Required Coursework for Secondary Education Chemistry Certification (grades 7-12)

CHE 104 General Chemistry I (3 cr):
Study of basic principles and theories of chemistry including stoichiometry, atomic and molecular structures, the periodic law and its application, solutions, and gas laws. Problem solving is introduced. Three hours lecture per week. Co-requisite: CHE 110 or 112.

CHE 105 General Chemistry II (3 cr):
Introductory thermodynamics, kinetics, acid bases, chemical equilibrium, electro-chemistry and fundamental descriptive chemistry. Prerequisites: CHE 104, 110 or 112; CHE 111.

CHE 107 Laboratory Safety (1 cr):
Basic study of all laboratory safety rules and regulations including fire hazards, chemical toxicity, waste control, explosive chemicals, emergency procedures, protective equipment, and laboratory equipment hazards. Required: science majors.

CHE 110 General Chemistry I Lab (1 cr):
Laboratory techniques will be discussed and applied to the solution of typical chemical problems and the experimental nature of chemistry. Three hours of laboratory per week. Co-requisite: CHE 104.

CHE 111 General Chemistry II Lab (1 cr):
Laboratory techniques emphasizing qualitative analysis. Three hours of laboratory per week. Prerequisites: CHE 104, 110 or 112; Co-requisite: CHE 105.

CHE 201 Organic Chemistry I (3 cr):
Study of fundamental principles of organic chemistry emphasizing topics involving structure, reactivity, bonding, stereochemistry, acids and bases, electrophilic addition and nucleophilic substitution. Three hours lecture per week. Prerequisites: CHE 104, 105, 110 or 112, 111; Co-requisite: CHE 210.

CHE 202 Organic Chemistry II (3 cr):
Study of functional groups, reaction mechanisms and problems in synthesis. Three hours lecture per week. Prerequisites: CHE 201, 210; Co-requisite: CHE 211.

CHE 210 Organic Chemistry I Lab (1 cr):
Study and practice in the basic techniques employed in an organic chemistry laboratory including crystallization, melting point determination, extraction, chromatography, distillation and other techniques for the isolation and purification of organic compounds. Three hours of laboratory per week. Prerequisites: CHE 104, 110; 105, 111 or 112. Co-requisite: CHE 201.

CHE 211 Organic Chemistry II Lab (1 cr):
Focus is placed on the chemical synthesis of organic compounds using routine reactions including nucleophilic substitution and elimination, Williamson ether synthesis, Aldol and Claisen condensations, aromatic substitution, and condensation polymerization. Three hours of laboratory per week. Prerequisites: CHE 201, 210. Co-requisite: CHE 202, CHE 212.
CHE 212 Analytic Chemistry (4 cr)
Quantitative study of gravimetric and volumetric methods of analysis with emphasis on problem solving. Other topics will include a survey on the use of instrumental methods of analysis. Attention will be directed primarily to practical aspects of solving analytical problems. Integrates laboratory and classroom work. Prerequisite: CHE 104, 105, 110 or 112, 111.

CHE 301 Physical Chemistry I (3 cr):
Study of properties of gases, laws of thermodynamics and thermochemistry. 3 hours lecture/week. Prerequisites: CHE 104, 105, 110 or 112, 111.

CHE 302 Physical Chemistry II (3 cr):
Emphasis on reaction kinetics, solution properties, electrochemistry and macromolecules. Three hours lecture per week. Prerequisite: CHE 301. Co-requisite: CHE 303.

CHE 401 Biochemistry (3 cr):
Study of proteins, enzymes, carbohydrates, lipids and nucleic acids in relationship to biological and metabolic processes. Prerequisites: CHE 104, 105, 110 or 112, 111; 201, 210; 202, 211.

CHE 410 Biochemistry Lab (1 cr):
Advanced studies in the isolation, purification and characterization of proteins and nucleic acids. An introduction to separation techniques like chromatography, electrophoresis and the evaluation of enzyme activity is provided, as well as an exploration into the basic techniques employed for the isolation, purification and manipulation of DNA. Three hours of laboratory per week. Prerequisites: CHE 104, 105, 110 or 112, 111, 201, 202, 210, 211. Corequisite: CHE 401.

Related Requirements for Secondary Education Chemistry Certification
BIO 103 Principles of Biology (4 cr):
Provides a survey of important biological concepts and principles to all living organisms. Topics include prokaryotic and eukaryotic cells, energetic, comparative physiology, evolution and ecology. Integrates laboratory and classroom work. This course is limited to science majors, biology minors, and biology-secondary education majors.

BIO 104 Zoology (4 cr):
Investigative survey of life processes common in animals. Gas exchange, internal transport, nervous and endocrine control, reproduction, and homeostatic mechanisms are major topics included. Integrates laboratory and classroom work. Prerequisite: BIO 103 or permission of the instructor.

PHY 110 General Physics I (4 cr):
Introduction to standard non-calculus college physics course. Topics include Newton’s laws of motion, work, energy, impulse, momentum, properties of solids, liquids, and gases, heat, and the laws of thermodynamics. Course includes three hours laboratory per week. Prerequisite: high school algebra.

PHY 111 General Physics II (4 cr):
Continuation of Physics I. Topics include wave phenomena, electricity, magnetism, light, sound, optics, relativity and quantum theory. Prerequisite: PHY 110.
MAT 230 Calculus I (4 cr):
This course is an introduction to limits, continuity, differentiation, integration and their applications. Prerequisite: four years high school mathematics or MAT 131, or satisfactory score on the Mathematics Placement Test.

MAT 231 Calculus II (4 cr):
This course includes applications and techniques of integration, derivatives and integrals of trigonometric, exponential and logarithmic functions. Techniques of integration. Prerequisite: MAT 230.

PSY 210 Educational Psychology (3 cr):
Investigates principles and practices related to learning and variety of factors that affect it. Prerequisite: PSY 101.