

Chemistry

Department Information

Department of Chemistry website

<https://www.southalabama.edu/colleges/artsandsci/chemistry/>

Undergraduate Studies

The chemistry curriculum is designed for students seeking a liberal education as well as for those students requiring more specialized training and skills. The courses provide the foundation necessary for those planning careers as chemists and biochemists following graduation, for students planning to further their education through advanced degrees in chemistry, biochemistry, related sciences, and for those in other professional fields. Two basic curricula are offered for chemistry majors:

1. The American Chemical Society certified degree program in Chemistry is available for those students seeking technical positions in chemistry, as well as for those planning to attend graduate school, or
2. A Biochemistry Option track is available for students strongly interested in the interface of chemistry and biomedical or biological sciences, especially for students anticipating going to graduate school in medical sciences, biochemistry, biophysics, or other life sciences.

Students pursuing a degree in Chemistry also must have a minor in another discipline. All first-time freshmen must successfully complete CAS 100: First Year Experience as a degree requirement. Students must enroll during their first term at USA, except for summer-entry students who must enroll in the fall semester following entry.

Undergraduate Senior Thesis In Chemistry

The Chemistry Senior Thesis Program is designed to stimulate analytical and critical thinking and as such offers motivated and focused undergraduate students the opportunity to develop research and communication skills in preparation for a graduate or professional career. To apply for admission into the program, a student must:

1. Have Junior Chemistry Major status or above.
2. Have completed CH 131, CH 132, CH 201, CH 202, plus one (1) more lower or upper division chemistry course.
3. Have earned a 3.25 GPA or better in chemistry courses attempted.
4. Have earned a 3.0 GPA or better overall.
5. Obtain a recommendation from a faculty member who will serve as research mentor for senior thesis.

In addition to fulfilling the requirements of the standard chemistry program, senior thesis students must complete:

1. A minimum of six (6) semester hours of Honors Research (CH 499). Upon successful completion of six (6) hours of CH 499 the requirement for four (4) hours of Directed Studies (CH 494) will be waived.
2. A formal research Project Prospectus needs to be submitted and approved by the student's research mentor during the first term of participation in program. The prospectus will be prepared under the supervision of the student's research mentor and should include an introduction to the proposed research project, proposed research methods, and relevant literature citations.
3. Complete a written research thesis.
4. The formation of a thesis committee will be at the discretion of the faculty mentor.
5. Present a formal oral defense of the research work to Chemistry Department faculty and students.
6. Complete a poster presentation at national, regional, or local research forum.

Examples of appropriate venues for the presentation include an ACS National meeting, the USA Annual Research Forum (Spring term) or the UCUR Annual Research Forum (Fall term). Students participating in the Chemistry Senior Thesis Program who have a 3.5 GPA will also be eligible for Departmental Honors status. Chemistry majors who are part of the University Honors College will meet the requirements for the Undergraduate Chemistry Senior thesis as well as those of the University's program.

Graduate Studies

Although the Department of Chemistry has no graduate degree programs, courses are offered at the graduate level for those students who need such work.

Areas Of Study

Chemistry ACS Certified Chemistry Track, Major
Chemistry Biochemistry Track, Major
Minor in Chemistry

Courses

Chemistry (CH) (CH)

CH 101L Survey Inorg-Org Chem Lab 1 cr

Laboratory exercises associated with CH 101. CH 101 must be taken concurrently or as a prerequisite. Together, CH 101 and CH 101L count as one laboratory science course, partially fulfilling general education requirements. Fee. Core Course.

Co-requisite: CH 101

CH 131L General Chemistry I Lab 1 cr

Laboratory exercises associated with CH 131. CH 131 and CH 131L must be taken concurrently. Together, CH 131 and CH 131L count as one laboratory science course, partially fulfilling general education requirements. Fee. Core course.

