 14,200 number of jobs
- \$73,450 potential earnings

### Forensic science technicians

- 14.1% much faster than the average
- 17,200 number of jobs
- \$60,590 potential earnings

### Natural sciences managers

- 4.8% about as fast as the average
- 71,400 number of jobs
- \$137,940 potential earnings

### 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

#### \*Note

Source of occupation titles and labor data is 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.

## Description

The Bachelor of Science degree in Chemistry is designed to provide a thorough foundation in the various fields of chemistry and the related sciences. The program is for students planning careers in the chemical industries or governmental laboratories, or who intend to do graduate work in chemistry. Students in the program have the opportunity to participate in an exchange program with the University of Leicester in England.

Chemistry students in specific concentrations may apply early to the M.S. degree and double count 9 credit hours of graduate courses toward both degree programs. See the Combined Bachelor's/Master's Degree Program policy in the University Catalog for more information.

The Chemistry major comprises the following concentrations:

- The **Biochemistry** concentration provides strong preparation for students interested in pursuing graduate studies in biochemistry or planning a career as a practicing biochemist in industrial research and development, government research laboratories or in academia. It also provides ideal preparation for students intending to pursue a Doctor of Pharmacy degree, having been designed to closely fit the requirements for admission to the Northeastern Ohio Medical University (NEOMED). With careful planning students may transfer to NEOMED after three years at Kent State, using 16 credit hours of courses from NEOMED to complete their Kent State degree requirements. With the selection of appropriate elective courses, this concentration meets the minimum requirements for certification by the American Chemical Society.
- The **Biochemistry–Pre-Medicine/Pre-Osteopathy/Pre-Dentistry** concentration is the recommended track for students intending to go on to medical or dental school.
- The **Chemistry** concentration is designed for students interested in careers as practicing chemists in industrial research and development, in government research laboratories or in academia. It includes a strong foundation in both chemistry and related disciplines (physics and mathematics) and provides opportunities to pursue advanced chemistry electives. This concentration meets the requirements for certification by the American Chemical Society and is ideal for students who plan to pursue graduate studies in chemistry.
- The **Industrial Chemistry** concentration provides solid background training in the major areas of chemistry, as well as practical training and related experiences in fields sought by local and regional chemical industries.
- The **Materials Chemistry** concentration is recommended for students interested in pursuing graduate study or industrial careers in materials science, including nanotechnology. Its requirements, similar to those of the traditional chemistry concentration, provide an opportunity for more in-depth study in the synthesis and characterization of inorganic and organic materials, including polymers.

## Accreditation

The B.S. degree in Chemistry is accredited by the American Chemical Society (ACS).

## 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 first-year students.

**Freshman Students on the Regional Campuses:** Kent State campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, 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, minimum 48 PTE score or minimum 100 DET 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 chemical knowledge to their profession
2. Develop their abilities to plan and execute chemical experiments
3. Prepare and deliver written and oral scientific reports

## 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.

Destination Kent State: First Year Experience	1
Course is not required for students with 25 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
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 (or 42)
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate. Students in a B.A. and/or B.S. degree in the College of Arts and Sciences must complete 42 upper-division credit hours.	
Total Credit Hour Requirement	120
Some bachelor's degrees require students to complete more than 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
<b>Total Credit Hours:</b>	<b>36-37</b>

## Program Requirements

### Major Requirements

Code	Title	Credit Hours
<b>Major Requirements (courses count in major GPA)</b>		
CHEM 10060	GENERAL CHEMISTRY I (KBS)	4-6
or CHEM 10970	HONORS GENERAL CHEMISTRY I (KBS)	
or CHEM 11060	GENERAL CHEMISTRY I BOOST (KBS)	
CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
or CHEM 10971	HONORS GENERAL CHEMISTRY II (KBS)	
CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
CHEM 30105	ANALYTICAL CHEMISTRY I	3
CHEM 30301	INORGANIC CHEMISTRY I	2
CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
CHEM 30481	ORGANIC CHEMISTRY I	3
CHEM 30482	ORGANIC CHEMISTRY II	3
<b>Additional Requirements (courses do not count in major GPA)</b>		
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	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)		9
General Electives (total credit hours depends on earning 120 credit hours, including 42 upper-division credit hours) <sup>2</sup>		6
<b>Concentrations</b>		
Choose from the following:		67

