MISSION, PHILOSOPHY AND GOALS

The Department of Chemistry and Chemical Technology supports and endorses the mission, philosophy and goals of the founding institution:

“To Educate the People, the Whole People.”

The Department of Chemistry and Chemical Technology is an integral part of Bronx Community College and the City University of New York. Therefore, the Department has the responsibility to provide courses in chemistry for students in the various programs and curricula. These courses meet the requirements for the first two years of a four-year college program. They include first and second year courses for chemistry and other science majors, for health science majors, and courses for non-science majors.

Students in Science, Technology and Health care fields who need to take a course in Chemistry, must take either General College Chemistry I (CHM 11) or Fundamentals of General Chemistry I (CHM 17). A prerequisite for these courses is a Chemistry Placement Test, consisting of 40 multiple choice questions, based on a broad range of topics from High School or other basic Chemistry courses. The test helps the BCC Chemistry Department faculty place students into the right Chemistry classes.

The specific goals of the Department of Chemistry and Chemical Technology are:

• Develop transfer and career programs to respond to education and employment needs of the community that we serve.

• Develop and maintain modern and competitive chemistry courses to serve the science and non-science students of the college.

• Maintain a high level of instructional excellence through an experienced and dedicated technical staff.

In addition to the traditional basic and advanced college chemistry courses, the Department of Chemistry offers career-oriented programs in Environmental Technology, Earth Systems and Environmental Science, Pharmaceutical Manufacturing Technology and, most recently, Forensic Science.

Professor and Chairperson: Dr. Neal Phillip
Professors: T. Brennan, V. Flaris, K. Ismail, E. Passer, M. Pulver, H. Stein
Associate Professor: S. Bhaskaran
Assistant Professors: A. Durante, J. Molina, M. Ponnala (sub), F. Saeedi, D. St. Hilaire, A. Socha, S. Therese
Lecturers: R. Lupo, S. Segni (sub)
College Laboratory Technicians: M. Fields, D. Kim, C. Rodriguez
Approximately 20 adjuncts per semester

COURSES
Chemistry (CHM)
Earth Systems and Environmental Science (ESE)
Environmental Technology (ENV)
Pharmaceutical Manufacturing Technology (PMT)
Science (SCI)

DEGREE PROGRAMS
Environmental Technology, A.A.S.
Liberal Arts and Sciences – Chemistry, A.S.
Liberal Arts and Science – Earth Systems and Environment Science, A.S.
Pharmaceutical Manufacturing Technology, A.A.S.
Science for Forensics, A.S.
ENVIRONMENTAL TECHNOLOGY
Associate in Applied Sciences Degree | Career Program
Department of Chemistry and Chemical Technology

This competency-based curriculum provides state-of-the-art training for careers in environmental technology. Environmental Technology utilizes the principles of science, engineering, communications and economics to protect and enhance safety, health and natural resources.

All credits from this program may be transferred to Medgar Evers College for a bachelor’s degree in Environmental Health. Students interested in transferring to the Environmental Engineering program at The City College should see Dr. Neal Phillip. The program articulates with SUNY Empire State. See the Transfer Planning website for more details.

Curriculum Coordinator: Dr. Vicki Flaris

Environmental Technology Curriculum (Pathways)
60 Credits required for A.A.S. Degree

Required Core
A. English Composition
   • ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)
B. Mathematical and Quantitative Reasoning
   • MTH 23 Probability and Statistics (3 Credits)
C. Life and Physical Sciences
   • CHM 17 Fundamentals of General Chemistry (4 Credits)

Flexible Core
A. World Cultures and Global Issues
   • HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)
D. Individual and Society
   • COMM 11 Fundamentals of Interpersonal Communication (3 Credits)

E. Scientific World
   • CHM 18 Fundamentals of General Chemistry II (4 Credits)

Additional Flexible Core Requirement - Area E.
   • BIO 11 General Biology I (4 Credits)

Total 24

Required Areas of Study
• BIO 12 General Biology II (4 Credits)
• DAT 33 Microcomputer Applications (2 Credits)
• ENG 223 Scientific and Technical Writing (3 Credits)
• MTH 13 Trigonometry and College Algebra (3 Credits)
• PHY 11 College Physics I (4 Credits)
• RESTRICTED ELECTIVE (1 Credit)

Total 17

Specialization Requirements
• ENV 11 Introduction to Environmental Health (4 Credits)
• ENV 12 Environmental and Occupational Regulations (4 Credits)
• ENV 23 Environmental Toxicology (3 Credits)
• ENV 31 Water Chemistry and Pollution (4 Credits)
• ENV 32 Atmospheric Chemistry and Pollution (4 Credits)

Total 19

1 Students intending to transfer to four-year programs in Environmental Science and Environmental Engineering should take MTH 30 and MTH 31 in lieu of MTH 13 and MTH 23.
2 Students intending to transfer to four-year programs in Environmental Science and Environmental Engineering should take CHM 11 and CHM 12 in lieu of CHM 17 and CHM 18.
3 Students can substitute CHM 38 for DAT 33.
4 Students can substitute ENG 12 for ENG 223.
5 Students can take ART 10 or MUS 10, or WFA 10 or any PEA one credit course. Students who intend to transfer should choose

ENVIRONMENTAL TECHNOLOGY (PRE-PATHWAYS)
Associate in Applied Sciences Degree | Career Program
Department of Chemistry and Chemical Technology

If you began studying at BCC in or after Fall 2013, Pathways applies. Pathways also applies to students who have returned to CUNY after an absence of more than one semester. If you are a continuing student who entered before Fall 2013, you will be able to choose whether you remain with your existing requirements or change to Pathways. You should consult with an academic advisor.