Pre-requisite: CH 100 Minimum Grade of D or CH 110 Minimum Grade of D or ACT Math 24 or SAT Mathematics 560 or MATH SECTION SCORE 580 or MA 112 Minimum Grade of C or MA 113 Minimum Grade of C or MA 172 Minimum Grade of C or MA 115 Minimum Grade of C or MA 121 Minimum Grade of C or MA 120 Minimum Grade of C or MA 287 Minimum Grade of C or MA 125 Minimum Grade of C or MA 132 Minimum Grade of C or MA 126 Minimum Grade of C or MA 233 Minimum Grade of C or MyMathTest 080 or University test - Math 85 .

CH 132L General Chemistry II Lab 1 cr

Laboratory exercises associated with CH 132. CH 132 must be taken concurrently or as a prerequisite. Together, CH 132 and CH 132L count as one laboratory science course, partially fulfilling general education requirements. Fee. Core course.

Pre-requisite: CH 131 Minimum Grade of D and CH 131L Minimum Grade of D.

CH 201L Organic Chemistry I Lab 1 cr

Laboratory exercises associated with CH 201. (Offered Fall and Spring Semesters.) The laboratory introduces basic organic laboratory practices such as the collection of physical properties data, separation and purification techniques, synthesis, and spectroscopic methods. CH 201 must be taken concurrently or as a prerequisite. Fee.

Co-requisite: CH 201

Pre-requisite: (CH 116 Minimum Grade of D) or (CH 132 Minimum Grade of D and CH 132L Minimum Grade of D)).

CH 202L Organic Chemistry II Lab 1 cr

Laboratory exercises associated with CH 202. The laboratory continues with the basic organic laboratory practices with additional synthetic methods. (Offered Fall and Spring Semesters.) CH 202 must be taken concurrently or as a prerequisite. Fee.

Co-requisite: CH 202

Pre-requisite: (CH 222 Minimum Grade of D) or (CH 201 Minimum Grade of D and CH 201L Minimum Grade of D).

CH 265L Introductory Analysis Lab 1 cr

Laboratory exercises associated with CH 265. (Offered Fall and Spring Semesters.) CH 265 must be taken concurrently or as a prerequisite. Fee.

Co-requisite: CH 265

Pre-requisite: (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C) or (CH 116 Minimum Grade of C).

CH 301L Physical Chemistry I Lab-W 1 cr

Laboratory exercises associated with CH 301. (Offered Fall Semester.) Lab is required for chemistry majors. Fee.

Co-requisite: CH 301

Pre-requisite: (CH 265 Minimum Grade of D or CH 266 Minimum Grade of D) and (MA 126 Minimum Grade of D or MA 223 Minimum Grade of D) and (PH 202 Minimum Grade of D or PH 217 Minimum Grade of D) or MA 227 Minimum Grade of D or (MA 234 Minimum Grade of D and PH 115 Minimum Grade of D) or PH 113 Minimum Grade of D and (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C). PH 202 and MA 227 and MA 234 can be taken concurrently with this course.

CH 302L Physical Chemistry II Lab - W 1 cr

Laboratory exercises associated with CH 302. (Offered Spring Semester.) Lab is required for chemistry majors. Fee. Co-requisite: CH 302

Pre-requisite: ((EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and CH 265 Minimum Grade of D) and (CH 265L Minimum Grade of D or CH 266 Minimum Grade of D) and (MA 126 Minimum Grade of D or MA 233 Minimum Grade of D) and (PH 202 Minimum Grade of D or PH 217 Minimum Grade of D) or (MA 227 Minimum Grade of D or MA 234 Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 113 Minimum Grade of D). PH 202 and MA 227 and MA 234 can be taken concurrently with this course.

CH 465L Instrumental Analysis Lab 2 cr

Laboratory exercises associated with CH 465. (Offered Fall Semester.) Fee.

Co-requisite: CH 465

Pre-requisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D).

CH 514L Environmental Chemistry Lab 1 cr

Laboratory exercises associated with CH 514. Real-world samples will be used to learn appropriate isolation techniques followed by chemical and instrumental analysis. CH 514 must be taken concurrently. (Offered in Fall Semester.) Fee.

Co-requisite: CH 514

Pre-requisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D).