Biochemistry
Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry
Chemistry
Industrial Chemistry
Materials Chemistry

Minimum Total Credit Hours: 120

<sup>1</sup> PHIL 21001 is recommended for students in the Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry concentration.

<sup>2</sup> The following are recommended for students in the Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry concentration: COMM 15000, ECON 22060, ECON 42086, PSYC 40111, PSYC 41363, SOC 42563.

## Biochemistry Concentration Requirements

Code	Title	Credit Hours
<b>Concentration Requirements (courses count in major GPA)</b>		
BSCI 10120	BIOLOGICAL FOUNDATIONS (KBS) (KLAB)	4
BSCI 30140	CELL BIOLOGY	4
BSCI 30156	ELEMENTS OF GENETICS	3
BSCI 30171	GENERAL MICROBIOLOGY	4
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) <sup>1</sup>	1
CHEM 40251	ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC)	2
CHEM 40261	PRINCIPLES OF BIOCHEMISTRY I	3
CHEM 40262	PRINCIPLES OF BIOCHEMISTRY II	3
CHEM 40263	PHYSICAL BIOCHEMISTRY	3
CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES	4
CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
MATH 12021	CALCULUS FOR LIFE SCIENCES <sup>2</sup>	4
MATH 12022	PROBABILITY AND STATISTICS FOR LIFE SCIENCES <sup>2</sup>	3
PHY 13001	GENERAL COLLEGE PHYSICS I (KBS) <sup>3</sup>	4
PHY 13002	GENERAL COLLEGE PHYSICS II (KBS) <sup>3</sup>	4
PHY 13021	GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB) <sup>3</sup>	1
PHY 13022	GENERAL COLLEGE PHYSICS LABORATORY II (KBS) (KLAB) <sup>3</sup>	1
Concentration Electives (below are recommendations) 9		
<i>Strongly suggested electives</i>		
BSCI 40174	IMMUNOLOGY	
BSCI 40220	BIOINFORMATICS	
BSCI 40430	ANIMAL PHYSIOLOGY	
or BSCI 40460	ADVANCED HUMAN PHYSIOLOGY	
BSCI 40462	ADVANCED HUMAN PHYSIOLOGY: READINGS AND CASE STUDIES	
BTEC 40191	SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY	
CHEM 40109	BIOANALYTICAL CHEMISTRY	
CHEM 40113	CHEMICAL SEPARATIONS	
CHEM 40295	SPECIAL TOPICS IN BIOCHEMISTRY	
CHEM 40365	BIOLOGICAL INORGANIC CHEMISTRY	
CHEM 40796	INDIVIDUAL INVESTIGATION <sup>4</sup>	
<i>Other suggested electives</i>		
CHEM 30106	ANALYTICAL CHEMISTRY II	

CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC)	
CHEM 40110	ANALYTICAL MASS SPECTROMETRY	
CHEM 40116	SPECTROCHEMICAL METHODS OF ANALYSIS	
CHEM 40195	SPECIAL TOPICS IN ANALYTICAL CHEMISTRY	
CHEM 40302	INORGANIC CHEMISTRY II	
CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	
CHEM 40395	SPECIAL TOPICS IN INORGANIC CHEMISTRY	
CHEM 40451	ORGANIC MATERIALS CHEMISTRY	
CHEM 40476	SPECTROSCOPIC IDENTIFICATION OF ORGANIC COMPOUNDS	
CHEM 40477	INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	
CHEM 40478	SYNTHESIS OF ORGANIC LIQUID CRYSTALS	
CHEM 40483	INTERMEDIATE ORGANIC CHEMISTRY	
CHEM 40495	SPECIAL TOPICS IN ORGANIC CHEMISTRY	
CHEM 40559	NANOMATERIALS	
CHEM 40571	SURFACE CHEMISTRY	
CHEM 40595	SPECIAL TOPICS IN PHYSICAL CHEMISTRY	

