

# DEPARTMENT OF CHEMISTRY

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## About

The Department of Chemistry is approved by the American Chemical Society.

**Chair:** Dustin Gross (deg013@shsu.edu), Ph.D.

**Contact Information:** (936) 294-4067

**Website:** Department of Chemistry (<http://www.shsu.edu/academics/chemistry/>)

## Mission

The Department of Chemistry is committed to providing an educational environment conducive to scholarship, intellectual development, and the acquisition of a foundation of knowledge and techniques required of professional chemists. This goal requires the effective representation of the fundamental areas of chemistry, a dedicated and creative faculty, and support for the many functions of the department.

## Academic Program

### General Information

#### Advisory Committee

For students completing a thesis, a thesis advisor will be selected and the research project will begin in the first semester of graduate work. The student and the thesis director, with approval from the chair, will select two additional faculty members to serve on the thesis committee.

#### Period of Study

Students taking 6-9 semester hours of coursework each long semester and three semester hours during summer sessions will typically finish their graduate program in two years. A minimum of three long semesters and one summer session is required. Registration for the research course will typically occur during the summer term.

#### Comprehensive Exam and Oral Thesis Defense

An oral presentation of the thesis to the faculty in a seminar format is required, and the thesis must be defended before the student's thesis committee. All graduate students are required to pass an oral comprehensive exam based on their coursework. The oral comprehensive exam is typically concurrent with the thesis defense. Once enrolled in a thesis class, a student must be continually enrolled until graduation.

## Highlights

- Students work with Chemistry faculty on state-of-the-art research in the Chemistry and Forensic Science Building research laboratories.
- The Department of Chemistry recently purchased an X-ray diffractometer and continually looks for ways to improve and enhance their research equipment.
- Master of Science in Chemistry (<https://catalog.shsu.edu/archives/2025-2026/graduate-and-professional/college-departments/science-and-engineering-technology/chemistry/chemistry-ms/>)
  - Master of Science in Chemistry, with Thesis (<https://catalog.shsu.edu/archives/2025-2026/graduate-and-professional/college-departments/science-and-engineering-technology/chemistry/chemistry-ms/>)
  - Master of Science in Chemistry, Non-Thesis (<https://catalog.shsu.edu/archives/2025-2026/graduate-and-professional/college-departments/science-and-engineering-technology/chemistry/chemistry-ms/>)

## Assistantships

Most graduate students in the MS Chemistry programs are supported by a graduate assistantship, either serving as a lab assistant in a teaching lab for 20 hours per week or carrying our research on a faculty member's research grant. In addition, the department can often offer a summer research stipend.

## Scholarships

Scholarships are available from the College of Science and Engineering Technology and from The Graduate and Professional School to support students' studies. Please check the websites for the College and Graduate and Professional School for more information.

For more information about graduate student financial opportunities, please email the Department of Chemistry at [chemistry@shsu.edu](mailto:chemistry@shsu.edu).

#### CHEM 5001. Independent Study in Chemistry. 1-3 Hours.

This course is intended to provide an avenue for selected graduate students to engage in independent studies. Registration is on an individual basis and is restricted to students in residence. Variable Credit (1-3).

**Prerequisite:** Approval of department chair.

**CHEM 5100. Chemical Literature & Seminar. 1 Hour.**

Students will participate in the departmental seminar program. This participation will require the preparation and presentation of current research material in a format acceptable to the American Chemical Society.

**CHEM 5361. Physical Organic Chemistry. 3 Hours.**

This course consists of a study of the effect of structure upon reactivity of organic compounds. The qualitative and quantitative relationship of structure to acidity and basicity in organic chemistry is developed. In addition, reactive intermediates (carbocations, carbanions and free radicals) are studied.