CH 565L Instrumental Analysis Lab 2 cr

Laboratory exercises associated with CH 565. (Offered Fall Semester.) Requires Graduate status. Fee.

Pre-requisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D).

CH 101 Survey of Inorg and Org Chem 3 cr

An intensive presentation of inorganic and organic chemistry principles selected to convey a basic understanding of their relationship to and function in the life process. Laboratory exercises will introduce students to basic laboratory procedures, often using exercises related to life process.

This course is generally taken by students in the College of Nursing. CH 101L must be taken concurrently. Together, CH 101 and CH 101L count as one laboratory science course, partially fulfilling general education requirements. (Offered Fall and Spring Semesters.) Core Course.

Co-requisite: CH 101L

CH 131 General Chemistry I 3 cr

Three lecture hours and one recitation hour per week for one semester. First of a two-semester sequence for majors, minors, and others seeking quantitative treatment. Topics include the nuclear model, stoichiometry, chemical reactions, gas laws, thermochemistry, atomic structure, and molecular bonding. Together, CH 131 and CH 131L count as one laboratory science course partially fulfilling general education requirements. (Offered Fall and Spring Semesters). Core Course.

Pre-requisite: CH 100 Minimum Grade of D or CH 110 Minimum Grade of D or ACT Math 24 or SAT Mathematics 560 or MATH SECTION SCORE 580 or MA 112 Minimum Grade of C or MA 113 Minimum Grade of C or MA 172 Minimum Grade of C or MA 115 Minimum Grade of C or MA 121 Minimum Grade of C or MA 120 Minimum Grade of C or MA 287 Minimum Grade of C or MA 125 Minimum Grade of C or MA 132 Minimum Grade of C or MA 126 Minimum Grade of C or MA 233 Minimum Grade of C or MyMathTest 080 or University test - Math 85 .

CH 132 General Chemistry II 3 cr

Continuation of CH 131. Topics include solutions, colligative properties, chemical kinetics, equilibrium, acids and bases, pH, buffers, titrations, thermodynamics, and electrochemistry. Additional topics may include nuclear chemistry, organic and biochemistry, chemistry of inorganic compounds, transition metal complexes, and industrial chemistry. Both the lecture and laboratory experiences of CH 131 (General Chemistry I) are prerequisites. CH 132L must be taken concurrently. Together, CH 132 and CH 132L count as one laboratory science course, partially fulfilling general education requirements. (Offered Fall and Spring Semesters.) Core Course.

Pre-requisite: CH 115 Minimum Grade of D or (CH 131 Minimum Grade of D and CH 131L Minimum Grade of D).

CH 150 Intro to Computer Chemistry 2 cr

This course will introduce the student to direct application and use of computer activity for applications in chemistry; acquisition of data from instrumentation, data analysis, presentation of experimental data, and chemical structure and modeling programs. Fee.

Pre-requisite: (CH 115 Minimum Grade of D or (CH 131 Minimum Grade of D and CH 131L Minimum Grade of D) or (CH 141 Minimum Grade of D and CH 141L Minimum Grade of D)) and ((MA 113 Minimum Grade of D or MA 172 Minimum Grade of D) or (MA 115 Minimum Grade of D or MA 121 Minimum Grade of D) or (MA 125 Minimum Grade of D or MA 132 Minimum Grade of D) or (MA 126 Minimum Grade of D or MA 233 Minimum Grade of D)). CH 141 and CH 141L can be taken concurrently with this course.

CH 201 Organic Chemistry I 3 cr

Fundamentals of structure and chemical behavior of organic molecules including nomenclature, properties, structure, stereochemistry, spectroscopy (both infrared and nuclear magnetic resonance), reactions, synthesis, and mechanisms of alkanes, alkenes, alkyl halides, and alcohols. (Offered Fall and Spring Semesters). CH 201L must be taken concurrently.

Co-requisite: CH 201L

Pre-requisite: CH 116 Minimum Grade of D or (CH 132 Minimum Grade of D and CH 132L Minimum Grade of D) or (CH 141 Minimum Grade of D and CH 141L Minimum Grade of D).

