

Northeast Texas Community College &  
Texas A&M University – Texarkana  
2019-2020 Guided Pathways

Associate of Science in Chemistry to  
Bachelor of Science in Chemistry

| NTCC                     |           | A&M-TEXARKANA |            |
|--------------------------|-----------|---------------|------------|
| COURSES                  | HOURS     | COURSES       | HOURS      |
| ENGL 1301                | 3         | CHEM 321      | 4          |
| SPCH 1315 (or) SPCH 1321 | 3         | CHEM 340      | 4          |
| MATH 2413                | 4         | CHEM 351      | 4          |
| CHEM 1411                | 4         | CHEM 410      | 4          |
| CHEM 1412                | 4         | CHEM 497      | 4          |
| PHIL 2306*               | 3         | CHEM 352      | 4          |
| ARTS 1301*               | 3         | CHEM 405      | 3          |
| HIST 1301                | 3         | CHEM 411      | 3          |
| HIST 1302                | 3         | CHEM 421      | 3          |
| GOVT 2305                | 3         | CHEM 440      | 4          |
| GOVT 2306                | 3         | CHEM 479      | 3          |
| PSYC 2301*               | 3         | CHEM 499      | 1-6        |
| ENGL 2311                | 3         | MATH 357      | 3          |
| PHYS 2425                | 4         |               |            |
| CHEM 2423                | 4         |               |            |
| CHEM 2425                | 4         |               |            |
| PHYS 2426                | 4         |               |            |
| PHED*                    | 2         |               |            |
| OTHER REQUIREMENTS:      |           |               |            |
| BIOL 1406                | 4         |               |            |
| BIOL 1407                | 4         |               |            |
| MATH 2414                | 4         |               |            |
| <b>TOTAL</b>             | <b>72</b> | <b>TOTAL</b>  | <b>121</b> |

\*Other Courses may Apply. See NTCC Degree Plan for Options

46 Upper Division (UD) Hours Required for the BS Degree

30 Hours of Residency Required

Travel to Main Campus in Texarkana Required to Complete Degree

UD= Upper Division

LD= Lower Division

Effective September 1, 2019 – August 31, 2024.

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## Texas A&M University – Texarkana Course Descriptions

**CHEM 1111. General Chemistry I (Lab). 1 Hour.** This course introduces students to basic laboratory experiments supporting theoretical principles presented in [CHEM 1311](#). The course introduces the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports. Corequisite: [CHEM 1311](#).

**CHEM 1112. General Chemistry II (Lab). 1 Hour.** This course introduces students to basic laboratory experiments supporting theoretical principles presented in [CHEM 1312](#). Students will be introduced to the use of the scientific method in experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports. Prerequisite: [CHEM 1111](#). Corequisite: [CHEM 1312](#).

**CHEM 1117. General Chemistry for Engineering Students Lab. 1 Hour.** This course introduces students to basic laboratory experiments supporting theoretical principles presented in [CHEM 1307](#). The course introduces to the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports. Corequisite: [CHEM 1307](#).

**CHEM 1305. Introductory Chemistry. 3 Hours.** This course surveys basics of a wide range of Chemistry concepts. Topics include fundamental properties of matter, atomic structure, chemical bonding, molecular structure, solutions, chemical reactions, properties of gases, chemical equilibrium, acid-based concepts, kinetics, electrochemistry, nuclear chemistry, and an introduction to organic and biomolecules. It is a course designed for non-science, pre-nursing, and allied health students. This course is intended to provide students with a background in chemistry so that other courses such as, pharmacology and food & nutrition, can be appreciated on a molecular level. Familiarity with algebra is needed to solve problems in the course.

**CHEM 1307. General Chemistry for Engineering Students. 3 Hours.** This course provides engineering students with a background in important concepts and principles of chemistry. The course emphasizes those areas engineers consider most relevant in an engineering context and examines practical applications in engineering and technology. Prerequisite: [MATH 1314](#) or [MATH 2412](#). Corequisite: [CHEM 1117](#).

**CHEM 1311. General Chemistry I. 3 Hours.** This course covers the fundamental principles of chemistry. This course is the first of two general chemistry courses offered sequentially for majors in biological, health, and physical sciences. Topics include measurements, fundamental properties of matter, states of matter, chemical reactions, chemical stoichiometry, periodicity of elemental properties, atomic structure, chemical bonding, molecular structure, solutions, properties of gases, and an introduction to thermodynamics and descriptive chemistry. Prerequisite: [MATH 1314](#) or [MATH 2412](#). Corequisite: [CHEM 1111](#).

**CHEM 1312. General Chemistry II. 3 Hours.** This course is the second course of the general chemistry sequence. Topics include chemical equilibrium, phase diagrams and spectrometry, acid-base concepts, thermodynamics, kinetics, electrochemistry, nuclear chemistry, and an introduction to organic

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chemistry and descriptive organic chemistry. Prerequisite: [CHEM 1111](#) and [CHEM 1311](#). Corequisite: [CHEM 1112](#).

