

Chemical Technology (CMT)

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The Chemical Technology program prepares students to become laboratory technicians or research associates in high-tech research and development or quality control laboratories, academic institutions, and government facilities. Graduates often are employed in chemical manufacturing, food/beverage, pharmaceutical, environmental, and polymer/plastic labs.

These technicians use sophisticated chemical/biochemical methods and cutting-edge instrumentation to analyze chemical and pharmaceutical substances and evaluate their properties. Many graduates continue their education in a bachelor's degree program in chemistry, biology/biotechnology, chemical engineering, or a pre-professional degree such as pre-pharmacy, pre-medicine, pre-dental, or pre-veterinary medicine.

Chemical Technology (CMT)

All degree-seeking students must complete a First Year Experience (FYE) course as part of the first 12 credit hours taken at Cincinnati State.

Semester 1		Lec	Lab	Credits
ENG 101	English Composition 1	3	0	3
CMT 111	Chemical Technology 1	0	3	1
XXX XXX Humanities/Social Sciences Elective 1				3
CHE 121 & CHE 131	General Chemistry 1 and General Chemistry 1 Lab	4	0	5
MAT XXX Mathematics Elective 1				4
Semester 2				
CHE 111	Bio-Organic Chemistry	3	3	4
CMT 112	Chemical Technology 2	0	3	1
CHE 122 & CHE 132	General Chemistry 2 and General Chemistry 2 Lab	4	0	5
MAT XXX Mathematics Elective 2				4
XXX XXX Technical Elective 1				3
Semester 3				
CMT 291	Full-Time Cooperative Education 1: Chemical Technology	1	40	2
Semester 4				
ENG 10X English Composition Elective				3
COMM 110	Public Speaking	3	0	3
CMT 220	Analytical Chemistry	3	3	4
XXX XXX Technical Elective 2				3
XXX XXX Science Elective 1				4
Semester 5				
CMT 230	Chemical Instrumental Analysis	3	3	4
CMT 290	Chemical Technology Capstone	1	4	3
XXX XXX Humanities/Social Sciences Elective 2				3
XXX XXX Science Elective 2				4

XXX XXX Technical Elective				3
3				
Semester 6				
CMT 292	Full-Time Cooperative Education 2: Chemical Technology	1	40	2
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Total Credits:		26	99	71

Electives

English Composition Elective

ENG 102	English Composition 2: Contemporary Issues	3
ENG 103	English Composition 2: Writing about Literature	3
ENG 104	English Composition 2: Technical Communication	3
ENG 105	English Composition 2: Business Communication	3

Humanities/Social Sciences Electives

Any ART, CRJ, CULT, ECO, FRN, GEO, HST, LIT, MUS, PHI, POL, PSY, REL, SOC, SPN, THE

Science Electives

Select one of the following series:

BIO 131 & BIO 132	Biology 1 and Biology 2	
PHY 151 & PHY 152	Physics 1: Algebra and Trigonometry-Based and Physics 2: Algebra and Trigonometry-Based	
PHY 201 & PHY 202	Physics 1: Calculus-Based and Physics 2: Calculus-Based	

Or two of the following courses:

EVS 110	Environmental Science: Conservation and Cleanup	4
EVS 120	Environmental Geology	4
EVS 130	Environmental Science: Ecology and Ecosystems	4

Technical Electives

CHE 201 & CHE 211	Organic Chemistry 1 and Organic Chemistry 1 Lab	5
CHE 202 & CHE 212	Organic Chemistry 2 and Organic Chemistry 2 Lab	5
any EVT, CET, EET, EMET, MET, PSET, SET		
MAT 131	Statistics 1	3
MAT 132	Statistics 2	3
MAT 253	Calculus 3	5

Or the following if not taken as a Mathematics elective:

MAT 251	Calculus 1	5
MAT 252	Calculus 2	5

any BIO or PHY listed in Science Elective, if not taken as Science Elective

Mathematics Elective

Take one of the following series:

MAT 125 & MAT 126	Algebra and Trigonometry and Functions and Calculus ¹	
MAT 151 & MAT 152	College Algebra and Trigonometry	
MAT 251 & MAT 252	Calculus 1 and Calculus 2	

¹ Students choosing this series must take MAT 126 prior to or concurrently with CHE 122.

CHE Courses

CHE 100 Basic Chemistry

3 Credits. 2 Lecture Hours. 2 Lab Hours.

An introductory course on concepts in chemistry. Topics include: dimensional analysis and problem solving, physical and chemical properties of matter, organization of the periodic table, writing and manipulating formulas, stoichiometry, gas laws, equilibrium, and acids and bases.