Curriculum Coordinator: Dr. Vicki Flaris

Environmental Technology Curriculum
60 Credits required for A.A.S. Degree

Core Requirements
• Restricted Elective (1 Credit)
• CHM 17 Fundamentals of General Chemistry I (4 Credits)
• CMS 11 Fundamentals of Interpersonal Communication (3 Credits)
• ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)
• ENG 23 Scientific and Technical Writing (3 Credits)
• HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)
• OCD 01 Orientation and Career Development (0 Credit)

Total 17
Required Areas of Study

- BIO 11 General Biology I (4 Credits)
- BIO 12 General Biology II (4 Credits)
- CHM 18 Fundamentals of General Chemistry II ** (4 Credits)
- DAT 33 Microcomputer Applications + (2 Credits)
- MTH 13 Trigonometry and College Algebra** (3 Credits)
- MTH 23 Probability and Statistics** (3 Credits)
- PHY 11 College Physics I (4 Credits)

TOTAL 24

Specialization Requirements

- ENV 11 Introduction to Environmental Health (4 Credits)
- ENV 12 Environmental and Occupational Regulations (4 Credits)
- ENV 23 Environmental Toxicology (3 Credits)
- ENV 31 Water Chemistry and Pollution (4 Credits)
- ENV 32 Atmospheric Chemistry and Pollution (4 Credits)

TOTAL 19

NOTE: Students must achieve a grade point average of 2.5 or better in the first four courses before they are considered for admission to the program. Students intending to transfer to a four-year program in environmental science must maintain a minimum index of 2.0; take CHM 11 and CHM 22 in lieu of CHM 17 and CHM 18; and MTH 30 and MTH 31 in lieu of MTH 13 and MTH 23.

NOTE: At least two courses must be taken from a list designated as “Writing Intensive” as published each semester in the Registration Guide and Schedule of Classes.

* Students can take ART 10 or MUS 10, or WFA 10 or any PEA one credit course. Students who intend to transfer should choose ART 10, or MUS 10, or any PEA one credit course.

** Students intending to transfer to four-year programs in Environmental Science or Environmental Engineering should take CHM 11 and CHM 22 in lieu of CHM 17 and CHM 18; and take MTH 30 and MTH 31 in lieu of MTH 13 and MTH 23.

*** Students can substitute ENG 12 for ENG 23.

+ Students can substitute CHM 38 for DAT 33.

LIBERAL ARTS AND SCIENCES

Associate in Science Degree | Transfer Degree

A student interested in the Associate in Science (A.S.) degree in Liberal Arts and Sciences has to choose one of four options: Biology, Chemistry, Earth Systems and Environmental Science, or Physics. Each option prepares students for transfer to a complementary four-year degree program. Students in the Chemistry, and the Earth Systems and Environmental Science options transfer to four-year science programs (biochemistry, biology, chemistry, earth and environmental science, etc.), teacher education programs, pharmacy schools, engineering programs (biomedical, chemical, environmental), or physician assistant or physical therapy programs. Enrichment programs are offered to encourage students to continue their education beyond the bachelor degree by attending graduate or other professional schools.

Liberal Arts and Sciences Curriculum (Pathways)

60 Credits required for A.S. Degree

Required Core

A. English Composition (6 Credits)
B. Mathematical and Quantitative Reasoning
   - MTH 30 Pre-Calculus Mathematics OR
   - MTH 31 Analytic Geometry and Calculus I (4 Credits)
C. Life and Physical Science
   - CHM 11 General Chemistry I (4 Credits)

SUBTOTAL 14

Flexible Core

A. World Cultures and Global Issues (3 Credits)
B. US Experience and its Diversity (3 Credits)
C. Creative Expression (3 Credits)
D. Individual and Society (3 Credits)
E. Scientific World
   - CHM 12 General Chemistry II (4 Credits)
   *Restricted Elective Select one course from Area A-E.
   - (3 Credits)

SUBTOTAL 19

Specialization Requirements

- MTH 31 Analytic Geometry and Calculus I** (0 - 4 Credits)
- MTH 32 Analytical Geometry and Calculus II (5 Credits)
- Specialization requirements for option*** (18 Credits)
- FREE ELECTIVES (0 - 4 Credits)

SUBTOTAL 27

Chemistry Option

Curriculum Coordinator: Dr. Nicolas Anuku

- CHM 31 Organic Chemistry I (5 Credits)
- CHM 32 Organic Chemistry II (5 Credits)
- Choose two of the three courses below:
  - CHM 33 Quantitative Analysis AND / OR
  - BIO 11 General Biology I AND / OR
  - PHY 11 Physics I (8 Credits)

TOTAL 18
Earth Systems and Environmental Science Option
Curriculum Coordinator: Dr. Farnosh Saeedi

- CHM 27 Principles of Laboratory Safety (2 Credits)
- CHM 33 Quantitative Analysis (4 Credits)
- Choose two of the three courses below:
  - ESE 11 Earth Systems Science: The Earth
  - ESE 12 Earth Systems Science: The Atmosphere
  - ESE 13 Earth Systems Science: The Ocean (8 Credits)
- ESE 21 Earth Systems Science: The Environment (4 Credits)

TOTAL 18

This program has obtained a waiver to require STEM variant courses in Required Core Area B and Area C and Flexible Core Area E. If students transferring into this program complete different courses in these areas, they will be certified as having completed the Common Core requirements, but it may not be possible for them to finish their degree within the regular number (60) of credits.