**CHEM 2423. Organic Chemistry I. 4 Hours.** This course is the first of a comprehensive and somewhat rigorous survey of organic chemistry emphasizing nomenclature, structure, properties, synthesis, and reaction mechanisms of carbon compounds. Prerequisite: [CHEM 1312](#) with a grade of C or better.

**CHEM 2425. Organic Chemistry II. 4 Hours.** This course is the second semester of Organic Chemistry sequence emphasizing the classes of aliphatic and aromatic compounds that contain oxygen and nitrogen. Prerequisite: [CHEM 2423](#).

**CHEM 289. Independent Study. 1-4 Hours.** This course provides individual instruction. Students may repeat the course when topics vary.

**CHEM 321. Inorganic Chemistry. 4 Hours.** This course focuses on descriptive inorganic chemistry. It covers bonding theories, redox chemistry, properties of main group and transition metals, ligand field theory, molecular magnetism, and electronic spectra in transition metal complexes. Prerequisites: [CHEM 1111](#), [CHEM 1112](#), [CHEM 1311](#), and [CHEM 1312](#).

**CHEM 340. Quantitative Chemical and Instrumental Analysis. 4 Hours.** This course covers fundamental theory and techniques in traditional chemical analysis. Topics include sampling and separation methods, measurements, statistics, equilibrium and pH studies, gravimetric and combustion analysis, electrochemical techniques, and introduction to instrumentation. Biology minors in Environmental Science require this course. Prerequisite: [CHEM 1312](#) with a grade of C or better.

**CHEM 351. Physical Chemistry I. 4 Hours.** This course is an introduction to quantum mechanics, solvable model problems, chemical kinetics, rigorous treatments of the first, second, and third laws of thermodynamics, as well as applications to gases (both ideal and real), liquids, solutions, and phase equilibria. Prerequisite: [MATH 2413](#), [PHYS 2325](#), and [PHYS 2326](#).

**CHEM 352. Physical Chemistry II. 4 Hours.** This course covers the following: quantum mechanics of many electron systems and approximate methods; chemical bonding and the electronic structure of molecules; rotational, vibrational, and electronic spectroscopy; statistical thermodynamics; and electrochemistry. Prerequisite: [CHEM 351](#).

**CHEM 405. Environmental Chemistry. 3 Hours.** This course is an application of chemical principles to the study of the environment. It includes natural processes and pollution problems related to air, water, and soil. Biology minors in Environmental Science require this course. Prerequisite: [CHEM 1311](#) and [CHEM 1312](#) with a grade of C or better.

**CHEM 410. Biochemistry I. 4 Hours.** Biochemistry I is the first semester of a one-year course. The first semester covers the structures and functions of amino acids, proteins, and simple and complex carbohydrates. This course also covers carbohydrate metabolism, including glycolysis, gluconeogenesis and signal cascades in carbohydrate metabolism. The course emphasizes understanding biochemistry from a biological point of view and on providing information on how biochemical events are regulated in living tissues. Prerequisite: [CHEM 2423](#) and [CHEM 2425](#) with a C or better in both courses.

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**CHEM 411. Biochemistry II. 3 Hours.** Biochemistry II is the second semester of a one-year course. The second semester covers the structures and functions of lipids & cell membranes and nucleic acids. This course also covers metabolisms of biomolecules, including citric acid cycle, oxidative phosphorylation, and the biosynthesis of amino acids, proteins, lipids, DNA and RNA. The course emphasizes understanding biochemistry from a biological point of view and on providing information on how biochemical events are regulated in living tissues. Prerequisite: [CHEM 410](#).

**CHEM 421. Advanced Inorganic Chemistry. 3 Hours.** This course involves an in-depth study of chemical bonds, comparison of valence bond and molecular bond theories, coordination compounds, and inorganic nomenclature. Prerequisite: [CHEM 321](#) and [CHEM 352](#).

**CHEM 440. Instrumental Analysis. 4 Hours.** This course focuses on the theory and application of instrumental methods, such as high performance liquid chromatography (HPLC), gas chromatography (GC), infrared (IR) spectroscopy, nuclear magnetic resonance (NMR) spectroscopy, atomic absorption (AA) spectroscopy, and mass spectroscopy (MS). Prerequisite: [CHEM 340](#).

**CHEM 479. Capstone in Chemistry. 3 Hours.** This course provides instruction on topics and concepts in major area (i.e. physical, inorganic, organic, analytical, and biological) of chemistry. Prerequisite: Permission of instructor.

**CHEM 489. Individual Study. 1-4 Hours.** This course provides individual instruction. Students may repeat the course when topics vary.

**CHEM 497. Special Topics in Chemistry. 1-4 Hours.** This course provides instruction on special topics in an identified area of chemistry. Students may repeat the course for credit when topics vary. Prerequisite: Permission of instructor.

**CHEM 499. Independent Research. 1-6 Hours.** Independent research in Chemistry conducted by a student under the guidance of a faculty member of his or her choice. The student is required to maintain a research journal and submit a project report by the end of the semester and potentially make an oral presentation on the project. SCH and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.

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