CHEMISTRY (CHEM)

CHEM 5302 Current Trends in Chemistry
3 Semester Credit Hours (3 Lecture Hours)
THE STUDY AND DISCUSSION OF CURRENT TOPICS AND RESEARCH EFFORTS IN CHEMISTRY. THE COURSE IS INTENDED TO PROVIDE TEACHERS WITH BACKGROUND AND UNDERSTANDING THAT WILL ENRICH THEIR CLASSROOM PRESENTATIONS IN THE CHEMISTRY CURRICULUM. MAY BE REPEATED FOR CREDIT WHEN TOPICS VARY. OFFERED ON SUFFICIENT DEMAND.

CHEM 5303 Research in the Chemical Sciences
3 Semester Credit Hours (3 Lecture Hours)
STUDIES AND ANALYSIS OF PERTINENT LITERATURE. MAY BE REPEATED FOR CREDIT, BUT CREDIT MAY COUNT ONLY ONCE TOWARDS THE DEGREE PLAN.

CHEM 5317 Advanced Instrumental Analysis
3 Semester Credit Hours (3 Lecture Hours)
ADVANCED STUDY OF INSTRUMENTAL METHODS OF ANALYSIS: SPECTROSCOPY, CHROMATOGRAPHY, AND ELECTROCHEMICAL METHODS.
Prerequisite: CHEM 3418.

CHEM 5321 Molecular Ecology
3 Semester Credit Hours (3 Lecture Hours)
A LABORATORY INTENSIVE GRADUATE COURSE THAT EMPHASIZES THE USE OF BIOCHEMICAL AND MOLECULAR TECHNIQUES TO ADDRESS ECOLOGICAL QUESTIONS. FIELD SAMPLING, SAMPLE PREPARATION, BIOCHEMICAL AND MOLECULAR GENETIC ASSAYS, STATISTICAL ANALYSIS AND COMPUTER-BASED MODELING TECHNIQUES ARE USED IN A PROJECT-BASED APPROACH TO ASSESS POPULATION GENETIC DIVERSITY, STRUCTURE AND MIGRATION RATES IN A KEY ECOSYSTEM SPECIES. SUCH ESTIMATES ARE OF INCREASING CONCERN FOR CONSERVATION AND HABITAT MANAGEMENT.

CHEM 5322 Supramolecular Chemistry
3 Semester Credit Hours (3 Lecture Hours)
THE COURSE INTRODUCES ADVANCED TOPICS COVERING THE AREAS SYNTHETIC MOLECULAR RECEPTORS, HOST-GUEST CHEMISTRY, BIOCHEMICAL SELF-ASSEMBLY, CRYSTAL ENGINEERING AND MOLECULAR TEMPLATION. SUPRAMOLECULAR CHEMISTRY HAS BEEN CALLED "CHEMISTRY BEYOND THE MOLECULE" FOCUSING ON INTERMOLECULAR INTERACTIONS AND FORCES LEADING TO THE FORMATION COMPLEXES AND SUPERSTRUCTURES IN SOLUTION AND IN THE SOLID-STATE. THE MATERIAL TAKES A CLASSICAL APPROACH TO CHEMICAL PEDAGOGY THAT INSTILLS THE EXCITEMENT OF MODERN RESEARCH AREAS IN THE CHEMICAL SCIENCES. THE COURSE IS DESIGNED AT AN ADVANCED LEVEL FOR GRADUATE STUDENTS.
Prerequisite: CHEM 3412.

CHEM 5341 Advanced Organic Chemistry
3 Semester Credit Hours (3 Lecture Hours)
THE COURSE INTRODUCES ADVANCED TOPICS COVERING THE AREAS OF MOLECULAR STRUCTURE AND THERMODYNAMICS AS WELL AS REACTIVITY, KINETICS, AND MECHANISMS OF ORGANIC MOLECULAR ARCHITECTURES AND ENSEMBLES. THE MATERIAL TAKES A CLASSICAL APPROACH TO CHEMICAL PEDAGOGY THAT INSTILLS THE EXCITEMENT OF MODERN RESEARCH AREAS IN THE CHEMICAL SCIENCES. THE COURSE IS DESIGNED AT AN ADVANCED LEVEL FOR GRADUATE STUDENTS.
Prerequisite: CHEM 3412.

CHEM 5352 Computational Chemistry
3 Semester Credit Hours (3 Lecture Hours)
THE COURSE WILL INCLUDE THE INVESTIGATION OF THE USES AND OUTCOMES OF COMPUTATIONAL CHEMISTRY, INCLUDING BOTH CLASSICAL (NON-QUANTUM) SIMULATIONS OF MOLECULAR SYSTEMS AND QUANTUM MECHANICAL MODELING OF MOLECULES. EMPHASIS WILL BE ON CONSTRUCTING AN APPROPRIATE MOLECULAR MODEL, PERFORMING THE APPROPRIATE CALCULATION, AND INTERPRETING THE RESULTS OF THE CALCULATION.