Prerequisites: AFL 085 and MAT 120, or appropriate placement test scores

CHE 105 Chemistry for Consumers

3 Credits. 2 Lecture Hours. 2 Lab Hours.

A course for non-science majors on the relevance of basic principles of chemistry to daily life. Topics include: laboratory/data analysis, matter classification, the periodic table, compound formation, chemical reactions, synthesis/analysis of consumer products, and the global impact of consumerism.

Prerequisites: AFL 085 and AFM 095, or appropriate placement test scores

CHE 110 Fundamentals of Chemistry

4 Credits. 3 Lecture Hours. 3 Lab Hours.

A college-level general chemistry course for non-majors. Topics include: atomic structure, bonding, chemical reactions, properties and states of matter, acids and bases, and equilibrium.

Prerequisites: AFL 085, and AFM 095 (minimum grade B) or MAT 105 (minimum grade C) or MAT 120 (minimum grade C), or appropriate placement test scores

CHE 111 Bio-Organic Chemistry

4 Credits. 3 Lecture Hours. 3 Lab Hours.

Study of foundational concepts of organic chemistry and biochemistry. Topics include: types of organic compounds and representative reactions, and biochemical compounds and reactions.

Prerequisites: CHE 110 (minimum grade C) or CHE 121 and CHE 131 (minimum grade C)

CHE 115 General, Organic, and Biological Chemistry

4 Credits. 3 Lecture Hours. 3 Lab Hours.

A survey of basic general, organic, and biological chemistry. Topics include: dimensional analysis, problem-solving strategies, atomic structure, chemical bonding, reactions, acid-base chemistry, attractive forces, functional groups, structure/reactions of major macromolecules, and metabolism.

Prerequisites: AFM 095 (minimum grade B) and AFL 085 (minimum grade C), or appropriate placement test scores

CHE 121 General Chemistry 1

4 Credits. 4 Lecture Hours. 0 Lab Hour.

A general chemistry course for science majors. Topics include: measurement systems; composition, properties, and reactions of elements and compounds; states of matter; atomic structure and bonding; and solution chemistry.

Prerequisites: AFL 085 and High School Chemistry (within three years, minimum grade B) or CHE 100 (minimum grade B) or CHE 110 (minimum grade C) and MAT 121 or MAT 150 (minimum grade C for both), or appropriate placement test score

CHE 122 General Chemistry 2

4 Credits. 4 Lecture Hours. 0 Lab Hour.

A continuation of CHE 121. Topics include: kinetics, chemical equilibrium, acid-base chemistry, acid-base and solubility equilibrium, thermodynamics, electrochemistry, and chemistry of transition elements.

Prerequisites: CHE 121 and CHE 131 (minimum grade C for both) and MAT 125 or MAT 151 or MAT 153 (minimum grade C for all)

CHE 131 General Chemistry 1 Lab

1 Credit. 0 Lecture Hour. 3 Lab Hours.

A laboratory course that accompanies CHE 121.

Prerequisites: CHE 100 or CHE 110 (minimum grade C) and MAT 150 or appropriate placement test score

CHE 132 General Chemistry 2 Lab

1 Credit. 0 Lecture Hour. 3 Lab Hours.

A laboratory course that accompanies CHE 122.

Prerequisites: CHE 121 and CHE 131 (minimum grade C for both)

CHE 198 First Year Special Topics in Chemistry

1-9 Credits. 0 Lecture Hour. 0 Lab Hour.

A course on selected topics related to Chemistry, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Vary by section

CHE 199 First Year Independent Project in Chemistry

1-9 Credits. 0 Lecture Hour. 0 Lab Hour.

A project related to Chemistry that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Chemistry faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Vary by section

CHE 201 Organic Chemistry 1**3 Credits. 3 Lecture Hours. 0 Lab Hour.**

An organic chemistry course for students preparing for science-related employment or additional science education. Topics include: principles of carbon chemistry including bonding, structure, mechanisms, properties, reactions, synthesis, acids, and bases.

Prerequisites: CHE 122 and CHE 132 (minimum grade C for both)

CHE 202 Organic Chemistry 2**3 Credits. 3 Lecture Hours. 0 Lab Hour.**

A continuation of CHE 201. Topics include: mass spectrometry; infrared, ultraviolet/visible, and NMR spectroscopies; aromaticity; chemistry of benzene, carboxylic acids, amines, aldehydes, and ketones; and oxidation and reduction.

