

B.A. IN CHEMISTRY

Code	Title	Credits
Major in Chemistry (B.A.)		
Choose one of the following:		4-8
CHE 113 & CHE 113D & CHE 214 & CHE 215	General Chemistry I and General Chemistry I Lab and General Chemistry II and General Chemistry II Lab	
Or		
CHE 208 & CHE 208D	Accelerated General Chemistry and Accelerated General Chemistry Lab	
CHE 200	Laboratory Safety and Chemical Hygiene	1
CHE 224 & CHE 225	Organic Chemistry I and Organic Chemistry I Lab	4
CHE 226 & CHE 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHE 312 & CHE 313	Quantitative Analysis and Quantitative Analysis Lab	4
CHE 344 & CHE 345	Thermodynamics, Kinetics, and Statistical Mechanics and Thermodynamics, Kinetics, and Statistical Mechanics Lab	4
CHE 395	Chemistry Seminar: Research and Professional Development	1
CHE 490	Chemistry Seminar: Research	2
CHE 494	Chemistry Seminar: Research Presentation	1
Electives from 300 or 400 level chemistry courses		12
MAT 123M	Precalculus ¹	3
MAT 124M	Calculus 1	4
MAT 125	Calculus 2	4
PHY 292 & PHY 292D	General Physics I and General Physics I Lab	4
PHY 296 & PHY 297	General Physics II and General Physics II Lab	4
Code	Title	Credits
Major		56-60
General Education		42-43
Electives		20-23
Total Credits		122

¹ Students may test out of this course based on their performance on the Math and Computer Science department placement exam.

Students may not declare a B.A. in Chemistry and a B.S. in Chemistry.

Students may not declare a B.A. in Chemistry and a Minor in Chemistry.

Courses whose number is followed by a letter fulfill a General Education requirement.

B.A. in Chemistry 2

CHE 101 • Introduction to Chemistry 3 Credits

Overview of atoms—their composition, their ability to form bonds, and their ability to interact as molecules. Open to all students but tailored for nursing and allied health fields.

Corequisites: Registration in CHE 101D is required. Offered: Fall, Spring.

CHE 101D • Introduction to Chemistry Lab 1 Credit

Laboratory experience accompanying CHE 101. Provides a hands-on extension of course topics in a collaborative, laboratory environment. Topics include: reactions, thermodynamics, acids and bases, nuclear decay, and others.

Corequisites: Registration in CHE 101 is required. Offered: Fall, Spring.

CHE 102 • Intermediate Chemistry 3 Credits

Students explore chemical theories related to atomic structure, molecular orbitals, thermodynamics, and states of matter. Examination of three dimensional structures of molecules and build quantitative skills.

Prerequisites: CHE 101/CHE 101D. Offered: Interim.

CHE 113 • General Chemistry I 3 Credits

Chemical properties and principles, structure and reactivity, stoichiometry, thermodynamics, atomic and molecular theory, and states of matter.

Prerequisites: Two years of High school math; High school chemistry or Consent of instructor. Corequisites: Registration in CHE 113D is required. Offered: Fall, Occasionally summer.

CHE 113D • General Chemistry I Lab 1 Credit

Laboratory experience accompanying CHE 113 to improve experimental skills such as accurate observation, data collection, and analysis while mastering techniques used by chemists for the precise measurements of mass, volume, and concentration. Small group collaboration and experimental design are included.

Corequisites: Registration in CHE 113 is required. Offered: Fall, Occasionally summer.

CHE 200 • Laboratory Safety and Chemical Hygiene 1 Credit

High standards of safety and chemical hygiene make the science laboratory a safe, comfortable, interesting place to work. This course reviews the standards and federal/state guidelines pertaining to safety and hygiene in the laboratory.

Prerequisites: One year of High school chemistry and One semester of college-level science. Offered: Fall, Spring.

CHE 208 • Accelerated General Chemistry 3 Credits

Chemical properties and principles, stoichiometry, structure, reactivity, atomic theory, states of matter, solutions, thermodynamics, kinetics, equilibria, acids and bases, electrochemistry, descriptive inorganic chemistry, and nuclear chemistry. Intended for science and engineering students who have a strong math background.

Prerequisites: MAT 124M (may be taken concurrently). Corequisites: Registration in CHE 208D is required. Offered: Fall. Special Notes: Meets the same requirements of CHE 113/CHE 113D and CHE 214/CHE 215.

CHE 208D • Accelerated General Chemistry Lab 1 Credit

Laboratory experience accompanying CHE 208.

Corequisites: Registration in CHE 208 is required. Offered: Fall.

CHE 214 • General Chemistry II 3 Credits

Study of solutions, chemical kinetics, thermodynamics, solution equilibria, acids and bases, electrochemistry, descriptive inorganic chemistry, and nuclear chemistry.

Prerequisites: CHE 113/CHE 113D. Corequisites: Registration in CHE 215 is required. Offered: Spring, Occasionally summer.