CHEM 5361 Organic Geochemistry
3 Semester Credit Hours (3 Lecture Hours)
AN INTRODUCTION TO THE PROPERTIES AND CYCLING OF NATURAL ORGANIC MATERIALS WILL BE PRESENTED TO BENEFIT GRADUATE STUDENTS STUDYING MARINE SYSTEMS. THE COURSE IS DESIGNED TO FOLLOW THE GEOLOGIC CYCLE OF ORGANIC MATTER, FROM PRODUCTION IN LIVING ORGANISMS TO BURIAL IN SEDIMENTS AND PRESERVATION IN THE DEPOSITIONAL RECORD. SPECIFIC TOPICS INCLUDE FACTORS CONTROLLING PRESERVATION IN SEDIMENTS, METHANOGENESIS, DIAGNETIC ALTERATIONS OF ORGANIC COMPOUNDS, FOSSIL FUEL PRODUCTION AND DEGRADATION, LIFE IN THE DEEP BIOSPHERE, BIOMARKERS FOR ANCIENT LIFE, AND ISOTOPIC VARIATIONS IN THE SEDIMENTARY RECORD.

CHEM 5362 Chemical Oceanography
3 Semester Credit Hours (3 Lecture Hours)
THIS COURSE WILL COVER BOTH CHEMICAL PROCESSES IN THE OCEANIC ENVIRONMENT AND HOW BIOLOGY, GEOLOGY AND PHYSICS AFFECT THE CHEMISTRY. TOPICS INCLUDE AIR-SEA INTERACTIONS, WATER COLUMN CHEMISTRY, AND REACTIONS IN SEDIMENTARY ENVIRONMENTS. STUDENTS ARE EXPECTED TO PARTICIPATE IN THE TEACHING PROCESS THROUGH THEIR INVOLVEMENT IN SMALL GROUPS, CLASS DISCUSSIONS, AND MODELING/SIMULATION EXERCISES.
Prerequisite: CHEM 1311 and 1312.

CHEM 5369 Advanced Molecular Spectroscopy
3 Semester Credit Hours (3 Lecture Hours)
THE COURSE IS TAUGHT AT THE GRADUATE LEVEL WITH THE CURRICULUM FOCUSING ON THE ADVANCED SPECTROSCOPIC METHODS OF MOLECULAR STRUCTURE DETERMINATION. THE COURSE AIMS TO PRESENT FOUNDATIONAL THEORETICAL CONCEPTS OF DIFFERENT MOLECULAR SPECTROSCOPY TECHNIQUES INCLUDING NUCLEAR MAGNETIC RESONANCE, INFRARED, ULTRAVIOLET-VISIBLE, AND MASS SPECTROSCOPIES AND HOW THESE TECHNIQUES ARE USED TO INTERPRET SPECTRA OF UNKNOWN AND STRUCTURALLY COMPLEX MOLECULAR ANALYTES. THIS INCLUDES MODES OF ABSORPTION AND EMISSION, QUALITATIVE AND QUANTITATIVE USES AND POTENTIAL PROBLEMS AND LIMITATIONS. THE COURSE HAS BEEN DESIGNED FOR STUDENTS WHO HAVE COMPLETED ORGANIC CHEMISTRY II LECTURE AND LABORATORY DURING THEIR UNDERGRADUATE CAREER.

CHEM 5375 Stable Isotope Biogeochemistry
3 Semester Credit Hours (3 Lecture Hours)
THIS COURSE TEACHES STABLE ISOTOPE SYSTEMATICS OF FIVE COMMON LIGHT ELEMENTS - CARBON, NITROGEN, HYDROGEN, OXYGEN AND SULFUR IN BIOLOGICAL, GEOLOGICAL, AND SYSTEMS. COURSE MATERIAL INCLUDES BASIC PRINCIPLES, ANALYTICAL METHODS, THERMODYNAMIC AND KINETIC FRACTIONATIONS, AND APPLICATIONS OF STABLE ISOTOPE ANALYSES IN A WIDE RANGE OF NATURAL SYSTEMS. THIS COURSE IS RECOMMENDED TO GRADUATE STUDENTS IN CHEMISTRY, GEOLOGY, BIOLOGICAL SCIENCES, AND COASTAL AND MARINE SYSTEM SCIENCE.
Prerequisite: CHEM 1412.

