

CHEMISTRY, SECONDARY CERTIFICATION OPTION

Bachelor of Science

The Bachelor of Science in Chemistry program with Secondary Teacher Certification option guides students in studying the properties, composition, and structure of substances, the transformations they undergo, and the energy changes that occur during these processes. Students gain a strong foundation of knowledge in chemistry and develop their scientific skills to succeed in secondary chemistry teaching careers or postgraduate study in the chemical sciences or the teaching field. Our chemistry program is housed in a state-of-the-art science facility with modern instrumentation, including FT-NMR, FTIR, GCMS, LCMS, HPLC, DSC, HPLC, flame AAS, and SEM. Guided by proficient faculty, students can choose from various authentic hands-on learning experiences, including undergraduate research, service learning, and internships. Students can also practice leadership skills and engage in professional development through involvement in the Chemist Honor Society or other registered student clubs. Students in this program will also study with the expert faculty in the School of Education, which uses the latest in pedagogical techniques, to prepare themselves for certification to teach science at the secondary level in middle or high schools. Secondary Teacher candidates move through the School of Education in cohorts. (PES I, II, III, and IV). The candidates will participate in field hours every semester (for a total of almost 1000 field hours) to hone the teaching side of their craft with the student teaching internship in PES IV.

Admission requirements for acceptance into the Secondary Professional Teacher Education program can be found on the Secondary Education (<http://catalog.daltonstate.edu/schoolofeducation/education/secondaryeducation/>) page.

Program Course Requirements

Click here to view Core IMPACTS General Education Curriculum requirements (<http://catalog.daltonstate.edu/programs/coreimpacts/>).

Program Advice (can share with CORE curriculum):

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| MATH 1113 | Precalculus Mathematics (Grade C or better Required) | 3 |
| COMM 1110 | Fundamentals of Speech (Grade C or better Required) | 3 |
| PSYC 1101 | Introduction to Psychology (Grade C or better Required) | 3 |
| MATH 2253 | Calculus and Analytic Geom I (Required) | 4 |
| PHYSICS LAB SCIENCE SEQUENCE (REQUIRED): | | 8 |
| PHYS 1111K & PHYS 1112K | Introductory Physics I and Introductory Physics II | |
| PHYS 2211K & PHYS 2212K | Principles of Physics I and Principles of Physics II | |

Click here to view Core IMPACTS General Education Curriculum requirements (<http://catalog.daltonstate.edu/programs/coreimpacts/>).

Core IMPACTS General Education Curriculum requirements 42

NOTE: Core IMPACTS courses can also satisfy requirements in your Program of Study. Please review the requirements for your major to prevent taking extra courses. The USG Core IMPACTS curriculum, is designed to ensure that students acquire essential knowledge in foundational academic areas and develop career-ready competencies. There are seven Core IMPACTS areas. Students at all USG institutions must meet the Core IMPACTS requirements in all specified areas.

Field of Study: Major Related

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| BIOL 1107K | Principles of Biology I | 4 |
| CHEM 1211K | Principles of Chemistry I ** | 4 |
| CHEM 1212K | Principles of Chemistry II ** | 4 |
| CHEM 2000 | Scientific Communication | 2 |
| MATH 2254 | Calculus and Analytic Geom II | 4 |

Required Chemistry Courses

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|------------|--------------------------------|---|
| CHEM 3211K | Organic Chemistry I | 4 |
| CHEM 3212K | Organic Chemistry II | 4 |
| CHEM 3311K | Quantitative Analysis | 4 |
| CHEM 3312K | Instrumental Methods of Analys | 4 |
| CHEM 3411K | Physical Chemistry I | 4 |
| CHEM 4000 | Senior Seminar | 2 |
| CHEM 4110K | Advanced Inorganic Chemistry | 4 |

Upper Level Elective

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| Choose one of the following upper level electives: | | 3-4 |
| CHEM 3500 | Biochemistry | |
| CHEM 3700K | Environmental Chemistry | |

Education Courses

Prior to enrollment in EDUC 2110 / EDUC 2150, EDUC 2120, and EDUC 2130, students must have completed ENGL 1101 with a grade of C or better. Prior to enrollment in EDUC 2130 and EDUC 2150 students must have completed PSYC 1101 with a grade of C or better. Approved background check, proof of professional liability insurance, completion of the mandated reporter training course, and a score of "100" on an ethics assessment are also required.

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| EDUC 2110 | Investig Critical/Contem Issue (Includes 10 hrs of practicum) | 3 |
| or EDUC 2150 | Topics in Education | |
| EDUC 2120 | Expl Socio-Cultural Perspect (Includes 10 hrs of practicum) | 3 |
| EDUC 2130 | Exploring Learning/Teaching (Includes 10 hrs of practicum) | 3 |

Professional Education Semester 1 (PES I) - Fall Semester

Prior to enrollment in PES I courses, students must be accepted to the Teacher Education Program and have completed CHEM 1211K and CHEM 1212K with grades of C or better.