<b>Additional Requirements (courses do not count in major GPA)</b>	
Kent Core Mathematics and Critical Reasoning	3
Kent Core Social Sciences (must be from two disciplines)	6
Minimum Total Credit Hours:	67

<sup>1</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.

<sup>2</sup> MATH 12002 and MATH 12003 may be substituted as a package in place of MATH 12021 and MATH 12022.

<sup>3</sup> PHY 23101 and PHY 23102 may be substituted as a package, in place of PHY 13001, PHY 13002, PHY 13021, PHY 13022.

<sup>4</sup> Maximum 4 credit hours of CHEM 40796 may be counted towards the concentration electives.

## Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry Concentration Requirements

Code	Title	Credit Hours
<b>Concentration Requirements (courses count in major GPA)</b>		
BSCI 10120	BIOLOGICAL FOUNDATIONS (KBS) (KLAB)	4
BSCI 30140	CELL BIOLOGY	4
BSCI 30156	ELEMENTS OF GENETICS	3
BSCI 30171	GENERAL MICROBIOLOGY	4
BSCI 40430	ANIMAL PHYSIOLOGY	3
or BSCI 40460	ADVANCED HUMAN PHYSIOLOGY	
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) <sup>1</sup>	1
CHEM 40251	ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC) <sup>1</sup>	2
CHEM 40261	PRINCIPLES OF BIOCHEMISTRY I	3
CHEM 40262	PRINCIPLES OF BIOCHEMISTRY II	3
CHEM 40263	PHYSICAL BIOCHEMISTRY	3
CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES	4
CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
MATH 12021	CALCULUS FOR LIFE SCIENCES <sup>2</sup>	4
MATH 12022	PROBABILITY AND STATISTICS FOR LIFE SCIENCES <sup>2</sup>	3
PHY 13001	GENERAL COLLEGE PHYSICS I (KBS) <sup>3</sup>	4
PHY 13002	GENERAL COLLEGE PHYSICS II (KBS) <sup>3</sup>	4

PHY 13021	GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB) <sup>3</sup>	1
PHY 13022	GENERAL COLLEGE PHYSICS LABORATORY II (KBS) (KLAB) <sup>3</sup>	1
Concentration Electives, choose from the following:		6
BSCI 30517	HUMAN ANATOMY	
or BSCI 30518	VERTEBRATE ANATOMY	
BSCI 40174	IMMUNOLOGY	
BSCI 40220	BIOINFORMATICS	
BTEC 40191	SEMINAR: RECENT DEVELOPMENTS IN BIOTECHNOLOGY	
CHEM 30106	ANALYTICAL CHEMISTRY II	
CHEM 40109	BIOANALYTICAL CHEMISTRY	
CHEM 40302	INORGANIC CHEMISTRY II	
CHEM 40365	BIOLOGICAL INORGANIC CHEMISTRY	
CHEM 40477	INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	
CHEM 40483	INTERMEDIATE ORGANIC CHEMISTRY	
CHEM 40796	INDIVIDUAL INVESTIGATION <sup>4</sup>	
<b>Additional Requirements (courses do not count in major GPA)</b>		
Kent Core Mathematics and Critical Reasoning		3
PSYC 11762	GENERAL PSYCHOLOGY (DIVD) (KSS)	3
SOC 12050	INTRODUCTION TO SOCIOLOGY (DIVD) (KSS)	3
Minimum Total Credit Hours:		67

<sup>1</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.