CHEM 5392 Thesis Proposal
3 Semester Credit Hours
REVIEW OF THE LITERATURE ON A THESIS TOPIC. COMPLETION OF A WRITTEN RESEARCH PROPOSAL INCLUDING PROPOSED EXPERIMENTAL DESIGN.

CHEM 5393 THESIS RESEARCH
3 Semester Credit Hours (3 Lecture Hours)
Chemistry Thesis Track students only. Collection and organization of research data. To receive a qualitative grade, the student must present a first draft of the thesis manuscript to the thesis advisor. If the semester ends before the advisor receives the first draft, an “In Progress” is recorded and the course must be repeated.
Prerequisite: CHEM 5392.

CHEM 5394 Thesis Submission
3 Semester Credit Hours
THESIS DEFENSE AND COMPLETION OF THE THESIS MANUSCRIPT INCLUDING ACCEPTANCE OF THE FINAL COPY BY THE ADVISORY COMMITTEE. MAY BE REPEATED; NO MORE THAN THREE HOURS MAY BE TAKEN PER SEMESTER.

CHEM 5397 Directed Research
3 Semester Credit Hours
CHEMISTRY PROFESSIONAL TRACK STUDENTS ONLY. COLLECTION, ORGANIZATION AND SUBMISSION OF RESEARCH DATA. TO RECEIVE A QUALITATIVE GRADE, THE STUDENT MUST SUCCESSFULLY DEFEND THE PROFESSIONAL PROJECT, THE STUDENT’S GRADUATE COMMITTEE MUST ACCEPT THE PROFESSIONAL PAPER, AND A FINAL COPY MUST BE ON FILE IN THE DEAN’S OFFICE. IF THE SEMESTER ENDS BEFORE THESE ARE ACCOMPLISHED, AN "IN PROGRESS" IS RECORDED AND THE COURSE MUST BE REPEATED.

CHEM 5417 Advanced Environmental Chemistry
4 Semester Credit Hours (4 Lecture Hours)
ADVANCED STUDY OF THE IMPACT OF CHEMISTRY ON THE ENVIRONMENT. TOPICS WILL INCLUDE THE CHEMISTRY OF THE NATURAL ENVIRONMENT AND THE MODIFICATIONS TO THAT ENVIRONMENT BROUGHT ABOUT BY HUMAN ACTIVITIES. INCLUDES READINGS IN CURRENT LITERATURE AND RESEARCH ON AN ENVIRONMENTAL ISSUE. INCLUDES A LABORATORY COMPONENT.
Prerequisite: CHEM 1412.
Co-requisite: SMTE 0093.

CHEM 5421 Aquatic Chemistry
4 Semester Credit Hours (4 Lecture Hours)
A STUDY OF THE CHEMISTRY OF NATURAL AND POLLUTED WATERS. TOPICS INCLUDE CHEMICAL KINETIC AND EQUILIBRIUM PRINCIPLES AS APPLIED TO NATURAL AND POLLUTED WATERS, AND THE ECOTOXICOLOGICAL ASPECTS OF AQUATIC CHEMISTRY. IN ADDITION, CRITICAL READINGS IN CURRENT LITERATURE AND RESEARCH ON ENVIRONMENTAL ISSUES WILL BE DISCUSSED. INCLUDES A LABORATORY COMPONENT.
Co-requisite: SMTE 0093.

CHEM 5431 Environmental Instrumental Analysis
4 Semester Credit Hours (4 Lecture Hours)
A PRESENTATION OF STANDARD INSTRUMENTAL TOOLS AND INSTRUMENTAL METHODS USED FOR THE CHARACTERIZATION OF ENVIRONMENTAL POLLUTANTS AND THEIR DISTRIBUTION IN THE ENVIRONMENT. INCLUDES A LABORATORY COMPONENT.

CHEM 5490 Advanced Topics
1-4 Semester Credit Hours (1-4 Lecture Hours)
SUBJECT MATERIALS VARIABLE. ADVANCED TOPICS INCLUDING CURRENT LITERATURE RESEARCH. MAY BE REPEATED FOR CREDIT WHEN TOPICS ARE SUFFICIENTLY DIFFERENT.

CHEM 5596 Directed Independent Study
1-5 Semester Credit Hours
STUDY IN AREAS OF CURRENT INTEREST. (A TOTAL OF SIX HOURS OF DIRECTED INDEPENDENT STUDY MAY BE COUNTED TOWARD THE MS DEGREE.)

CHEM 5940 Project Research
1-9 Semester Credit Hours (3 Lecture Hours)
STUDENT RESEARCH ON A PROJECT OF INTEREST. THIS VARIABLE CREDIT HOUR COURSE MAY BE REPEATED IN DIFFERENT SEMESTERS. STUDENT MAY COUNT UP TO SIX HOURS OF CHEM 5940 TOWARD THE CHEMISTRY THESIS TRACK OR PROFESSIONAL TRACK WITH APPROVAL FROM THE PROGRAM COORDINATOR.