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| EDUC 3272 | Class Mgmt Sec Ed Field Exp I | 2 |
| EDUC 3902 | Curric/Asses Secondary Teacher | 3 |

Professional Education Semester 2 (PES II) - Spring Semester

Prior to enrollment in PES II courses, students must have completed EDUC 3902 and EDUC 3272 with grades of C or better.

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| EDUC 3273 | Class Mgmt Sec Ed Field Exp II | 2 |
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| EDUC 4902 | Meth/Strat Teach STEM Sec | 3 |
| Professional Education Semester 3 (PES III) - Fall Semester | | |
| Prior to enrollment in PES III, students must have completed EDUC 3273 and EDUC 4902 with grades of C or better. | | |
| EDUC 3120 | Teaching Diverse Learners(Sec) ⁺ | 3 |
| EDUC 3274 | Class Mgm Sec Ed Field Exp III | 2 |
| Professional Education Semester 4 (PES IV) - Spring Semester | | |
| Prior to enrollment in PES IV, students must have completed EDUC 3120 with a grade of B or better (required for certification) and EDUC 3274 and all upper division coursework in the major with grades of C or better. | | |
| READ 3456 | Reading across Curric Sec Educ | 3 |
| EDUC 4953 | Teaching Internship Seminar | 1 |
| EDUC 4954 | Internship Sec School Chem | 8 |
| Total Hours | | 125-126 |

** Completion of CHEM 1211K and 1212K with grades of C or better are required for candidates seeking certification in Secondary Chemistry.

**ENGL 1101 is a prerequisite for EDUC 2110 and 2120. ENGL 1101 and PSYC 1101 are prerequisites for EDUC 2130 and EDUC 2150. Grades of C or better are required.

+ Secondary candidates must earn a grade of B or better in EDUC 3120, Teaching Diverse Learners (a requirement for certification).

Courses

CHEM 1151K. Survey of Chemistry. 3-3-4 Units.

Introduces the fundamentals of chemistry including general principles of atomic structures, bonding, reactions, gases, water, solutions, pH and elementary organic chemistry and biochemistry.(S)

Prerequisites: MATH 1001, 1101, or 1111 and ENGL 0999 unless exempt.

CHEM 1211K. Principles of Chemistry I. 3-3-4 Units.

Explores the discipline of chemistry through an understanding of the basic laws and properties of matter, stoichiometry, atomic structure, chemical bonding, gas laws, solutions and the physical states of matter. Requires laboratory experimentation which illustrates applications of concepts studied in lecture.(F,S,M)

Prerequisites: MATH 1111 with a grade of "C" or better, ENGL 0999 unless exempt.

CHEM 1212K. Principles of Chemistry II. 3-3-4 Units.

Continues the exploration of the discipline of chemistry begun in CHEM 1211. Focuses on the more quantitative aspects of chemistry including chemical equilibria, kinetics, acid-base, solubility product, electrochemistry and coordination compounds. Requires laboratory development of techniques necessary to identify common metallic and non-metallic ions.(F,S,M)

Prerequisites: CHEM 1211K.

CHEM 2000. Scientific Communication. 2-0-2 Units.

An introduction to the principles of ethics in the chemical sciences. Also, the infrastructure of scientific scholarship is introduced with an emphasis on interaction with the scientific community, responsible conduct in research, and communication of scientific findings.(F)

Prerequisites: CHEM 1211K Corequisites: CHEM 1212K.

CHEM 3211K. Organic Chemistry I. 3-3-4 Units.

Introduces the chemistry of organic compounds including aliphatic and aromatic hydrocarbons, stereochemistry, monofunctional compounds and some polyfunctional compounds. Requires the illustration of techniques for synthesis, separation, purification and identification of organic compounds in the laboratory.(F,S,M)

Prerequisites: CHEM 1212K.

CHEM 3212K. Organic Chemistry II. 3-3-4 Units.

Continues the exploration of the chemistry of organic compounds with an emphasis on the characteristics and reactions of a variety of functional groups. Requires the illustration of techniques for synthesis, separation, purification and identification of organic compounds in the laboratory. (F,S,M)

Prerequisites: CHEM 3211K.

CHEM 3311K. Quantitative Analysis. 3-4-4 Units.

Introduction to statistics. The use of spreadsheets. Principles and techniques of volumetric analysis. Concepts of chemical equilibria as applied to acid-base, precipitation, and complex ion reactions. Electrochemistry and potentiometry. Introduction to spectroscopy and chromatography.(F,S)

Prerequisites: CHEM 1212K and MATH 1113.

CHEM 3312K. Instrumental Methods of Analys. 3-3-4 Units.