<sup>2</sup> MATH 12002, MATH 12003 and MATH 30011 may be substituted as a package in place of MATH 12021 and MATH 12022.

<sup>3</sup> PHY 23101 and PHY 23102 may be substituted as a package, instead of PHY 13001, PHY 13002, PHY 13021, PHY 13022.

<sup>4</sup> Maximum 3 credit hours of CHEM 40796 may be counted towards the concentration electives.

## Chemistry Concentration Requirements

Code	Title	Credit Hours
<b>Concentration Requirements (courses count in major GPA)</b>		
CHEM 30106	ANALYTICAL CHEMISTRY II	2
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) <sup>1</sup>	1
CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC) <sup>1</sup>	2
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
CHEM 40302	INORGANIC CHEMISTRY II	2
CHEM 40303	INORGANIC CHEMISTRY III	2
CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
CHEM 40477	INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	1
CHEM 40483	INTERMEDIATE ORGANIC CHEMISTRY	1
CHEM 40555	PHYSICAL CHEMISTRY I	3
CHEM 40556	PHYSICAL CHEMISTRY II	3
CHEM 40557	PHYSICAL CHEMISTRY LABORATORY	2
CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5

MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	4
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Advisor-Approved Chemistry Upper-Division Elective (CHEM 40000 level)		3
<b>Additional Requirements (courses do not count in major GPA)</b>		
Kent Core Social Sciences (must be from two disciplines)		6
General Electives		9
Minimum Total Credit Hours:		67

<sup>1</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.

## Industrial Chemistry Concentration Requirements

Code	Title	Credit Hours
<b>Concentration Requirements (courses count in major GPA)</b>		
CHEM 20050	CAREER PATHWAYS IN CHEMISTRY	1
CHEM 30106	ANALYTICAL CHEMISTRY II	2
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) <sup>1</sup>	1
CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC) <sup>1</sup>	2
CHEM 40302	INORGANIC CHEMISTRY II	2
CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES <sup>2</sup>	4
CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
MATH 12022	PROBABILITY AND STATISTICS FOR LIFE SCIENCES	3-4
or MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	
PHY 22564	INTRODUCTION TO MATERIALS PHYSICS	3
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Chemistry Elective, choose from the following:		3
CHEM 40352	INORGANIC MATERIALS CHEMISTRY	
CHEM 40451	ORGANIC MATERIALS CHEMISTRY	
CHEM 40559	NANOMATERIALS	
CHEM 40571	SURFACE CHEMISTRY	
Concentration Electives, choose from the following:		12
ACCT 23020	INTRODUCTION TO FINANCIAL ACCOUNTING	
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	
CHEM 40092	INTERNSHIP IN CHEMISTRY AND BIOCHEMISTRY (ELR) <sup>3</sup>	
or CHEM 40796	INDIVIDUAL INVESTIGATION	
CHEM 40113	CHEMICAL SEPARATIONS	
CHEM 40352	INORGANIC MATERIALS CHEMISTRY	
CHEM 40451	ORGANIC MATERIALS CHEMISTRY	
CHEM 40557	PHYSICAL CHEMISTRY LABORATORY	
CHEM 40559	NANOMATERIALS	
CHEM 40571	SURFACE CHEMISTRY	
ENGR 43080	INDUSTRIAL AND ENVIRONMENTAL SAFETY	

PLST 48401 PATENT LAW

<b>Additional Requirements (courses do not count in major GPA)</b>	
Kent Core Social Sciences (must be from two disciplines)	3
General Electives	6
Minimum Total Credit Hours:	67

- <sup>1</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.
- <sup>2</sup> Taking both CHEM 40555 and CHEM 40556 may be substituted in place of CHEM 40567 and 2 credit hours of concentration electives.
- <sup>3</sup> CHEM 40092 is strongly encouraged.