* Restricted Elective: must select one course from Flexible Core A-E. No more than two courses in any discipline or interdisciplinary field.

**For students that take MTH 30 to fulfill the Required Core.

***See your department advisor for the appropriate sequence of specialization courses. Students transferring to a college of pharmacy should complete BIO 11 and 12.

Both options also articulate with SUNY Empire State College. Copies of these agreements may be found on the BCC Transfer Planning website.

LIBERAL ARTS AND SCIENCES (Pre-Pathways)
Associate in Science Degree | Transfer Degree

If you began studying at BCC in or after Fall 2013, Pathways applies. Pathways also applies to students who have returned to CUNY after an absence of more than one semester. If you are a continuing student who entered before Fall 2013, you will be able to choose whether you remain with your existing requirements or change to Pathways. You should consult with an academic advisor.

Liberal Arts and Sciences Curriculum
60 Credits required for A.S. Degree

Core Requirements
- ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)
- ENG 12* Composition and Rhetoric II (3 Credits)
- CMS 11 Fundamentals of Interpersonal Communication (3 Credits)
- HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)
- PEA Physical Education OR
- HLT 91 Critical Issues in Health (1-2 Credits)

TOTAL 13-14

Required Areas of Study
- CHM 11 General Chemistry I (4 Credits)
- CHM 22 General Chemistry II with Qualitative Analysis (5 Credits)
- MTH 31 Analytic Geometry and Calculus I (4 Credits)
- MTH 32 Analytic Geometry and Calculus II (5 Credits)
- ART 11 Introduction to Art OR
- MUS 11 Introduction to Music OR
- Humanities OR Social Sciences** (3 Credits)
- MODERN LANGUAGE† (0-8 Credits)

TOTAL 21-29

Specialization Requirements # (18 Credits)
Chemistry Option
Curriculum Coordinator: Dr. Nicolas Anuku
- CHM 31 Organic Chemistry I (5 Credits)
- CHM 32 Organic Chemistry II (5 Credits)
- CHM 33 Quantitative Analysis (4 Credits)
- BIO 11 General Biology I OR PHY 11 Physics I (4 Credits)

TOTAL 18

Earth Systems and Environmental Science Option
Curriculum Coordinator: Dr. Farnosh Saeedi
- CHM 27 Principles of Laboratory Safety (2 Credits)
- CHM 33 Quantitative Analysis (4 Credits)
- ESE 11 Earth Systems Science: The Earth OR
- ESE 12 Earth Systems Science: The Atmosphere OR
- ESE 13 Earth Systems Science: The Ocean (Choose two of the above three courses) (8 Credits)
- ESE 21 Earth Systems Science: The Environment (4 Credits)

TOTAL 18

*Students in the Earth Systems and Environmental Science Option may also select from ENG 14, ENG 15, or ENG 16.

**See your advisor to determine the appropriate course from an approved list of Humanities or Social Science courses.

†Modern Language is a requirement for students planning to transfer to a CUNY four-year college and major in biology, chemistry, earth science or physics. Students planning to transfer should see the language requirements for the four-year degree program at the senior college.

# See your department advisor for the appropriate sequence of specialization courses. Students transferring to a college of pharmacy should complete BIO 11 and 12.

*Students may also select BIO 11 or PHY 11.

The Chemistry Option fully articulates with Lehman's B.S. in Physical Anthropology and B.A. in Biology. Both options also articulate with SUNY Empire State College. Copies of these agreements may be found on the BCC Transfer Planning website.
PHARMACEUTICAL MANUFACTURING TECHNOLOGY

Associate in Applied Sciences Degree | Career Program
Department of Chemistry and Chemical Technology

The Pharmaceutical Manufacturing Technology (PMT) program is a specialized chemical technology program designed to meet the needs of the pharmaceutical and related industries (cosmetics, food, plastics, custom chemicals, research centers, pilot plants etc.). The PMT curriculum prepares students to work in manufacturing, research and development, and quality control and quality assurance departments of pharmaceutical, cosmetics, and related chemical industries. Today’s industrial environment requires technicians well trained in state-of-the-art instruments, computer methods, safety protocols and federal and state government regulations.

The PMT program provides a solid foundation in liberal arts and sciences combined with specialized training in the field. Students also have the option of transferring to science and engineering bachelor’s programs or to pharmacy schools to continue their education. The program articulates with SUNY Empire State College. Visit the Transfer Planning web site for details.