CHEM 5993 Thesis Research
1-9 Semester Credit Hours
CHEMISTRY THESIS TRACK STUDENTS ONLY. COLLECTION, ORGANIZATION, AND ANALYSIS OF RESEARCH DATA.

CHEM 6321 Molecular Ecology
3 Semester Credit Hours (3 Lecture Hours)
A LABORATORY INTENSIVE GRADUATE COURSE THAT EMPHASIZES THE USE OF BIOCHEMICAL AND MOLECULAR TECHNIQUES TO ADDRESS ECOLOGICAL QUESTIONS. FIELD SAMPLING, SAMPLE PREPARATION, BIOCHEMICAL AND MOLECULAR GENETIC ASSAYS, STATISTICAL ANALYSIS AND COMPUTER-BASED MODELING TECHNIQUES ARE USED IN A PROJECT-BASED APPROACH TO ASSESS POPULATION GENETIC DIVERSITY, STRUCTURE AND MIGRATION RATES IN A KEY ECOSYSTEM SPECIES. SUCH ESTIMATES ARE OF INCREASING CONCERN FOR CONSERVATION AND HABITAT MANAGEMENT. OFFERED ON SUFFICIENT DEMAND.

CHEM 6362 Chemical Oceanography
3 Semester Credit Hours (3 Lecture Hours)
THIS COURSE WILL COVER BOTH CHEMICAL PROCESSES IN THE OCEANIC ENVIRONMENT AND HOW BIOLOGY, GEOLOGY AND PHYSICS AFFECT THE CHEMISTRY. TOPICS INCLUDE AIR-SEA INTERACTIONS, WATER COLUMN CHEMISTRY, AND REACTIONS IN SEDIMENTARY ENVIRONMENTS. STUDENTS ARE EXPECTED TO PARTICIPATE IN THE TEACHING PROCESS THROUGH THEIR INVOLVEMENT IN SMALL GROUPS, CLASS DISCUSSIONS, AND MODELING/SIMULATION EXERCISES. OFFERED ON SUFFICIENT DEMAND.
Prerequisite: CHEM 1411 and 1412.

CHEM 6375 Stable Isotope Biogeochemistry
3 Semester Credit Hours (3 Lecture Hours)
THIS COURSE TEACHES STABLE ISOTOPE SYSTEMATICS OF FIVE COMMON LIGHT ELEMENTS - CARBON, NITROGEN, HYDROGEN, OXYGEN AND SULFUR IN BIOLOGICAL, GEOLOGICAL, AND SYSTEMS. COURSE MATERIAL INCLUDES BASIC PRINCIPLES, ANALYTICAL METHODS, THERMODYNAMIC AND KINETIC FRACTIONATIONS, AND APPLICATIONS OF STABLE ISOTOPE ANALYSES IN A WIDE RANGE OF NATURAL SYSTEMS. THIS COURSE IS RECOMMENDED TO GRADUATE STUDENTS IN CHEMISTRY, GEOLOGY, BIOLOGICAL SCIENCES, AND COASTAL AND MARINE SYSTEM SCIENCE.
Prerequisite: CHEM 1412.

CHEM 6417 Advanced Environmental Chemistry
4 Semester Credit Hours (4 Lecture Hours)
ADVANCED STUDY OF THE IMPACT OF CHEMISTRY ON THE ENVIRONMENT. TOPICS WILL INCLUDE THE CHEMISTRY OF THE NATURAL ENVIRONMENT AND THE MODIFICATIONS TO THAT ENVIRONMENT BROUGHT ABOUT BY HUMAN ACTIVITIES. INCLUDES READINGS IN CURRENT LITERATURE AND RESEARCH ON AN ENVIRONMENTAL ISSUE. INCLUDES A LABORATORY COMPONENT.
Prerequisite: CHEM 1412.

CHEM 6421 Aquatic Chemistry
4 Semester Credit Hours (4 Lecture Hours)
A STUDY OF THE CHEMISTRY OF NATURAL AND POLLUTED WATERS. TOPICS INCLUDE CHEMICAL KINETIC AND EQUILIBRIUM PRINCIPLES AS APPLIED TO NATURAL AND POLLUTED WATERS, AND THE ECOTOXICOLOGICAL ASPECTS OF AQUATIC CHEMISTRY. IN ADDITION, CRITICAL READINGS IN CURRENT LITERATURE AND RESEARCH ON ENVIRONMENTAL ISSUES WILL BE DISCUSSED. INCLUDES A LABORATORY COMPONENT