## Materials Chemistry Concentration Requirements

Code	Title	Credit Hours
<b>Concentration Requirements (courses count in major GPA)</b>		
CHEM 30050	INTRODUCTION TO MATERIALS CHEMISTRY	2
CHEM 30106	ANALYTICAL CHEMISTRY II	2
CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
CHEM 40053	MATERIALS CHEMISTRY LABORATORY	2
CHEM 40302	INORGANIC CHEMISTRY II	2
CHEM 40303	INORGANIC CHEMISTRY III	2
CHEM 40352	INORGANIC MATERIALS CHEMISTRY	3
CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
CHEM 40451	ORGANIC MATERIALS CHEMISTRY	3
CHEM 40555	PHYSICAL CHEMISTRY I	3
CHEM 40556	PHYSICAL CHEMISTRY II	3
CHEM 40557	PHYSICAL CHEMISTRY LABORATORY	2
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	4
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Concentration Electives, choose from the following:		1-2
CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC) <sup>1</sup>	
CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC) <sup>1</sup>	
CHEM 40477	INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	
CHEM 40483	INTERMEDIATE ORGANIC CHEMISTRY	
CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	
CHEM 40571	SURFACE CHEMISTRY	
CHEM 40796	INDIVIDUAL INVESTIGATION	
<b>Additional Requirements (courses do not count in major GPA)</b>		
Kent Core Social Sciences (must be from two disciplines)		6
General Electives		7
Minimum Total Credit Hours:		67

- <sup>1</sup> A minimum C grade must be earned in 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.<sup>1</sup>
- Minimum Elementary I and II of the same language

- <sup>1</sup> 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 fewer 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.

## Roadmaps

- Biochemistry Concentration
- Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry Concentration
- Chemistry Concentration
- Industrial Chemistry Concentration
- Materials Chemistry Concentration

### Biochemistry Concentration

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
!	CHEM 10060 GENERAL CHEMISTRY I (KBS) or CHEM 10970 or HONORS GENERAL CHEMISTRY I (KBS) or CHEM 11060 or GENERAL CHEMISTRY I BOOST (KBS)	4-6
!	BSCI 10120 BIOLOGICAL FOUNDATIONS (KBS) (KLAB)	4
!	CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12021 CALCULUS FOR LIFE SCIENCES	4
	UC 10097 DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement	3
	Credit Hours	17
Semester Two		
!	CHEM 10061 GENERAL CHEMISTRY II (KBS) or CHEM 10971 or HONORS GENERAL CHEMISTRY II (KBS)	4
!	CHEM 10063 GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12022 PROBABILITY AND STATISTICS FOR LIFE SCIENCES	3
	Foreign Language	4
	Kent Core Requirement	3
	Credit Hours	15
Semester Three		
!	BSCI 30156 ELEMENTS OF GENETICS	3
!	CHEM 30475 ORGANIC CHEMISTRY LABORATORY I (ELR)	1
!	CHEM 30481 ORGANIC CHEMISTRY I	3
!	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 Four		
!	BSCI 30140 CELL BIOLOGY	4
!	CHEM 30301 INORGANIC CHEMISTRY I	2
!	CHEM 30476 ORGANIC CHEMISTRY LABORATORY II	1
!	CHEM 30482 ORGANIC CHEMISTRY II	3
!	PHY 13002 GENERAL COLLEGE PHYSICS II (KBS)	4
!	PHY 13022 GENERAL COLLEGE PHYSICS LABORATORY II (KBS) (KLAB)	1
	Credit Hours	15

Semester Five		
!	CHEM 30105 ANALYTICAL CHEMISTRY I	3
!	CHEM 30107 ANALYTICAL CHEMISTRY LABORATORY I (WIC)	1
!	CHEM 40261 PRINCIPLES OF BIOCHEMISTRY I	3
!	CHEM 40567 PHYSICAL CHEMISTRY FOR LIFE SCIENCES	4
	Kent Core Requirement	3
	Credit Hours	14