Curriculum Coordinator: Dr. Thomas Brennan

Pharmaceutical Manufacturing Technology Curriculum (Pathways)

60 Credits required for A.A.S. Degree

Required Core

A. English Composition
   • ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)

B. Life and Physical Sciences
   • CHM 11 General Chemistry I (4 Credits)

Flexible Core

A. World Cultures and Global Issues
   • HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)

D. Individual and Society
   • COMM 11 Fundamentals of Interpersonal Communication (3 Credits)

E. Scientific World
   • CHM 12 General Chemistry II (4 Credits)
   • Additional Flexible Core Requirement – Scientific World
      • BIO 11 General Biology I (4 Credits)

SUBTOTAL 21

Required Areas of Study

• ART 10* Art Survey (1 Credit)
• BIO 12 General Biology II (4 Credits)
• CHM 31 Organic Chemistry I (5 Credits)
• CHM 32 Organic Chemistry II (5 Credits)
• ENG 23 Scientific and Technical Writing (3 Credits)
• MTH 13 Trigonometry and College Algebra (3 Credits)
• MTH 14 Algebra and Introduction to Calculus (3 Credits)

SUBTOTAL 24

Specialization Requirements

• CHM 27 Principles of Laboratory Safety (2 Credits)
• CHM 37 Quantitative Instrumental Analysis (4 Credits)
• CHM 38 Computer Applications in Chemistry (2 Credits)
• RESTRICTED ELECTIVES* (5-6 Credits)
• CHM 39 Foundations of Pharmaceutical Process Technology (3 Credits)
• CHM 40 Pharmaceutical and Chemical Technology (3 Credits)
• PMT 41 Pharmaceutical Chemistry (3 Credits)
• PMT 42 Pharmaceutical Product Preparation (3 Credits)
• PMT 43 Pharmaceutical Laws and Regulations (2 Credits)
• FREE ELECTIVES to complete 60 credit requirement (1-2 Credits)

SUBTOTAL 15

1 Students can substitute PHY 11 for BIO 12. Students who wish to substitute both PHY 11 and PHY 12 for BIO 11 and BIO 12 need department approval.

2 Students can substitute MUS 10, or any PEA one-credit course, or CPR 10, or WFA 10 for ART 10.

3 Students intending to transfer to four-year programs should substitute MTH 30 and MTH 31 and 32 for MTH 13 and MTH 14.

4 Students may choose any combination of restricted electives CHM 39, CHM 40, PMT 41, PMT 42 and PMT 43 to meet the program credits requirement.

PHARMACEUTICAL MANUFACTURING TECHNOLOGY (PRE-PATHWAYS)

Associate in Applied Sciences Degree | Career Program
Department of Chemistry and Chemical Technology

If you began studying at BCC in or after Fall 2013, Pathways applies. Pathways also applies to students who have returned to CUNY after an absence of more than one semester. If you are a continuing student who entered before Fall 2013, you will be able to choose whether you remain with your existing requirements or change to Pathways. You should consult with an academic advisor.

Curriculum Coordinator: Dr. Thomas Brennan

Pharmaceutical Manufacturing Technology Curriculum

60 Credits required for A.A.S. Degree

Core Requirements

• ART 10* Art Survey (1 Credit)
• BIO 11 General Biology I (4 Credits)
• CHM 11 General Chemistry I (4 Credits)
• CMS 11 Fundamentals of Interpersonal Communication (3 Credits)
• ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)
• HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)
• MTH 13 Trigonometry and College Algebra (3 Credits)
• OCD 10 Orientation and Career Development (0 Credit)

TOTAL 21
Required Areas of Study

• BIO 12 General Biology II (4 Credits)
• CHM 22 General Chemistry II with Qualitative Analysis (5 Credits)
• CHM 31 Organic Chemistry I (5 Credits)
• CHM 32 Organic Chemistry II (5 Credits)
• ENG 23 Scientific and Technical Writing (3 Credits)
• MTH 14** Algebra and Introduction to Calculus (3 Credits)

TOTAL 25

Specialization Requirements

• CHM 27 Principles of Laboratory Safety (2 Credits)
• CHM 37 Quantitative Instrumental Analysis (4 Credits)
• CHM 38 Computer Applications in Chemistry (2 Credits)
• Restricted Electives## (5-6 Credits)
  • CHM 39 Foundations of Pharmaceutical Process Technology (3 Credits)
  • CHM 40 Pharmaceutical and Chemical Technology (3 Credits)
  • PMT 41 Pharmaceutical Chemistry (3 Credits)
  • PMT 42 Pharmaceutical Product Preparations (3 Credits)
  • PMT 43 Pharmaceutical Laws and Regulations (2 Credits)
• FREE ELECTIVE*** (to complete 60 credit requirement) (0-1 Credit)

TOTAL 14

NOTE: At least two courses must be taken from a list designated as “Writing Intensive” as published each semester in the Registration Guide and Schedule of Classes.

*Students can substitute MUS 10, or any PEA one-credit course, or CPR 10, or WFA 10 for ART 10.

#Students can substitute PHY 11 for BIO 12. Students who wish to substitute both PHY 11 and PHY 12 for BIO 11 and BIO 12 need department approval.

