Chemistry

Thomas P. West (Department Head)
Location: Science Building, Room 318, 903-886-5392
Chemistry Web Site (http://www.tamuc.edu/academics/colleges/scienceEngineeringAgriculture/departments/chemistry/default.aspx)

The professional degree program in the Department of Chemistry is approved by the American Chemical Society and has been designed to provide in-depth chemical education for students. Five programs of study for a bachelor's degree with a major in chemistry are provided to meet the different career goals of the candidate as identified below.

Students seeking a bachelor's degree in the following major must complete:

1. degree requirements for a Bachelor of Science degree, and
2. Core Curriculum requirements (refer to those sections of this catalog).

In addition, transfer students are required to complete a minimum of CHEM 351 Physical Chemistry and 18 semester hours of advanced chemistry for a major and 7-8 semester hours of advanced chemistry for a minor at A&M-Commerce.

The department offers accelerated five-year Bachelor of Science and Master of Science degrees for freshmen and three-year Bachelor of Science and Master of Science degrees for transfers. Please see departmental advisers for consultation.

Fast-Track Bachelors + Masters Chemistry Non-Thesis (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/bs-chem-acnt/)

Chemistry B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/chemistry-bs/)

Biochemistry B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/biochemistry/)

Chemistry B.S. - A.C.S. Professional Degree (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/chemistry-bs-acs-professional-degree/)

Chemistry B.S. - A.C.S.-Certified Degree with a Biochemistry Concentration (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/chemistry-bs-biochemistry-emphasis/)

Chemistry B.S. - A.C.S.-Certified Degree with the Environmental Chemistry Concentration

Chemistry Minor (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/chemistry-minor/)

Chemistry Second Major (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/chemistry/chemistry-second-major/)

CHEM 1105 - Introductory Chemistry Laboratory I
Hours: 1
A one semester experimental survey of the fundamentals of chemistry, exploring the basic physical principles and the descriptive chemistry of metals and non-metals, with applications to related fields. This course is not suitable for biological science majors or minors. (Students planning to enter professional and/or graduate schools should elect CHEM 1111-1112.) Prerequisites: MATH 1314 with a minimum grade of C, MATH 1324 with a minimum grade of C, MATH 179 with a minimum grade of C or MATH 1332 with a minimum grade of C (concurrent or adequate high school mathematical preparation). Corequisites: CHEM 1305.

CHEM 1107 - Introductory Chemistry Laboratory II
Hours: 1
A one semester experimental survey of organic chemistry and biochemistry. The course explores the principles, nomenclature, reactions and synthesis of organic compounds and the chemistry of biological processes. This course is not suitable for biological science majors or minors. (Students planning to enter professional and/or graduate schools should elect Chemistry 2123-2125.) Prerequisites: CHEM 1305 with a minimum grade of C or CHEM 1311 with a minimum grade of C or CHEM 1312 with a minimum grade of C. Corequisites: CHEM 1307.

CHEM 1111 - General and Quantitative Chemistry Laboratory I
Hours: 1
Introduction to methods and techniques of chemical experimentation using quantitative and semi-quantitative procedures to explore problems in chemistry. Prerequisites: MATH 1314 (concurrent or adequate high school mathematical preparation) with a minimum grade of C or concurrent enrollment. Corequisites: CHEM 101, CHEM 1311.

CHEM 1112 - General and Quantitative Chemistry Laboratory II
Hours: 1
Introduction to methods and techniques of chemical experimentation using qualitative and semiquantitative procedures to exploring problems in chemistry. Prerequisites: CHEM 1311 and CHEM 1111 with a minimum grade of C, and CHEM 101 with a minimum grade of C. Corequisites: CHEM 102, CHEM 1312.

CHEM 1305 - Introductory Chemistry I
Hours: 3
Three semester hours (3 lecture). A one semester survey of the fundamentals of chemistry covering the basic physical principles and the descriptive chemistry of the metals and non-metals with applications to related fields. This course is not suitable for biological science majors or minors. (Students planning to enter professional and/or graduate schools should elect Chemistry 1311-1312). Prerequisites: MATH 1314 with a minimum grade of C, MATH 1324 with a minimum grade of C, MATH 179 with a minimum grade of C or MATH 1332 with a minimum grade of C (concurrent or adequate high school mathematical preparation).