Semester Six		
!	BSCI 30171 GENERAL MICROBIOLOGY	4
!	CHEM 40568 ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
!	CHEM 40262 PRINCIPLES OF BIOCHEMISTRY II	3
	Kent Core Requirement	3
	Kent Core Requirement	3
	Credit Hours	14

Semester Seven		
	Concentration Electives	6
	Kent Core Requirement	3
	Kent Core Requirement	3
	Kent Core Requirement	3
	Credit Hours	15

Semester Eight		
!	CHEM 40251 ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC)	2
!	CHEM 40263 PHYSICAL BIOCHEMISTRY	3
	Concentration Elective	3
	General Electives	6
	Credit Hours	14
	Minimum Total Credit Hours:	120

### Biochemistry - Pre-Medicine/Pre-Osteopathy/Pre-Dentistry Concentration

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
!	CHEM 10060 GENERAL CHEMISTRY I (KBS) or CHEM 10970 or HONORS GENERAL CHEMISTRY I (KBS) or CHEM 11060 or GENERAL CHEMISTRY I BOOST (KBS)	4-6
!	BSCI 10120 BIOLOGICAL FOUNDATIONS (KBS) (KLAB)	4
!	CHEM 10062 GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12021 CALCULUS FOR LIFE SCIENCES	4
	PSYC 11762 GENERAL PSYCHOLOGY (DIVD) (KSS)	3
	UC 10097 DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Credit Hours	17

Semester Two		
!	CHEM 10061 GENERAL CHEMISTRY II (KBS) or CHEM 10971 or HONORS GENERAL CHEMISTRY II (KBS)	4
!	CHEM 10063 GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
	SOC 12050 INTRODUCTION TO SOCIOLOGY (DIVD) (KSS)	3
!	MATH 12022 PROBABILITY AND STATISTICS FOR LIFE SCIENCES	3

Foreign Language		4
Credit Hours		15
<b>Semester Three</b>		
! BSCI 30156	ELEMENTS OF GENETICS	3
! CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
! CHEM 30481	ORGANIC CHEMISTRY I	3
! PHY 13001	GENERAL COLLEGE PHYSICS I (KBS)	4
! PHY 13021	GENERAL COLLEGE PHYSICS LABORATORY I (KBS) (KLAB)	1
Foreign Language		4
Credit Hours		16
<b>Semester Four</b>		
! BSCI 30140	CELL BIOLOGY	4
! CHEM 30301	INORGANIC CHEMISTRY I	2
! CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
! CHEM 30482	ORGANIC CHEMISTRY II	3
! PHY 13002	GENERAL COLLEGE PHYSICS II (KBS)	4
! PHY 13022	GENERAL COLLEGE PHYSICS LABORATORY II (KBS) (KLAB)	1
Credit Hours		15
<b>Semester Five</b>		
! BSCI 30171	GENERAL MICROBIOLOGY	4
! CHEM 40261	PRINCIPLES OF BIOCHEMISTRY I	3
! CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES	4
Kent Core Requirement		3
Credit Hours		14
<b>Semester Six</b>		
! BSCI 40430	ANIMAL PHYSIOLOGY or or ADVANCED HUMAN PHYSIOLOGY BSCI 40460	3
! CHEM 40262	PRINCIPLES OF BIOCHEMISTRY II	3
! CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours		13
<b>Semester Seven</b>		
! CHEM 30105	ANALYTICAL CHEMISTRY I	3
! CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC)	1
Concentration Electives		3
Kent Core Requirement		3
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours		16
<b>Semester Eight</b>		
! CHEM 40251	ADVANCED BIOLOGICAL CHEMISTRY LABORATORY (WIC)	2
! CHEM 40263	PHYSICAL BIOCHEMISTRY	3
Concentration Electives		3
General Electives		6
Credit Hours		14
Minimum Total Credit Hours:		120

## Chemistry Concentration

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.