**Students intending to transfer to four-year programs should substitute MTH 30 and MTH 31 and 32 for MTH 13 and MTH 14.

## Students may choose any combination of the restricted electives CHM 39, CHM 40, PMT 41, PMT 42 and PMT 43 to meet the program credits requirement.

*** Students may take a one credit free elective course to fulfill the program credit requirement.

SCIENCE FOR FORENSICS

Associate in Science Degree | Joint Degree Program
Department of Chemistry and Chemical Technology

The Science for Forensics (SFF) Associate in Science (A.S.) degree program is part of a joint program between Bronx Community College and John Jay College of Criminal Justice for students with a strong interest in science, law, and public service. BCC graduates of the Science for Forensics A.S. program will continue their studies at John Jay College where they will earn a Bachelor of Science in Forensic Science. To enter the Forensic Science program at John Jay, BCC graduates must have a 2.5 or better GPA in foundation coursework. Creation of this 2 + 2 partnership in forensic science will open up a new opportunity for New York City area students to receive an excellent education leading to exciting career paths. The SFF program will provide future forensic scientists with the necessary scientific foundation and technical training in general chemistry, organic chemistry, physics, biology, mathematics, data collection and analysis, oral and written communication skills, teamwork, and hands-on experience for successful, productive and rewarding careers in local, regional and national forensic science and chemistry based laboratories, major research centers, university facilities, government testing labs, and public utilities.

Curriculum Coordinator: Dr. John Molina

Science for Forensics Curriculum (Pathways)

60 Credits required for A.S. Degree

Required Core

A. English Composition (6 Credits)
B. Mathematical and Quantitative Reasoning
   • MTH 31 Calculus and Analytical Geometry (4 Credits)
C. Life and Physical Sciences
   • CHM 11 General College Chemistry I (4 Credits)

SUBTOTAL 14

Flexible Core

Select two courses from any of the following areas (Flexible Core A-D) , with no more than one course in any area, and no more than one course in any discipline or interdisciplinary field (6 Credits)

A. World Cultures and Global Issues
B. U.S. Experience in Diversity
C. Creative Expression
D. Individual and Society

The following courses are required:

E. Scientific World
   • CHM 12 General Chemistry II (4 Credits)
   • PHY 31 Physics I (4 Credits)

SUBTOTAL 14
Required Areas of Study

- BIO 11 General Biology I (4 Credits)
- BIO 12 General Biology II (4 Credits)
- MTH 32 Analytic Geometry and Calculus II (5 Credits)
- PHY 32 Physics II (4 Credits)
- RESTRICTED ELECTIVE 3 (1 Credit)

SUBTOTAL 18

Specialization Requirements

- CHM 31 Organic Chemistry I (5 Credits)
- CHM 32 Organic Chemistry II (5 Credits)
- CHM 33 Quantitative Analysis (4 Credits)

SUBTOTAL 14

1 This program has received a waiver to require students to complete MTH 31 to fulfill Required Core B, CHM 11 to fulfill Required Core C, CHM 12 to fulfill Flexible Core E, and PHY 31 (selected from Flexible Core E) to fulfill the sixth Flexible Core course.

2 To fulfill the two-year degree requirements of this Joint Degree with John Jay College, this program has received an additional waiver to allow students to complete a portion of the Common Core requirements prior to transfer and complete the remaining requirements upon transfer.

3 Any PEA one credit course, or CPR 10, or WFA 10, or ART 10, or MUS 10.

**SCIENCE FOR FORENSICS (Pre-Pathways)**

**Associate in Science Degree | Joint Degree Program**

**Department of Chemistry and Chemical Technology**

If you began studying at BCC in or after Fall 2013, Pathways applies. Pathways also applies to students who have returned to CUNY after an absence of more than one semester. If you are a continuing student who entered before Fall 2013, you will be able to choose whether you remain with your existing requirements or change to Pathways. You should consult with an academic advisor.

Curriculum Coordinator: Dr. John Molina

**Science for Forensics Curriculum**

60 Credits required for A.S. Degree

**Core Requirements**

- BIO 11 General Biology I (4 Credits)
- BIO 12 General Biology II (4 Credits)
- CMS 11 Fundamentals of Interpersonal Communication (3 Credits)
- ENG 10 Fundamentals of Composition and Rhetoric OR ENG 11 Composition and Rhetoric I (3 Credits)
- ENG 12 Composition and Rhetoric II (3 Credits)
- HIS 10 History of the Modern World OR HIS 11 Introduction to the Modern World (3 Credits)
- MTH 31 Analytic Geometry and Calculus I (4 Credits)
- OCD 01 Orientation and Career Development (0 Credit)

TOTAL 24

**Required Areas of Study**

- MTH 32 Analytic Geometry and Calculus II (5 Credits)
- PHY 31 Physics I (4 Credits)
- PHY 32 Physics II (4 Credits)
- Restricted Elective 1 (0-1 Credit)

TOTAL 13-14

**Specialization Requirements**

- CHM 11 General College Chemistry I (4 Credits)
- CHM 12 General Chemistry II OR CHM 222 General Chemistry II with Qualitative Analysis (4 or 5 Credits)
- CHM 31 Organic Chemistry I (5 Credits)
- CHM 32 Organic Chemistry II (5 Credits)
- CHM 33 Quantitative Analysis (4 Credits)

TOTAL 22-23

**NOTE:** At least two courses must be taken from a list designated as “Writing Intensive” as published each semester in the Registration Guide and Schedule of Classes.