CHEM 1307 - Introductory Chemistry II
Hours: 3
A one semester survey of organic chemistry and biochemistry. The course treats the principles, nomenclature, reactions and methods of synthesis of organic compounds. Special attention is given to the chemistry of biological processes. This course is not suitable for biological science majors or minors. (Students planning to enter professional and/or graduate schools should elect Chemistry 2323-2325.) Prerequisites: CHEM 1305 with a minimum grade of C or CHEM 1311 with a minimum grade of C or CHEM 1312 with a minimum grade of C.

CHEM 1311 - General and Quantitative Chemistry I
Hours: 3
This course is primarily for students majoring in the sciences or in pre-professional programs. The lecture covers the fundamental laws, theories, and descriptive aspects of chemistry. Problem solving is stressed. Prerequisites: MATH 1314 (concurrent or adequate high school mathematical preparation) with a minimum grade of C or concurrent enrollment. Corequisites: CHEM 101, CHEM 1111.

CHEM 1312 - General and Quantitative Chemistry II
Hours: 3
A continuation of General Chemistry. Prerequisites: CHEM 1311 and CHEM 1111 with a minimum grade of C, and CHEM 101 with a minimum grade of C, or CHEM 1411 with a minimum grade of C, and MATH 1314 with a minimum grade of C or MATH 141 with a minimum grade of C. Corequisites: CHEM 102, CHEM 1112.

CHEM 2123 - Organic Chemistry Laboratory I
Hours: 1
Introduction of techniques for organic chemistry laboratory, including preparation, setup, and running reactions and the characterization of the properties of representative organic compounds. Prerequisites: CHEM 1312 with a minimum grade of C, CHEM 102 with a minimum grade of C and CHEM 1112 with a minimum grade of C. Corequisites: CHEM 201, CHEM 2323.

CHEM 2125 - Organic Chemistry Laboratory II
Hours: 1
Continuation of CHEM 2123. Prerequisites: CHEM 2323 or CHEM 2423 with minimum grade of C, CHEM 201 with minimum grade of C and CHEM 2123 with a minimum grade of C. Corequisites: CHEM 202, CHEM 2325.

CHEM 2323 - Organic Chemistry I
Hours: 3
An integrated introductory course in organic chemistry. The reactions of aliphatic compounds are considered in terms of molecular orbital theory, carbonium ion, carbanion and free radical reaction mechanisms; stereochemistry and molecular conformations, transition state theory and principles of organic synthesis are covered. Prerequisites: CHEM 1312 with a minimum grade of C, CHEM 102 with a minimum grade of C and CHEM 1112 with a minimum grade of C. Corequisites: CHEM 201, CHEM 2123.

CHEM 2325 - Organic Chemistry II
Hours: 3
A continuation of Chemistry 2323. The chemistry of polyfunctional aliphatic compounds, amino acids and proteins, sugars, and carbohydrates, polycyclic and heterocyclic compounds. Spectroscopy (NMR, IR, MS and Uv/Vis) is covered. Prerequisites: CHEM 2323 or CHEM 2423 with a minimum grade of C, CHEM 201 with a minimum grade of C, and CHEM 2123 with a minimum grade of C. Corequisites: CHEM 202, CHEM 2125.

CHEM 101 - General Chemistry Tutorial I
Hours: 1
Practice in chemical reasoning and solving of conceptual and numerical problems in general chemistry. Review and application of mathematical skills in chemistry. Prerequisites: MATH 1314 (concurrently or adequate high school mathematical preparation) with a minimum grade of C or concurrent enrollment. Corequisites: CHEM 1111, CHEM 1311.

CHEM 102 - General Chemistry Tutorial II
Hours: 1
A continuation of Chemistry 101. Further practice in chemical reasoning and solving of conceptual and numerical problems in general chemistry, especially those concerning chemical equilibrium and reactions. Prerequisites: CHEM 1311 and CHEM 1111 with a minimum grade of C, and CHEM 101 with a minimum grade of C. Corequisites: CHEM 1112, CHEM 1312.

CHEM 201 - Organic Chemistry Tutorial I
Hours: 1
Practice in chemical reasoning and problem solving in organic chemistry. Review and application of relevant facts and principles of general chemistry and organic chemistry. Prerequisites: CHEM 1312 with minimum grade of C, CHEM 102 with minimum grade of C and CHEM 1112 with minimum grade of C. Corequisites: CHEM 2123, CHEM 2323.