CH 202 Organic Chemistry II 3 cr

Continuation of study of structure and chemical behavior of organic molecules including aromatic compounds, ketones and aldehydes amines, carboxylic acids and their derivatives, carbohydrates, amino acids, peptides and proteins, nucleic acids, alkynes, ethers and epoxides, and conjugated dienes. (Offered Fall and Spring Semesters.) CH 202L must be taken concurrently. Fee.

Co-requisite: CH 202L

Pre-requisite: (CH 201 Minimum Grade of D and CH 201L Minimum Grade of D) or CH 222 Minimum Grade of D.

CH 265 Introductory Analysis 3 cr

A detailed study of the fundamental theories and principles of chemistry with emphasis on their application to quantitative analysis. Because proficiency of the material covered in CH 132 is vital for success in this course, students are strongly advised to take the two courses as close together as schedules permit. (Offered Fall and Spring Semesters.)

Co-requisite: CH 265L

Pre-requisite: (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C) or (CH 116 Minimum Grade of C).

CH 301 Physical Chemistry I 3 cr

Gas Laws, First and Second Law of Thermodynamics, Phase Equilibrium, Chemical Equilibrium, Physical Chemistry of Solutions, Electrochemistry, Transport Properties, and Chemical Kinetics. (Offered Fall Semester).

Co-requisite: CH 301L

Pre-requisite: (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and (CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D and (MA 126 Minimum Grade of D or MA 233 Minimum Grade of D) and (PH 202 Minimum Grade of D or PH 217 Minimum Grade of D) or (MA 227 Minimum Grade of D or MA 234 Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 113 Minimum Grade of D). PH 202 and MA 227 and MA 234 can be taken concurrently with this course.

CH 302 Physical Chemistry II 3 cr

Quantum Theory and Applications to Atoms and Molecules, Spectroscopy, and Statistical Thermodynamics. (Offered Spring Semester.) Required for chemistry majors.

Co-requisite: CH 302L

Pre-requisite: (CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and (MA 126 Minimum Grade of D or MA 223 Minimum Grade of D) and (PH 202 Minimum Grade of D or PH 217 Minimum Grade of D) or (MA 227 Minimum Grade of D or MA 234 Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 113 Minimum Grade of D). PH 202 and MA 227 and MA 234 can be taken concurrently with this course.

CH 394 Directed Studies - 1 TO 4 cr

Student works in a research laboratory under faculty guidance. May be repeated; sum of all directed studies cannot exceed eight (8) credits. Requires Junior standing or permission of Department Chair.

CH 401 Intern Inorganic Chemistry 3 cr

Atomic and molecular structure and bonding emphasizing the use of symmetry, group theory, and molecular orbitals; NMR spectrometry; coordination chemistry; organometallic chemistry and homogeneous catalysis. (Offered Spring Semester).

Pre-requisite: (CH 301 Minimum Grade of D and CH 301L Minimum Grade of D and CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D.

CH 440 Biochemistry I 3 cr

Study of fundamental biochemical concepts; emphasis is placed on protein, carbohydrate, and lipid structures as related to their functional behavior; enzyme kinetics and mechanisms of action; thermodynamic relationships in biochemical systems. (Offered Fall Semester). Cross-listed with BLY 440.

Pre-requisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D).

CH 441 Biochemistry II 3 cr

Study of the reaction and regulations of intermediary metabolism; the biochemistry of genetic systems to include regulatory mechanisms and protein synthesis. (Offered Spring Semester). Cross-listed with BLY 441.

Pre-requisite: CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D.

CH 443 Lab Studies in Biochemistry 2 cr

Course familiarizes the student with the basic laboratory techniques commonly employed in biochemical research. (Offered Spring Semester). Cross-listed with BLY 443. Fee.

Pre-requisite: CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D.

CH 465 Instrumental Analysis 3 cr

Modern analytical instruments, their operating principles, and their applications. (Offered Fall Semester).