**Prerequisite:** CHEM 2325, CHEM 2125.

**CHEM 5362. Organic Reaction Mechanisms. 3 Hours.**

Current models for mechanisms of organic reactions are discussed and applied. The mechanisms and applications of synthetically important reactions are also surveyed. Literature searching for less often utilized but historically important transformations are integral to the course. The methods of determining reaction mechanisms are surveyed along with applications to individual reactions.

**Prerequisite:** CHEM 2325, CHEM 2125.

**CHEM 5367. Chemical Nano Sensing. 3 Hours.**

Students learn to set up a conceptual and empirical framework for designing, validating, and using calibrated measurements of chemical abundance within the context of chemical nano sensing. Students employ this framework to examine instruments used to study, and sensors designed to make advantageous use of, nanoscale phenomena in diverse chemical sensing settings.

**CHEM 5368. Analytical Spectroscopy. 3 Hours.**

Theory and application of selected areas of spectroscopy commonly used in qualitative and quantitative analysis are covered. Topics include atomic and molecular spectroscopy, mass spectrometry, laser analytical methods, fluorescence, phosphorescence, and chemiluminescence and their application to environmental, atmospheric, and bioanalytical problems.

**Prerequisite:** CHEM 4440.

**CHEM 5372. Advanced Biochemistry I. 3 Hours.**

The chemical structure and the biological functions and controls of proteins are reviewed. Proteins to be considered include enzymes, transport proteins and structural proteins. Protein biosynthesis and recombinant DNA technology are also discussed.

**CHEM 5373. Drug and Toxin Biochemistry. 3 Hours.**

Students examines biotransformations of drugs/toxins, mechanisms of drug interactions with biological systems, and selective toxicity. Students gain insight into the design of therapeutic agents and the destruction of harmful toxins/bacterial invaders in living systems. Attention is also given to how molecular structure is related to solubility and permeability and how to design systems for drug delivery within the human body.

**CHEM 5374. Chemistry of Coordination Compounds. 3 Hours.**

The chemistry of compounds containing metal ions is discussed. Emphasis is placed on the complexes of transition metals. The electronic configurations of these ions in various bonding environments are considered in interpreting their chemical and physical properties.

**Prerequisite:** CHEM 4367 and CHEM 4448.

**CHEM 5375. Organometallic Chemistry. 3 Hours.**

Students examine organometallic chemistry through a detailed presentation of structure and bonding. In addition, students focus on these principles with in-depth discussions of organometallic reaction mechanisms, advances in catalysis, carbene complexes, metathesis reactions, application to organic synthesis, and cluster compounds.

**Prerequisite:** Graduate Standing.

**CHEM 5381. Advanced Physical and Chemical Thermodynamics. 3 Hours.**

Principles are stressed including the three laws of thermodynamics, thermochemistry and statistical thermodynamics. Applications of the principles to gases, solution, mixtures, solids and interfaces are given.

**Prerequisite:** CHEM 4448.

**CHEM 5382. Symmetry and Spectroscopy. 3 Hours.**

Quantum theory and symmetry are studied in detail and applied to the interpretation and prediction of spectroscopic data. Infrared, Raman, and electronic spectroscopic methods are examined in depth.

**Prerequisite:** Graduate standing and CHEM 4448 or departmental approval.

**CHEM 5385. Selected Topics in Advanced Chemistry. 3 Hours.**

This course is adaptable to the needs and interests of the individual graduate student majoring in Chemistry. Modern developments in specific subdivisions of the field of chemistry are considered. It may be repeated for credit, provided the repetition is not in the same subdivisional field. The subdivisional fields offered are: analytical, biochemistry, environmental, inorganic, organic, and physical chemistry.

**Prerequisite:** Graduate standing in Chemistry.

**CHEM 6099. Thesis. 1-3 Hours.**

Students complete and successfully defend their Thesis. Variable Credit (1 to 3). Course Equivalents: CHEM 6399 .

**CHEM 6398. Graduate Research in Chemistry. 3 Hours.**

Students carry out research under the direction of a faculty member.

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