CHE 215 • General Chemistry II Lab 1 Credit

Laboratory experience accompanying CHE 214.

Corequisites: Registration in CHE 214 is required. Offered: Spring, Occasionally summer.

CHE 224 • Organic Chemistry I 3 Credits

Structure, nomenclature, function, and reactivity of organic compounds. Topics include bonding theory, acid-base reactions, conformational analysis, stereochemistry, nucleophilic substitution and elimination reactions, addition reactions, radical reactions, organic reaction mechanisms, and energy relations.

Prerequisites: CHE 214/CHE 215 or CHE 208/CHE 208D. *Corequisites:* Registration in CHE 225 is required. *Offered:* Fall.

CHE 225 • Organic Chemistry I Lab 1 Credit

Laboratory experience accompanying CHE 224. Topics include an introduction to organic chemistry laboratory techniques used in the preparation and purification of organic compounds. Infrared spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry, and computational chemistry techniques are also introduced.

Corequisites: Registration in CHE 224 is required. *Offered:* Fall.

CHE 226 • Organic Chemistry II 3 Credits

Continues CHE 224 by exploring the structure, nomenclature, function, and reactivity of additional organic compounds. Topics include the reactions of aromatic and carbonyl containing compounds, carbon-carbon bond-forming reactions, multi-step synthesis, and polymer chemistry. The chemistry of biological compounds such as carbohydrates, DNA, proteins, and lipids is also studied.

Prerequisites: CHE 224/CHE 225. *Corequisites:* Registration in CHE 227 is required. *Offered:* Spring.

CHE 227 • Organic Chemistry II Lab 1 Credit

Laboratory experience accompanying CHE 226. Laboratory includes single- and multi-step synthesis, purification, and identification of organic compounds. Infrared spectroscopy, 1D and 2D nuclear magnetic resonance spectroscopy, mass spectrometry, and computational chemistry will be used to explore the outcomes of organic reactions and their mechanisms.

Corequisites: Registration in CHE 226 is required. *Offered:* Spring.

CHE 304 • Essentials of Biochemistry 3 Credits

A survey of the structure, function, interactions, and chemical properties of the four major macromolecules: proteins, nucleic acids, lipids, and carbohydrates. Examination of primary metabolic pathways, bioenergetics, regulation, and homeostasis.

Prerequisites: CHE 224/CHE 225 and BIO 120/BIO 120D or BIO 124/BIO 124D. *Corequisites:* Registration in CHE 305 is required. *Offered:* Fall. *Special Notes:* Not open to students who have taken BIO 388/BIO 389 or CHE 388/CHE 389.

CHE 305 • Essentials of Biochemistry Lab 1 Credit

Laboratory experience accompanying CHE 304.

Corequisites: Registration in CHE 304 is required. *Offered:* Fall.

CHE 306 • Advanced Organic Chemistry 3 Credits

Bonding, kinetics, mechanisms of reactions, stereochemistry, and structure determination of organic compounds.

Prerequisites: CHE 226/CHE 227 and CHE 344/CHE 345. *Corequisites:* Registration in CHE 307 is required. *Offered:* Occasionally.

CHE 307 • Advanced Organic Chemistry Lab 1 Credit

Laboratory experience accompanying CHE 306.

Corequisites: Registration in CHE 306 is required. *Offered:* Occasionally.

CHE 312 • Quantitative Analysis 3 Credits

Principles and practice of modern quantitative analysis. Acid-base and ionic equilibria. Statistics, method selection and development, chromatography, and electrochemistry.

Prerequisites: CHE 214/CHE 215 or CHE 208/CHE 208D. *Corequisites:* Registration in CHE 313 is required. *Offered:* Spring.

CHE 313 • Quantitative Analysis Lab 1 Credit

Laboratory experience accompanying CHE 312.

Corequisites: Registration in CHE 312 is required. *Offered:* Spring.

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CHE 320 • Instrumental Analysis 3 Credits

Methods of instrumental analysis. Study of chemical and physical principles and practical application of spectroscopy, spectrometry, chromatography and electroanalysis. Fundamental electronic circuitry and computer data acquisition and control.

Prerequisites: CHE 312/CHE 313 or CHE 226/CHE 227 *Corequisites:* Registration in CHE 321 is required.

Offered: Fall.

CHE 321 • Instrumental Analysis Lab 1 Credit

Laboratory experience accompanying CHE 320.

Corequisites: Registration in CHE 320 is required. *Offered:* Fall.

CHE 344 • Thermodynamics, Kinetics, and Statistical Mechanics 3 Credits

Physical chemistry of the laws of thermodynamics and their application to phase and chemical equilibria. Chemical kinetics of reaction rates and reaction mechanisms. Statistical mechanics as it relates spectroscopy with thermodynamics and kinetics.

Prerequisites: CHE 214/CHE 215 or CHE 208/CHE 208D; PHY 202/PHY 202D; PHY 206/PHY 207 or PHY 292/PHY 292D; PHY 296/PHY 297; MAT 125. *Corequisites:* Registration in CHE 345 is required. *Offered:* Fall.