Prerequisites: CHE 201 and CHE 211 (minimum grade C for both)

CHE 211 Organic Chemistry 1 Lab**2 Credits. 0 Lecture Hour. 4 Lab Hours.**

A laboratory course that accompanies CHE 201. Laboratory experiences include: general organic laboratory techniques; isolation, purification, and identification of organic compounds; simple synthesis; and determination of unknowns.

Prerequisites: CHE 122 and CHE 132 (minimum grade C for both)

CHE 212 Organic Chemistry 2 Lab**2 Credits. 0 Lecture Hour. 4 Lab Hours.**

A laboratory course that accompanies CHE 202. Laboratory experiences include: simple, complex, and multistep synthesis; and isolation, purification, analysis, and identification of organic compounds.

Prerequisites: CHE 201 and CHE 211 (minimum grade C for both)

CHE 298 Second Year Special Topics in Chemistry**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Chemistry, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Vary by section

CHE 299 Second Year Independent Project in Chemistry**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Chemistry that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Chemistry faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Vary by section

CMT Courses**CMT 111 Chemical Technology 1****1 Credit. 0 Lecture Hour. 3 Lab Hours.**

A course on fundamental concepts and techniques in chemical technology. Topics include: the chemical technology major at Cincinnati State, career development, professional communication, chemical technicians' roles in industry, using Microsoft Office Suite, industrial/laboratory safety and hygiene, and laboratory statistics.

Prerequisites: AFL 085 and MAT 120, or appropriate placement test scores

CMT 112 Chemical Technology 2**1 Credit. 0 Lecture Hour. 3 Lab Hours.**

A continuation of CMT 111. Topics include: maintenance, calibration, and use of laboratory glassware and equipment; solution preparation skills; laboratory math and statistics; and using computers for data analysis.

Prerequisites: CMT 111, CHE 121, and CHE 131

CMT 191 Part-Time Cooperative Education 1: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their first part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

CMT 192 Part-Time Cooperative Education 2: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their second part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 191

CMT 193 Part-Time Cooperative Education 3: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their third part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 192

CMT 194 Part-Time Cooperative Education 4: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fourth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 193

CMT 195 Part-Time Cooperative Education 5: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fifth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 194

CMT 196 Part-Time Cooperative Education 6: Chemical Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their sixth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 195

CMT 198 First Year Special Topics in Chemical Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Chemical Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

CMT 199 First Year Independent Project in Chemical Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Chemical Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Chemical Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval

CMT 220 Analytical Chemistry**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A course on quantitative and qualitative chemical analysis with emphasis on wet chemical techniques. Topics include: sample preparation; volumetric, gravimetric, electrochemical, and separation methods; and statistical treatment of data.

Prerequisites: CMT 112, CHE 122, and CHE 132

CMT 230 Chemical Instrumental Analysis**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A course on quantitative and qualitative chemical analysis. Topics include: instrumental techniques, electrochemistry, atomic and molecular spectroscopy, gas and liquid chromatography, mass spectrometry, and statistical treatment of data.

Prerequisites: CMT 220 and CHE 111

CMT 290 Chemical Technology Capstone**3 Credits. 1 Lecture Hour. 4 Lab Hours.**

Students complete a project in their technical specialty area, including developing a procedure, performing testing, applying statistical techniques, and incorporating the data into a formal report and oral presentation.

Prerequisites: CMT 230

CMT 291 Full-Time Cooperative Education 1: Chemical Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

CMT 292 Full-Time Cooperative Education 2: Chemical Technology

2 Credits. 1 Lecture Hour. 40 Lab Hours.

Students seeking an associate's degree participate in their second full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 291

CMT 293 Full-Time Cooperative Education 3: Chemical Technology

2 Credits. 1 Lecture Hour. 40 Lab Hours.

Students seeking an associate's degree participate in their third full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 292

CMT 294 Internship 1: Chemical Technology

2 Credits. 1 Lecture Hour. 40 Lab Hours.

Students seeking an associate's degree participate in their first unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 111

CMT 295 Internship 2: Chemical Technology

2 Credits. 1 Lecture Hour. 40 Lab Hours.

Students seeking an associate's degree participate in their second unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: CMT 294

CMT 298 Second Year Special Topics in Chemical Technology

1-9 Credits. 0 Lecture Hour. 0 Lab Hour.

A course on selected topics related to Chemical Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

CMT 299 Second Year Independent Project in Chemical Technology

1-9 Credits. 0 Lecture Hour. 0 Lab Hour.

A project related to Chemical Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Chemical Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval