

CHEMISTRY (CHE)

CHE 501 QUANTITATIVE CHEMICAL ANALYSIS

3, 2/6

Not open to students who have had CHE 301 or equivalent. Advanced theoretical background and laboratory techniques required for quantitative and qualitative chemical analysis; emphasis on fundamental principles and applications of gravimetric, volumetric, electrochemical, and spectrophotometric analytical techniques; statistics for experimental data handling; conducting independent chemical analysis projects.

CHE 530 ADVANCED ENVIRONMENTAL CHEMISTRY

3, 3/0

Suggested Prerequisite: CHE 201 or equivalent. Chemistry of the environment, air, water, soil, living environments, and the effects of technology thereon; the atmosphere, industrial ecosystems, phase interactions, water pollution and treatment, air pollution, global warming and green chemistry, smog, hazard wastes, soil chemistry, and toxicological chemistry.

CHE 540 SPECIAL TOPICS IN ORGANIC CHEMISTRY

3, 3/0

Suggested Prerequisite: CHE 202 or equivalent. Advanced topics, discussed in detail, with emphasis on the current state of knowledge; topics are essentially independent of each other. Class may be repeated, provided that a student has not already received credit for the same topic.

CHE 550 ADVANCED PHYSICAL CHEMISTRY

4, 4/0

Prerequisites: Graduate status and instructor permission. Advanced study of thermodynamics and quantum mechanics, with applications to chemical problems.

CHE 560 SPECIAL TOPICS IN INORGANIC CHEMISTRY

3, 3/0

Suggested Prerequisite: CHE 462 or equivalent. One of the following topics, presented in detail: coordination chemistry, nonaqueous solvents, the representative elements and lanthanides, synthetic inorganic chemistry. Topics are essentially independent of each other. Class may be repeated, provided that a student has not already received credit for the same topic.

CHE 571 BIOCHEMICAL PRINCIPLES I

3, 3/0

Prerequisites: CHE 202 or equivalent; BIO 211 or BIO 214 recommended; not open to students who have taken CHE 470 or equivalent. Molecular structure and function of the four major classes of biomolecules: proteins, nucleic acids, lipids, and carbohydrates. Enzyme kinetics, mechanism, and regulation. Molecular nature of DNA replication; introduction to recombinant DNA technology.

CHE 572 ADVANCED BIOCHEMISTRY

3, 3/0

Suggested Prerequisite: CHE 571 or CHE 470 or equivalent; not open to students who have had CHE 472 or equivalent. Examination of metabolic processes in living systems. Relationship of metabolic enzyme activity to cellular control. The chemistry of genetic information, storage and expression.

CHE 588 TOPICS COURSE

3, 3/0

CHE 590 INDEPENDENT STUDY

1-3, 0/0

Independent investigation into a specific area of chemistry. Topic selected by student in consultation with a faculty member.

CHE 596 GRADUATE CONFERENCE IN CHEMISTRY

1-3, 3/0

Participation in a regional, national, or international conference in the field of chemistry overseen by a faculty member. Offered occasionally.

CHE 598 GRADUATE MICRO-COURSE

1-3, 0/0

Examination of significant disciplinary issues, topics, or practices.

Equivalent Course: FOR 598

CHE 620 KINETICS AND REACTION MECHANISMS

4, 4/0

Suggested Prerequisites: CHE 202, CHE 306 or CHE 550, and CHE 462 or instructor permission. Methods of determining mechanisms of chemical processes. Required for all M.A. in chemistry candidates.

CHE 626 SYMMETRY, GROUP THEORY, AND VIBRATIONAL SPECTROSCOPY

1, 1/0

Prerequisites: CHE202 and CHE204 or equivalents. Symmetry, point groups, and simple applications of group theory, with special emphasis on the vibrational spectroscopy of small molecules. Use of the department's IR spectrometers.

CHE 627 X-RAY CRYSTALLOGRAPHY

1, 1/0

Prerequisites: CHE 202 AND CHE 204 or equivalents. The seven crystal systems, 14 Bravais lattices, 32 crystallographic point groups, 230 space groups, the theory of X-ray diffraction, and the methods of crystal structure determination. Data mining using structural databases (Brookhaven Protein Data Bank and Cambridge Structural Database) for various applications in organic, coordination, pharmaceutical, and forensic chemistry. Collecting powder and/or single crystal diffraction data on the department's X-ray diffractometers; solving and refining a crystal structure using the appropriate software packages.

CHE 628 NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

1, 1/0

Prerequisites: CHE 202 and CHE 204 or equivalents. Theory and practice of nuclear magnetic resonance spectroscopy, including pulse and two-dimensional methods. Use of the department's NMR spectrometer.

CHE 629 MASS SPECTROMETRY

1, 1/0

Prerequisites: CHE202 and CHE204 or equivalents. Theory and practice of mass spectrometry. Basic physics of mass spectrometry and ionization methods. Gas phase chemistry, rearrangements, and ion molecule reactions. Use of the department's electron impact ionization and electrospray mass spectrometers.

CHE 670 BIOMOLECULES: PROTEINS, NUCLEIC ACIDS, AND ENZYMES

3, 3/0

Prerequisites: CHE202 or equivalent. Structure-function relationships in proteins, enzymes, and nucleic acids. Introduction to biochemical techniques for the study of proteins, nucleic acids, and enzymes. Examination of the molecular basis of enzyme function, signal transduction, and neural and sensory responses in living systems.

CHE 672 FORENSIC MOLECULAR BIOLOGY

4, 3/3

Prerequisites: CHE 470 D or BIO 305 and BIO 303 or BIO 350 and FOR 612 or CHE 312 or equivalents. Applications of biology, biochemistry, and genetics to forensic science with an in-depth look at the evidential information that can be obtained from blood, semen, saliva, and hair. Details of DNA profiling, including DNA extraction, DNA quantification, PCR amplification, STR analysis and interpretation, and mtDNA sequencing. Protein polymorphisms and immunological tests. Laboratory component providing hands-on experience with techniques commonly used in a forensic biology laboratory.
Equivalent Course: BIO 672

CHE 680 ADVANCED ANALYTICAL CHEMISTRY

3, 3/0

Prerequisites: CHE 501 or equivalent, or instructor permission. A study of chemical analysis using representative instrumental techniques, including spectroscopy, chromatography, and mass spectroscopy; emphasis on fundamental theory, principles of operation, capabilities, and limitations of various analytical instruments; integration of laboratory-based demonstrations of data collection and analysis using selected analytical techniques.

CHE 690 MASTER'S PROJECT

1-4, 0/0

A study on a problem of special interest planned and executed with consultation and advisement from the instructor and the student's project committee. The project will be submitted in acceptable form according to directions given by the Chemistry Department and presented orally to an audience of Chemistry Department faculty and students.

CHE 698 JOURNAL SEMINAR

1, 1/0

Prerequisites: Matriculated status in the M.S. in Forensic Science program or instructor permission. Examination of methods used to compose and deliver an effective seminar in the sciences. Searching the scientific literature. Oral presentation of a topic from the current literature in chemistry or forensic science. Required of all students in the M.S. in Forensic Science program.

CHE 699 THESIS SEMINAR AND DEFENSE

2, 2/0

Prerequisites: CHE 698. Oral presentation of master's thesis research at a departmental seminar. Defense of master's thesis to thesis committee. Required of all students in the M.S. in Forensic Science program.

CHE 721 THESIS/PROJECT CONTINUATION

0, 0/0

CHE 722 THESIS/PROJECT EXTENDED

0, 0/0

CHE 795 RESEARCH THESIS IN CHEMISTRY

1-12, 0/0

Individual investigation of an original problem in Chemistry submitted in acceptable form according to directions given by the Chemistry Department and the Graduate School.