CHE 345 • Thermodynamics, Kinetics, and Statistical Mechanics Lab 1 Credit

Laboratory experience accompanying CHE 344. Includes hands-on experience with physiochemical systems and computational modeling.

Corequisites: Registration in CHE 344 is required. *Offered:* Fall.

CHE 348 • Quantum Chemistry and Spectroscopy 3 Credits

Physical chemistry of the laws of quantum mechanics applied to atoms and molecules. Quantum mechanical solutions of model systems and their application to chemical spectroscopy.

Prerequisites: CHE 208/CHE 208D or CHE 214/CHE 215; PHY 292/PHY 292D; PHY 296/PHY 297; MAT 125. *Corequisites:* Registration in CHE 349 is required. *Offered:* Spring.

CHE 349 • Quantum Chemistry and Spectroscopy Lab 1 Credit

Laboratory experience accompanying CHE 348. Includes hands-on experience with physiochemical systems and computational modeling.

Corequisites: Registration in CHE 348 is required. *Offered:* Spring.

CHE 364 • Advanced Inorganic Chemistry 3 Credits

Chemistry of elements and their compounds, including symmetry, bonding theories, solid-state chemistry, coordination compounds, organometallics, and bioinorganic compounds.

Prerequisites: CHE 344/CHE 345 and One year of organic chemistry or Junior standing. *Corequisites:* Registration in CHE 365 is required. *Offered:* Spring.

CHE 365 • Advanced Inorganic Chemistry Lab 1 Credit

Laboratory experience accompanying CHE 364. Laboratory includes synthesis and characterization of inorganic compounds.

Corequisites: Registration in CHE 364 is required. *Offered:* Spring.

CHE 388 • Biochemistry I 3 Credits

Physical and chemical properties of living systems with an emphasis on macromolecular interaction, structure, and function. Structure, classification, purification, and function of nucleic acids, proteins, carbohydrates, and lipids, including membrane transport and enzymology.

Prerequisites: BIO 120/BIO 120D or BIO 124/BIO 124D; CHE 226/CHE 227 (BIO 128/BIO 128D recommended). *Corequisites:* Registration in CHE 389 is required. *Offered:* Fall. *Special Notes:* Not open to students who have taken CHE 304/CHE 305; Carries cross-credit in biology.

CHE 389 • Biochemistry I Lab 1 Credit

Laboratory experience accompanying CHE 388. Topics include: buffers, protein expression and purification, electrophoresis, enzyme kinetics, and additional advanced techniques.

Corequisites: Registration in CHE 388 is required. *Offered:* Fall.

CHE 393 • Research 1-4 Credits

Utilization of the techniques and understanding of chemical principles on a term project. Use of original literature to formulate and conduct an original laboratory or computational research project under the supervision of a chemistry faculty member.

Prerequisites: Consent of department. Repeatable course: May only be taken for credit once. Offered: Fall, Interim, Spring.

CHE 395 • Chemistry Seminar: Research and Professional Development 1 Credit

Students search the chemical literature and develop a proposal for their capstone research project. Discussion of chemical careers, graduate and professional school preparation, and ethical conduct in science.

Prerequisites: CHE 200 (may be taken concurrently); Junior standing; Major in chemistry or biochemistry/molecular biology. Offered: Fall.

CHE 396 • Biochemistry II 3 Credits

Metabolic pathways, bioenergetics, metabolic regulation, and metabolism of macromolecules (carbohydrates, lipids, proteins, and nucleotides). Macromolecular synthesis of RNA, DNA, and proteins, including an introduction to biotechnology.

Prerequisites: CHE 388/CHE 389 or BIO 388/BIO 389. Corequisites: Registration in CHE 397 is required. Offered: Spring.

CHE 397 • Biochemistry II Lab 1 Credit

Laboratory experience accompanying CHE 396. Laboratory includes mammalian cell culture techniques and bioassays, and plant biochemical techniques including lipid extraction and analysis. RNA and DNA, PCR, and gene expression.

Corequisites: Registration in CHE 396 is required. Offered: Spring.

CHE 490 • Chemistry Seminar: Research 2 Credits

Students pursue an original research project in Chemistry or Biochemistry supported by a faculty mentor. Required time commitment is approximately 3.5 hours per week per credit, including weekly meeting with faculty mentor.

Prerequisites: CHE 395 and Consent of instructor. Offered: Fall, Spring.

CHE 491 • Research 1-4 Credits

Students pursue an original research project in Chemistry or Biochemistry supported by a faculty mentor. Required time commitment is approximately 3.5 hours per week per credit, including weekly meeting with faculty mentor.

Prerequisites: CHE 490 and Consent of department. Offered: Fall, Interim, Spring.

CHE 494 • Chemistry Seminar: Research Presentation 1 Credit

Students prepare and deliver formal presentations, both oral and written, of their research results. Seminar meets weekly for discussion of current topics.

Prerequisites: CHE 490. Offered: Fall, Spring.