CHEM 202 - Organic Chemistry Tutorial II
Hours: 1
Practice in chemical reasoning and problem solving in organic chemistry. Review and application of relevant facts and principles in organic chemistry. Prerequisites: CHEM 2323 or CHEM 2423 with a minimum grade of C, CHEM 201 with a minimum grade of C and CHEM 2123 with a minimum grade of C. Corequisites: CHEM 2125, CHEM 2325.

CHEM 314 - General Biochemistry
Hours: 3
Introductory Biochemistry. Three semester hours. This is a one-semester course that serves as an introduction to the nomenclature and function of the major classes of molecules associated with living organisms. The subject matter is tailored for students interested in pharmacy, dentistry, medicine, and related health science disciplines that need a lecture course in Biochemistry with no laboratory. The course topics will be presented along with examples where basic knowledge in the field of biochemistry is relevant for the practice of modern medicinal chemistry and pharmacy. Prerequisites: BSC 1407 with a minimum grade of C and CHEM 2325 with a minimum grade of C.

CHEM 330 - Environmental Chemistry
Hours: 3
A study of the impact of chemistry on the environment. This course will cover topics, such as air pollution, water pollution and beneficial modifications of the environment. This course will provide a basic understanding of interactions between chemical compounds, whether anthropogenic or natural, and the environment. Prerequisites: CHEM 1307 or CHEM 2323 with minimum grade of C.

CHEM 340 - Quantitative & Instrumental Analysis
Hours: 4
Quantitative and Instrumental Analysis. Four semester hours (2 lecture, 8 lab). The theories and techniques of classical quantitative analysis and modern instrumental analysis will be covered. Prerequisite: CHEM 1312 with a minimum grade of C.

CHEM 341 - Advanced Chemistry I
Hours: 3
The course is one of the two courses that combine the basic theory and applications of existing advanced chemistry courses, including CHEM 2325, 340, 351, 352, 414, 415, and 441 into two courses that meet the needs of high school teachers. Prerequisites: CHEM 2323 with a minimum grade of C.

CHEM 342 - Advanced Chemistry II
Hours: 3
The course is one of the two courses that combine the basic theory and applications of existing advanced chemistry courses, including CHEM 2325, 340, 351, 352, 414, 415, and 441 into two courses that meet the needs of high school teachers. Prerequisites: CHEM 2323 with a minimum grade of C.

CHEM 351 - Physical Chemistry
Hours: 4
This course introduces the student to the field of physical chemistry, and consists of a presentation of the fundamental theories of chemistry, involving a detailed study of the properties of matter in the gaseous, liquid, and solid states. Properties of solutions, colloids, and elementary principles of thermodynamics and thermochemistry are given extensive consideration. Prerequisites: CHEM 1312 or equivalent with a minimum grade of C; MATH 2414 with a minimum grade of C, PHYS 2426 with a minimum grade of C (may be taken concurrently), or consent of the instructor.

CHEM 352 - Physical Chemistry
Hours: 4
A continuation of Chemistry 351 including a detailed study of chemical kinetics, atomic structure, and quantum mechanics. Prerequisites: PHYS 2426 and MATH 2414 with a minimum grade of C or consent of the instructor.

CHEM 361 - Physical Biochemistry
Hours: 3
This course explores the fundamental concepts of physical chemistry and their application to understanding how biological systems behave. This includes an overview of the basic laws of thermodynamics, quantum mechanics, biochemical equilibria, reaction rates and kinetics in biological reactions, and molecular spectroscopy. Prerequisites: CHEM 2325 Organic Chemistry II; MATH 2414, Calculus II.

CHEM 371 - Science and Math Education Theory and Practice
Hours: 1
Learning theory and teaching practices for science and math learning assistants. Topics include advanced questioning strategies, conceptual development, formative assessment, argumentation, metacognition, and nature of science. Crosslisted with: PHYS 371, BSC 371, MATH 371. Prerequisites: Instructor approval.

CHEM 397 - Special Topics
Hours: 1-4
Special Topics. One to four semester hours. Organized class. May be repeated when topics vary.

CHEM 401 - Chemical Sci & Profession
Hours: 1
One semester hour. (1, 2) Topics in chemical research, professional concerns, and employment trends are treated in seminar format. The course may be taken as many as four times for credit. This course integrates students' knowledge from other chemistry courses and prepares student for future careers. Prerequisites: CHEM 2325 with a minimum grade of C is the prerequisite. Crosslisted with: CHEM 501.