Theoretical principles and uses of modern instrumental methods covering: measurement theory, atomic spectroscopy, molecular spectroscopy, mass spectrometry, electrometry, electroanalysis and chromatographic separations.(S)

Prerequisites: CHEM 3311K.

CHEM 3411K. Physical Chemistry I. 3-3-4 Units.

A study of macromolecular phenomena in terms of micro molecular concepts including the gas state and thermodynamic.(F)

Prerequisites: CHEM 1212K, MATH 2254, PHYS 1112K or PHYS 2212K.

CHEM 3412K. Physical Chemistry II. 3-3-4 Units.

A continuation of CHEM 3411K including liquid and solid state, kinetics, and equilibria.(S)

Prerequisites: CHEM 1212K, MATH 2254, and PHYS 1112K or PHYS 2212K.

CHEM 3500. Biochemistry. 3-0-3 Units.

The chemical aspects of protein, carbohydrate, lipid, and nucleic acid, and enzyme function, bioenergetics, metabolism, photosynthesis, nuclei acid function, and protein biosynthesis.(S,M)

Prerequisites: BIOL 1107K and CHEM 3211K.

CHEM 3700K. Environmental Chemistry. 3-3-4 Units.

This course will cover the environmental chemistry involving the transport, distribution, reactions, and speciation of inorganic, organometallic and organic chemicals occurring in the air, soil and water environments at the local, national and global scale. Environmental transformations and degradation processes, toxicology, pollution and hazardous substances will be discussed(F)

Corequisites: CHEM 3211K.

CHEM 3900. Readings in Chemistry. 0-0-2 Units.

Independent in-depth study of the literature within a topic of current research in Chemistry. Approval of a faculty supervisor required before registration.(F,S, M)

Prerequisites: 12 hours of Chemistry and permission of the instructor.

CHEM 4000. Senior Seminar. 2-0-2 Units.

Survey of various topics, especially highlighting the interdisciplinary nature of chemistry.(S)

Prerequisites: 12 hours of upper level chemistry.

CHEM 4110K. Advanced Inorganic Chemistry. 3-3-4 Units.

Advanced theories of bonding and structure in inorganic chemistry with emphasis on ligand field theory, bioinorganic chemistry, and organometallic chemistry(S)

Prerequisites: CHEM 3212K, CHEM 3311K.

CHEM 4120. Drug Action and Drug Design. 3-0-3 Units.

This course is intended to introduce chemistry and biology students the key concepts in medicinal chemistry that overlaps the disciplines of a variety of science fields extended from chemistry and biology. This course will primarily consist of molecular mechanisms of drug target interactions in the body and drug design strategies for improving drug action. Some discussion will be devoted to specific drug classes, but the primary focus of the course will be acquiring the chemistry and theory of general drug action and drug design. This course will include limited hands-on experience using available computer programs in medicinal chemistry. (S) Prerequisite(s): CHEM 3212K or permission of instructor.

CHEM 4420. Adv Organic Spectroscopy. 3-0-3 Units.

This course is intended to introduce the spectroscopic methods used in the modern determination of organic structures. This will primarily consist of the study of mass spectrometry (MS), infrared (IR) spectroscopy, and nuclear magnetic resonance (NMR) spectrometry. Some discussion will be devoted to instrumental methods, but the primary focus of the course will be acquiring skill in the interpretation of this spectral data. This course will include hands-on experience using instrumentation. (F even-numbered years) Prerequisites: CHEM 3212K

CHEM 4430. Advanced Organic Chemistry. 3-0-3 Units.

A study of organic reactions and mechanisms which builds on the foundations of Organic Chemistry I and II (CHEM 3211K/3212K). Topics may include carbonyl compounds, amines, pericyclic reactions, organometallics, and synthetic polymers.(F odd-numbered years) Prerequisites: CHEM 3212K.

CHEM 4800. Service Learning in Chemistry. 0-0-1-4 Unit.

A lecture assistantship or laboratory assistantship within a chemistry course here at Dalton State. Repeatable for a maximum of 4 credit hours. (F,S,M)

Prerequisites: Approval of both a faculty supervisor and department chair.

CHEM 4860. Internship in Chemistry. 0-0-1-4 Unit.

A supervised, credit-earning work experience of one academic semester with a previously approved business firm, private agency or government agency. Repeatable for a maximum of 4 credit hours. (F,S,M).

Prerequisites: Permission of department chair.

CHEM 4900. Special Topics in Chemistry. 0-0-1-4 Unit.

Advanced concepts in chemistry will be presented, the detailed content varying from year to year. Course may be repeated for credit when topic differs.(Offered as Needed)

Prerequisites: CHEM 1212K and permission of instructor.

CHEM 4960. Research in Chemistry. 0-0-1-4 Unit.

Research project conducted by a student under guidance of a faculty member. Variable 1-4 hours. Repeatable for a maximum of 4 hours.(F,S,M)

Prerequisites: CHEM 1212K and approval of both a faculty supervisor and department chair.