1 Any PEA one credit course, or CPR 10, or WFA 10, or ART 10, or MUS 10.

2 Students take CHM 22 if CHM 12 is not offered.
COURSES
Chemistry

CHM 2  1 rec 2 lect 2 lab 0 cr
Introduction to Chemistry*
Introduction to types of matter, elements, compound, formulas, equations, use of arithmetic for chemical problem-solving, nomenclature, atomic structure and chemical bonding. Basic laboratory skills.
Corequisites: MTH 05 and RDL 02 or by departmental approval.

CHM 10  3 rec 3 lab 4 cr
Chemistry in Everyday Life
An elementary course for Liberal Arts and other non-science students which shows the significant role that chemistry plays in our everyday lives. Topics include, in addition to applications of basic principles, pollution and the environment, proteins, chemicals of food, poisons, toxins, drugs, chemicals and the mind. Laboratory: provides laboratory experience and illustrates relevant ideas in the lecture. It fulfills the laboratory science requirement for business, education associate and liberal arts students.
Corequisites: ENG 02 or RDL 02 if required.

*CHM 11  1 rec 2 lect 3 lab 4 cr
General College Chemistry I
Fundamental principles and theories of chemistry, aspects of atomic structure and bonding, chemical calculations, states of matter, solutions. Laboratory: chemical techniques and principles.
Prerequisites: Placement Exam or CHM 02; and MTH 05.
Required Core - Life and Physical Sciences
Flexible Core - Scientific World

CHM 12  1 rec 2 lect 3 lab 4 cr
General College Chemistry II
Solutions, kinetics, equilibria, electrochemistry, properties of non-metallic and metallic elements, nuclear chemistry, organic chemistry. Laboratory: chemical techniques and principles, and qualitative analysis. (Chemistry and other science majors should take CHM 22 in the second semester. Engineering Science majors may choose either CHM 12 or CHM 22 in the second semester.)
Prerequisite: CHM 11.
Flexible Core - Scientific World

CHM 13  3 rec 3 cr
Chemistry and the Environment
An elementary chemistry course for students in a curriculum, which requires only a 3-hour science course. The course shows the significant role that chemistry plays in our everyday lives. In addition to applications of basic principles, topics include pollution and the environment, proteins, chemicals of food, poisons, toxin drugs, chemicals and the mind.
Co-requisite: ENG 02 or RDL 02 if required.
Required Core - Life and Physical Sciences

CHM 17  1 rec 2 lect 3 lab 4 cr
*Fundamentals of General Chemistry I
Introductory course in general chemistry, atomic theory, formulas and equations, electron configurations, periodic table, chemical bonding, molecular structure, calculations, gas, liquid and solid states, solutions. Laboratory: illustrates the principles of course and laboratory techniques.
Prerequisites: Placement exam or CHM 02; and MTH 05 and RDL 02.
Required Core - Life and Physical Sciences
Flexible Core - Scientific World

CHM 18  1 rec 2 lect 3 lab 4 cr
Fundamentals of General Chemistry II
Continuation of CHM 17. Ionic reactions; acid-base theories, pH, chemical equilibria, structure, nomenclature and properties of hydrocarbons, alcohols, ethers, carbonyl compounds, amine and amides, acids, esters, fats, lipids, amino acids, proteins, and carbohydrates.
Prerequisite:* Students in science, technology and health care fields, who need to take a course in chemistry, must take either CHM 11 or CHM 17. A prerequisite for these courses is CHM 02 or achieving a score of 25 out or 40 on a chemistry placement exam. For more information, see the Department of Chemistry and Chemical Technology. CHM 17.
Flexible Core - Scientific World

CHM 20  1 rec, 2 lec, 3 lab, 4 cr
Introduction to Nanoscience
The course will give students an introduction to nanoscience, synthesis of nanomaterials, the tools to determine the mechanical properties and characterize these materials (for example, Electron Microscopy (SEM/TEM), Atomic Force Microscopy (AFM)), nanoscale modeling and societal impacts of nanomaterials/technology (such as, ethical, legal, environmental implications). Students will chose a nanomaterial of interest and also do a term paper and presentation. Laboratory demonstrations will illustrate principles of the course and laboratory techniques.
Prerequisites: Placement Exam or CHM 02; and MTH 05
Flexible Core - Scientific World

CHM 22  1 rec 2 lect 6 lab 5 cr
General Chemistry II with Qualitative Analysis
Prerequisite: CHM 11.

CHM 27  2 lect 2 cr
*Principles of Laboratory Safety
Presents the basic concepts of laboratory safety. Topics include legal issues, chemical and biological hazards, storage, laboratory design, and emergency responses.
Prerequisite: CHM 11 or CHM 17.
CHM 31 1 rec 3 lect 4 lab 5 cr
Organic Chemistry I
Structure, nomenclature, properties and reactions of organic compounds including electronic theory and mechanisms. Laboratory: preparation, purification and identification of representative organic compounds. Prerequisites: CHM 12, 18 or CHM 22.