CHEM 414 - Biochemistry
Hours: 4
Structure and function of large and small biomolecules involved in metabolism and information transfer in living organisms. The course treats both chemical and biological processes and their mechanisms. For students majoring in chemistry and life sciences, especially those interested in scientific, medical, or similar professional career. Prerequisites: CHEM 2325 with a minimum grade of C or concurrent enrollment.

CHEM 415 - Advanced Inorganic Chemistry
Hours: 4
Advanced study of inorganic reactions and mechanisms based on modern structural concepts. Prerequisites: CHEM 2325 with a minimum grade of C.

CHEM 416 - Special Topics in Advanced Organic Chemistry
Hours: 3
Topics of current interest in advanced organic chemistry. Prerequisites: CHEM 2325 with a minimum grade of C and consent of the instructor.

CHEM 417 - Advanced Biochemistry
Hours: 3
Advanced study of biochemistry from the standpoint of interrelationships between metabolic pathways and control mechanisms. Topics to be covered include the metabolism of lipids, amino acids and nucleotides, exploring the mechanisms behind bacterial photosystems and plant photosynthesis as well as comprehending the biochemical basis of DNA replication, RNA transcription, processing of transcripts and protein synthesis. Prerequisites: CHEM 314 or CHEM 414-414L with minimum grade of C.

CHEM 418 - Undergraduate Research
Hours: 1-3
Undergraduate Research. One to three semester hours. (1, 2, 3). Individual research project under the guidance of a faculty member. May be repeated for up to six (6) hours credit. Prerequisites: Consent of the faculty prior to registration.

CHEM 421 - Chemistry Lab Design I
Hours: 4
The course is one of the two courses that combine the design, development, setup, and operation of laboratories of existing chemistry courses, including CHEM 2325, 340, 351, 352, 414, 415, 441 into two courses which meet the needs of high school teachers.

CHEM 422 - Chemistry Lab Design II
Hours: 4
The course is one of the two courses that combine the design, development, setup, and operation of laboratories of existing chemistry courses, including CHEM 2325, 340, 351, 352, 415, 415, and 441, into two courses which meet the needs of high school teachers. Prerequisite: CHEM 2323 with a minimum grade of C.

CHEM 441 - Instrumental Analysis
Hours: 4
Instrumentation and laboratory techniques that are used in the modern analytical laboratory are discussed. The lecture presents the phenomenological basis for the techniques, applicability of the technique, and the instrument design. The laboratory demonstrates the use of some of the instruments. Some of the techniques that are discussed are: ultraviolet and visible, fluorescence and phosphorescence, flame emission and atomic absorption, infrared and Raman, X-ray, nuclear magnetic resonance, and mass spectroscopy. Chromatography and electroanalytical methods are also discussed. Prerequisites: CHEM 340-340L with a minimum grade of C or consent of the instructor.

CHEM 450 - Biotechnology and Applied Biochemistry
Hours: 3
This is a one-semester course that serves as an introduction to the role of biochemistry in biotechnology. The course topics include examples how the field of biochemistry has impacted a variety of biotechnological applications using bacterial, plants and animals such as the synthesis of biologically important products. Prerequisites: CHEM 2325 Organic Chemistry II; CHEM 414-414L Biochemistry-Biochemistry Laboratory.

CHEM 452 - Proteins and Enzymes
Hours: 3
An in-depth analysis of the structure and function of proteins and a special class of proteins called enzymes. The course will explore protein structure, protein motifs, protein domains, membrane proteins, glycoproteins, allosteric proteins, enzyme classification, mechanisms of enzyme function, enzyme kinetics and the importance of enzymes to metabolism. Prerequisites: CHEM 2325 Organic Chemistry II; CHEM 414-414L Biochemistry-Biochemistry Laboratory.

CHEM 489 - Independent Study
Hours: 1-6
Independent Study. One to four semester hours. Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member. May be repeated when the topic varies. Prerequisite: Consent of department head.

CHEM 490 - H Honors Thesis
Hours: 1-6
Honors Thesis. One to six semester hours.

CHEM 491 - H Ind Honors Readings
Hours: 1-3
Honors Readings. One to three semester hours.

CHEM 497 - Special Topics
Hours: 1-4
Special Topics. One to four semester hours. Organized class. May be repeated when topics vary.