<b>Semester One</b>		<b>Credits</b>
! CHEM 10060	GENERAL CHEMISTRY I (KBS)	4-6
or	or HONORS GENERAL CHEMISTRY I (KBS)	
CHEM 10970	or GENERAL CHEMISTRY I BOOST (KBS)	
or		
CHEM 11060		
! CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
! MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
Kent Core Requirement		3
Credit Hours		14
<b>Semester Two</b>		
! CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
or	or HONORS GENERAL CHEMISTRY II (KBS)	
CHEM 10971		
! CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
! MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours		16
<b>Semester Three</b>		
! CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
! CHEM 30481	ORGANIC CHEMISTRY I	3
! MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	4
! PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
Kent Core Requirement		3
Credit Hours		16
<b>Semester Four</b>		
! CHEM 30301	INORGANIC CHEMISTRY I	2
! CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
! CHEM 30482	ORGANIC CHEMISTRY II	3
! PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
Kent Core Requirement		3
Credit Hours		14
<b>Semester Five</b>		
! CHEM 30105	ANALYTICAL CHEMISTRY I	3
! CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC)	1
! CHEM 40477	INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	1
! CHEM 40483	INTERMEDIATE ORGANIC CHEMISTRY	1
! CHEM 40555	PHYSICAL CHEMISTRY I	3
Foreign Language		4
Kent Core Requirement		3
Credit Hours		16
<b>Semester Six</b>		
! CHEM 30106	ANALYTICAL CHEMISTRY II	2
! CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC)	2
! CHEM 40556	PHYSICAL CHEMISTRY II	3
! CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
Foreign Language		4
Kent Core Requirement		3
Credit Hours		15
<b>Semester Seven</b>		
! CHEM 40302	INORGANIC CHEMISTRY II	2

!	CHEM 40557	PHYSICAL CHEMISTRY LABORATORY	2
	Chemistry Upper-Division Elective (CHEM 40000 level)		3
	General Electives		6
	Credit Hours		13
<b>Semester Eight</b>			
!	CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
!	CHEM 40303	INORGANIC CHEMISTRY III	2
!	CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
	General Electives		9
	Credit Hours		16
	Minimum Total Credit Hours:		120

## Industrial Chemistry Concentration

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.

			Credits
<b>Semester One</b>			
!	CHEM 10060	GENERAL CHEMISTRY I (KBS)	4-6
	or	or HONORS GENERAL CHEMISTRY I (KBS)	
	CHEM 10970	or GENERAL CHEMISTRY I BOOST (KBS)	
	or	CHEM 11060	
!	CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	Credit Hours		14
<b>Semester Two</b>			
!	CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
	or	or HONORS GENERAL CHEMISTRY II (KBS)	
	CHEM 10971		
!	CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
	Kent Core Requirement		3
	Kent Core Requirement		3
	Credit Hours		16
<b>Semester Three</b>			
!	CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
!	CHEM 30481	ORGANIC CHEMISTRY I	3
!	MATH 12022	PROBABILITY AND STATISTICS FOR LIFE SCIENCES	3
	or	MATH 22005 or ANALYTIC GEOMETRY AND CALCULUS III	
!	PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
	Kent Core Requirement		3
	Credit Hours		15
<b>Semester Four</b>			
!	CHEM 20050	CAREER PATHWAYS IN CHEMISTRY	1
!	CHEM 30301	INORGANIC CHEMISTRY I	2
!	CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
!	CHEM 30482	ORGANIC CHEMISTRY II	3
!	PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
	ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
	Credit Hours		15
<b>Semester Five</b>			
!	CHEM 30105	ANALYTICAL CHEMISTRY I	3