Co-requisite: CH 465L

Pre-requisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D).

CH 490 Sp Top - 1 TO 4 cr

Study of a significant topic in Chemistry. May be repeated for a maximum of four credits when the content varies. Requires Senior standing.

CH 492 Seminar I 1 cr

Information retrieval from scientific references, journals, and on-line databases directed toward computer-based preparation of a student seminar having as the capstone experience a formal seminar for Department Faculty and students. (Offered Spring Semester). Requires Senior standing or permission of Department Chair. Fee.

CH 494 Directed Studies 1 TO 4 cr

Student works in a research laboratory under faculty guidance. May be repeated; sum of all directed studies cannot exceed eight (8) credits. Requires Senior standing or permission of Department Chair. Fee.

CH 499 Sr Honors Chemistry Project-H 3 cr

Student research under faculty direction; written report and oral presentation of research work to faculty and students. This course may be repeated once for a maximum of six credits. Requires permission of department chair. Fee.

CH 514 Environmental Chemistry 3 cr

Introduces the cycling of elements in the earth as groundwork for understanding the chemical reactions and fate of chemical species introduced as contaminants to the environment. The chemistry of natural and anthropogenic contaminants in the atmosphere, the hydrosphere, the lithosphere and the transport and transformation of chemical species in the environment are discussed. CH 514L must be taken concurrently. (Offered in Fall Semester.)

Co-requisite: CH 514L

Pre-requisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D).

CH 515 Environmental Toxicology 4 cr

Introduction to the scientific and technical principles of toxicological processes in the context of the ecosystem.

Students will understand both the types of major environmental toxicants and how to properly evaluate their toxicity and factors that influence toxicity. Students will recognize and coherently formulate risk assessment and by using the tools and techniques acquired, develop and communicate proposals for remedy.

Pre-requisite: (BLY 301 Minimum Grade of C and BLY 302 Minimum Grade of C) and (CH 201 Minimum Grade of C and CH 202 Minimum Grade of C) and (CH 540 Minimum Grade of B and CH 541 Minimum Grade of B).

CH 540 Biochemistry I 3 cr

Study of fundamental biochemical concepts; emphasis is placed on protein, carbohydrate, and lipid structures as related to their functional behavior, enzyme kinetics and mechanisms of action; thermodynamic relationships in biochemical systems. (Offered Fall Semester.) Requires Graduate status. Cross-listed with BLY 540.

Pre-requisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D).

CH 541 Biochemistry II 3 cr

Study of the reactions and regulations of intermediary metabolism; the biochemistry of genetic systems to include regulatory mechanisms and protein synthesis. (Offered Spring Semester.) Requires Graduate status. Cross-listed with BLY 541.

Pre-requisite: CH 540 Minimum Grade of B or BLY 540 Minimum Grade of B.

CH 543 Lab Studies in Biochemistry 2 cr

Course familiarizes the student with the basic laboratory techniques commonly employed in biochemical research. (Offered Spring Semester.) Requires Graduate status. Cross-listed with BLY 543. Fee.

Pre-requisite: CH 441 Minimum Grade of D or CH 540 Minimum Grade of B or CH 541 Minimum Grade of B. CH 441 and CH 541 can be taken concurrently with this course.

CH 565 Instrumental Analysis 3 cr

Modern analytical instruments, their operating principles, and their applications. (Offered Fall Semester). Requires Graduate status.

Pre-requisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D).

CH 590 Special Topics - 1 TO 4 cr

Study of a significant topic in chemistry. May be repeated for a maximum of four credits when the content varies. Requires Graduate status.

CH 592 Seminar

The use of scientific references and journals retrieval. Library assignment may be directed toward preparation of student seminars which are scheduled concurrently. (Offered as required). Requires Graduate status. Fee.

1 cr**CH 594 Directed Studies-**

Literature survey and research under senior staff guidance. May be repeated but not to exceed four credits. Fee.

1 TO 4 cr

Faculty

CLEMENTS, JASON W.

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MSET, University of South Alabama

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PHD, Florida State University

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