CHM 32 1 rec 3 lect 4 lab 5 cr
Organic Chemistry II
Organic spectroscopy (IR, NMR, UV) and mass spectrometry; molecular orbital theory applied to conjugated and aromatic systems; physical, chemical properties and major reactions of the main classes of organic molecules; aromatics, alcohols, aldehydes and ketones, carboxylic acids, carboxylic acid derivatives, amines, amides, peptides, carbohydrates as well as carbonyl α-substitution reactions and carbonyl condensation reactions. Prerequisite: CHM 31.

CHM 33 2 lect 6 lab 4 cr
Quantitative Analysis
Theory and laboratory methods of quantitative chemical analysis with laboratory determinations employing gravimetric and titrimetric (volumetric) methods, including acid-base, precipitation and oxidation-reduction reactions; use of chelating agents and analytical instruments. Prerequisite: CHM 22.

CHM 37 1 rec 2 lect 3 lab 4 cr
Quantitative Instrumental Analysis
Covers basic discussions of the theory, operation and analytical applications of spectroscopy and chromatography. This course begins to develop expertise in techniques involving the operation of many common laboratory instruments and how they are used in quantitative analysis with specific applications in the pharmaceutical field. Prerequisite: CHM 22.

CHM 38 1 lect 2 lab 2 cr
Computer Applications in Chemistry
Introduction to computer applications in chemistry including: ChemOffice, Excel, PowerPoint, Internet searches and research, and molecular modeling programs. Prerequisite: CHM 11 or CHM 17.

CHM 39 3 lect 3 cr
Foundations of Pharmaceutical Process Technology
Discusses the wide variety of products generated by the US pharmaceutical and chemical process industry; focuses on changing government regulations, environmental health and safety issues, and changing technologies. Provides knowledge of the chemical technician’s role in the pharmaceutical and chemical process industry. Prerequisite: CHM 22.

CHM 40 3 lect 3 cr
Pharmaceutical and Chemical Technology
Introduction to chemical processes and methods currently used in industry, including fluid flow, heat transfer, plant utilities, distillation, extractions, crystallization, filtration, drying, etc. Students will also investigate current topics and technology applications. Students choose a current method and write a comprehensive review for its use and applications. Fieldwork investigations, library, or computer investigations may be required.

CHM 101 1 cr
Contemporary Chemistry Laboratory
CHM 101, Contemporary Chemistry Laboratory, is a 1-credit, 3-hour laboratory course designed to teach non-science majors the fundamentals of working with laboratory equipment, data gathering, analysis, and reporting. Laboratory exercises are included to illustrate the principles of general chemistry and to provide practical examples of chemistry in our everyday lives, as in foods, cosmetics and personal care and household products. The laboratory exercises incorporates the use of modern chemical instrumentation available in the Department of Chemistry and Chemical Technology. Prerequisites / Corequisite: CHM 10 or CHM 110

CHM 110 3 lect 3 cr
Contemporary Chemistry
CHM 110 is an elementary course for Liberal Arts and other non-science students which provide students with a basic knowledge of General and Organic Chemistry and their application in understanding drugs, energy, and the environment. In addition to this, laboratory activities to enhance student interests and skills are included: measurements, testing the pH of the household products and beverages, measuring sugars in beverages, monitoring ambient levels of carbon dioxide, etc. Prerequisites / Corequisite: MTH 05 AND RDL 02 Required Core - Life and Physical Sciences
Earth Systems And Environmental Science

ESE 11 2 lec 1 rec 3 lab 4 cr
Earth Systems Science: The Earth
This course presents the scientific method and basic concepts in geology. Topics include materials, structures and surface features of the earth, oceans, and the processes that have produced them.
Prerequisites: ENG 02, RDL 02 if required.
Corequisite: MTH 05.
Flexible Core - Scientific World
Required Core - Life and Physical Sciences

ESE 12 2 lec 1 rec 3 lab 4 cr
Earth Systems Science: The Atmosphere
An introduction to the processes and phenomena of our atmosphere. Topics include clouds, sky color, storms, climates, the Ice Ages, and the greenhouse effect. Students will also be introduced to the science of weather forecasting using the BCC weather station.
Prerequisites: ENG 02, RDL 02 if required.
Corequisite: MTH 05.
Flexible Core - Scientific World
Required Core - Life and Physical Sciences

ESE 13 2 lec 1 rec 3 lab 4 cr
Earth Systems Science: The Ocean
This course presents the scientific method in oceanography and basic concepts of ocean studies. Topics include the ocean in the earth system, properties of ocean water, ocean currents, the dynamic coast and the ocean, and climate change. In the laboratory, students are introduced to the dynamic ocean by working with current (Internet) and archived oceanographic data coordinated with learning investigations keyed to current ocean activities and products. The course examines the world ocean with an Earth system perspective.
Prerequisites: ENG 02, RDL 02 if required.
Corequisite: MTH 05.
Flexible Core - Scientific World
Required Core - Life and Physical Sciences

ESE 21 2 lec 1 rec 3 lab 4 cr
Earth Systems Science: The Environment
This course provides a look at the earth system as a whole. Emphasis will be on the interrelation among biological, geological, climatological and human systems on continental and global scales. The links among these systems will be illustrated by present day processes and by the geologic record of scaled events in Earth system history. The course will include computer-based exercises and will also rely on Internet resources. Projects, papers, and presentations will be required.
Prerequisites: Choice of two out of three courses from ESE 11, ESE 12, and ESE 13.