!	CHEM 30107	ANALYTICAL CHEMISTRY LABORATORY I (WIC)	1
!	CHEM 40302	INORGANIC CHEMISTRY II	2
!	CHEM 40567	PHYSICAL CHEMISTRY FOR LIFE SCIENCES	4
	Foreign Language		4
	Credit Hours		14
<b>Semester Six</b>			
!	CHEM 30106	ANALYTICAL CHEMISTRY II	2
!	CHEM 30108	ANALYTICAL CHEMISTRY LABORATORY II (WIC)	2
!	CHEM 40568	ELEMENTARY PHYSICAL CHEMISTRY LABORATORY	1
!	PHY 22564	INTRODUCTION TO MATERIALS PHYSICS	3
	Concentration Elective		3
	Foreign Language		4
	Credit Hours		15
<b>Semester Seven</b>			
	Chemistry Elective		3
	Concentration Electives		6
	Kent Core Requirement		3
	Kent Core Requirement		3
	Credit Hours		15
<b>Semester Eight</b>			
!	CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
	Concentration Elective		3
	General Electives		12
	Credit Hours		16
	Minimum Total Credit Hours:		120

## Materials Chemistry Concentration

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.

			Credits
<b>Semester One</b>			
!	CHEM 10060	GENERAL CHEMISTRY I (KBS)	4-6
	or	or HONORS GENERAL CHEMISTRY I (KBS)	
	CHEM 10970	or GENERAL CHEMISTRY I BOOST (KBS)	
	or	CHEM 11060	
!	CHEM 10062	GENERAL CHEMISTRY I LABORATORY (KBS) (KLAB)	1
!	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	Credit Hours		14
<b>Semester Two</b>			
!	CHEM 10061	GENERAL CHEMISTRY II (KBS)	4
	or	or HONORS GENERAL CHEMISTRY II (KBS)	
	CHEM 10971		
!	CHEM 10063	GENERAL CHEMISTRY II LABORATORY (KBS) (KLAB)	1
!	MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
	Kent Core Requirement		3
	Kent Core Requirement		3
	Credit Hours		16
<b>Semester Three</b>			
!	CHEM 30475	ORGANIC CHEMISTRY LABORATORY I (ELR)	1
!	CHEM 30481	ORGANIC CHEMISTRY I	3



!	MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	4
!	PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
	Kent Core Requirement		3
	Credit Hours		16
	<b>Semester Four</b>		
!	CHEM 30050	INTRODUCTION TO MATERIALS CHEMISTRY	2
!	CHEM 30301	INORGANIC CHEMISTRY I	2
!	CHEM 30476	ORGANIC CHEMISTRY LABORATORY II	1
!	CHEM 30482	ORGANIC CHEMISTRY II	3
!	PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
	Kent Core Requirement		3
	Credit Hours		16
	<b>Semester Five</b>		
!	CHEM 30105	ANALYTICAL CHEMISTRY I	3
!	CHEM 40302	INORGANIC CHEMISTRY II	2
!	CHEM 40451	ORGANIC MATERIALS CHEMISTRY	3
!	CHEM 40555	PHYSICAL CHEMISTRY I	3
	Foreign Language		4
	Credit Hours		15
	<b>Semester Six</b>		
!	CHEM 40303	INORGANIC CHEMISTRY III	2
!	CHEM 40352	INORGANIC MATERIALS CHEMISTRY	3
!	CHEM 40364	INTERMEDIATE INORGANIC CHEMISTRY LAB	1
!	CHEM 40556	PHYSICAL CHEMISTRY II	3
	Foreign Language		4
	Kent Core Requirement		3
	Credit Hours		16
	<b>Semester Seven</b>		
!	CHEM 40557	PHYSICAL CHEMISTRY LABORATORY	2
	Kent Core Requirement		3
	Chemistry Electives		1-2
	General Electives		7
	Credit Hours		13
	<b>Semester Eight</b>		
!	CHEM 30106	ANALYTICAL CHEMISTRY II	2
!	CHEM 30284	INTRODUCTORY BIOLOGICAL CHEMISTRY	4
!	CHEM 40053	MATERIALS CHEMISTRY LABORATORY	2
	General Electives		6
	Credit Hours		14
	Minimum Total Credit Hours:		120