Environmental Technology

ENV 11 2 lect 1 rec 3 lab 4 cr
Introduction to Environmental Health
This course provides a basic understanding of widespread health problems that are linked to environmental and occupational health hazards. Students become familiar with the identity and sources of air and water pollutants, the routes of entry of these pollutants into the body and the harmful effects of these pollutants. Laboratory exercises familiarize students with methods of air, soil and water analysis. Field trips provide first-hand knowledge of public health, occupational health and safety issues.
Prerequisites: RDL 02, ENG 02, ESL 03 if required.
Flexible Core - Scientific World
Required Core - Life and Physical Sciences

ENV 12 2 lect 1 rec 3 lab 4 cr
Environmental and Occupational Regulations
Overview of judicial system, regulatory agencies and the federal register system. Definition of key terms and concepts in environmental law. Delineation of major environmental laws relating to water, wastewater, air, hazardous/solid waste, environmental impacts and the workplace. The laboratory section of the course will focus on hazardous materials training according to 29 CFR 1910.120. Students qualify to receive a 40-hour HAZMAT Certificate at the completion of the laboratory portion of the course.
Prerequisite: ENV 11.

ENV 21 1 lect 8 field study 3 cr
Field Study in the Environment
The course teaches students how to become field technicians which enables them to conduct site evaluations, on-site sampling and site remediation in compliance with EPA regulations. Students are also trained in health and safety procedures for hazardous waste operations.
Prerequisites: ENV 11, ENV 12.

ENV 22 2 lect 4 lab 4 cr
Environmental Methods of Analysis
This course includes lecture demonstrations and hands-on laboratory experiments with the equipment and instruments commonly used for air, soil and water analysis to determine levels of pollution.
Prerequisites: CHM 18, ENV 11.

ENV 23 3 lect 3 cr
Environmental and Occupational Toxicology
Introduction to principles of toxicology with emphasis on environmental and occupational health. Provides necessary background to understand the health effects of toxic waste and environmental pollutants.
Prerequisites: BIO 12, CHM 18 or CHM 22, ENV 11.
ENV 24 3 lect 12 internship 3 cr

**Environmental Internship**
Weekly seminars that integrate the fieldwork experience of students doing a supervised internship at various public and private environmental agencies, industrial companies and water treatment/waste management plants.
Prerequisites: ENV 11, ENV 12 and permission of Environmental Technology Program Administration.

ENV 31 2 lect 1 rec 3 lab 4 cr

**Water Chemistry and Pollution**
This course introduces students to the application of the principles of inorganic, physical and dilute solution equilibrium chemistry to aquatic systems, both in the aquatic environment and in water and wastewater treatment.
Prerequisite: CHM 18 or CHM 22.

ENV 32 2 lect 1 rec 3 lab 4 cr

**Atmospheric Chemistry and Pollution**
This course presents a concise, clear review of the fundamental aspects of atmospheric chemistry. It reviews our basic understanding of the chemistry of the earth’s atmosphere and discusses current environmental issues, including air pollution, acid rain, the ozone hole, and global climate change.
Prerequisite: CHM 18 or CHM 22.

PMT 41 2 lect 2 lab 3cr

**Pharmaceutical Chemistry**
This course emphasizes the chemical principles and reactions vital to drug design and drug action. The course is aimed at undergraduates who have a basic grounding in chemistry and are interested in learning about drug design and the molecular mechanisms by which drugs act in the body. It examines the general principles and strategies involved in discovering and designing new drugs and developing them for the marketplace, and it looks at particular ‘tools of the trade’ which are used in rational drug design. Clinically important drugs will be used as examples.
Prerequisite: CHM 31 or CHM 18.

PMT 42 3 lect 3cr

**Pharmaceutical Product Manufacturing**
This course discusses the science and technology that applies to pharmaceutical manufacturing. Students will study different pharmaceutical formulations, and their methods of preparation for solid, liquid and other pharmaceutical products. Specific classes of pharmaceuticals will be discussed. Special topics will include packaging, and marketing regulations.
Prerequisite: CHM 31.

PMT 43 2 lect 2cr

**Pharmaceutical Laws and Regulations**
This course discusses the pharmaceutical laws and regulations that govern manufacturing, packaging and marketing of pharmaceutical products. Students will discuss specific examples that impacted the development of the laws and regulations.
Prerequisite: ENG 10 or ENG 11.

SCI 12 3 hr 3cr

**Science Exploration - From the Stars to the Cells**
SCI 12 is an inquiry-based science content course. Topics include astronomy, earth science and advances in technology and material sciences: the stars, cosmology, the earth and other planets, plate tectonics, cycles of the earth and ecosystems and the environment; and the fundamental concepts of the living cell and the molecules of life; and superconducting materials and nanotechnology. The course includes hands-on activities and computer simulations.
Prerequisites: MTH 05, ENG 02, RDL 2 (if required)