Chemistry

Office: 2015 Percival Stern Hall

Phone: (504) 865-5573

Fax: (504) 865-5596

Website: www.chem.tulane.edu

Professors
William L. Alworth, Ph.D., California, Berkeley (Chair)

Larry D. Byers, Ph.D., Princeton

Michael F. Herman, Ph.D., Chicago (Dean, Graduate School)

Brent D. Koplitz, Ph.D., Princeton

C. J. Li, Ph.D., McGill University, Canada

Joel T. Mague, Ph.D., M.I.T.

Gary L. McPherson, Ph.D., Illinois (Associate Dean, Faculty of the Liberal Arts and Sciences)

V. Ramamurthy, Ph.D., Hawaii (Bernard Baus Professor of Chemistry)

Russell H. Schmehl, Ph.D., North Carolina

Mark Sulkes, Ph.D., Cornell

Associate Professors
Harry E. Ensley, Ph.D., Harvard

Mark J. Fink, Ph.D., Wisconsin

Pernilla Wittung-Stafshede, Ph.D., Chalmers University of Technology, Sweden

Assistant Professor
Sankaran Thayumanavan, Ph.D., Illinois

FRESHMAN PROGRAMS

Students who take chemistry to satisfy the science requirement of the B.A. curriculum must elect Chemistry 107 and 117. Science majors, engineering students, and students fulfilling medical school requirements should take Chemistry 107 and 117 and 108 and 118. Advanced placement may be granted in accordance with the results of a special placement examination given upon a petition.

Each year a small group of freshman students whose previous record and entrance and achievement examinations show superior preparation are invited to participate in the scholars and honors sequence of courses beginning with Chemistry H109 and H111, H110 and H112, which substitute for 107 and 117, 108 and 118 respectively.

MAJOR

Students majoring in chemistry must satisfy the general requirements of the B.S. curriculum. Chemistry 107 and 117; 108 and 118; 241 and 243; 242 and 244; 311 and 313; 312 and 314; and one of the lecture-lab combinations, 231 and 233, or 321 and 323, or 331 and 333; Mathematics 121, 122 or 141, 142, plus 221 and 224; and Physics 131 and 132 are required of all chemistry majors. In order to complete the major, three additional, three-credit courses above the 100 level are required. These may be in chemistry (Chemistry 305 does not satisfy this requirement) but may also be in relevant areas of biology, geology, mathematics or physics, subject to departmental approval. A list of courses fulfilling this requirement is available from the chemistry department.

Students intending to pursue graduate work in chemistry or in an allied interdisciplinary field should select their programs with care. Unless an interdisciplinary program of graduate work is contemplated, students should elect advanced chemistry courses, including 401 and/or 402 to complete the major. Majors are also strongly urged to complete courses in German and/or Russian through the 200 level. Close consultation with their department advisor will assure development of a program which can be recommended for graduate work.

The Department of Chemistry is fully accredited by the Committee on Professional Training of the American Chemical Society. The ACS will certify a degree which includes 107 and 117, 108 and 118, 241 and 243, 242 and 244, 302, 311 and 313, 312 and 314, 321 and 323, 423, 231 and 233, 331 and 333, eight credits of research, and one advanced course in chemistry, mathematics or physics.

Premedical students should elect Chemistry 107 and 117, 108 and 118, and 241 and 243 and 242 and 244 or their equivalents. In addition, Chemistry 231 and 233 are strongly recommended.

MINOR

A minor in chemistry consists of Chemistry 107 and 117 or Chemistry H109 and H111 and Chemistry 108 and 118 or Chemistry H110 and H112 plus four additional courses in chemistry chosen in consultation with the chemistry department. Prior approval of the choice of these courses and coregistration in appropriate laboratory courses is required. Only one semester of research may be counted towards the minor. For students whose major requires Chemistry 107 and 117 and Chemistry 108 and 118 at least one of the additional four courses must be one not required by that major. Because of the interdisciplinary nature of the biological chemistry major, students in this program may not minor in chemistry or biology.

HONORS COURSES

Students who elect H499 and H500 with the preparation of a senior research thesis may be recommended to the college for the award of degree with departmental honors.

CHEM H109 General Chemistry (3)
Staff. Prerequisite: approval of department. Corequisite: CHEM H111. Special course for superior students covering the material listed for 107 plus topics of current interest. Three hours of lecture per week. Concurrent registration in H111 required. Chemistry H109 and H111 may be substituted in the program for 107 and 117. Credit will not be given for both CHEM H109 and H111 and CHEM 107 and 117.

CHEM H110 General Chemistry (3)
Staff. Prerequisite: approval of department. Corequisite: CHEM H112. Special course for superior students covering the material listed for 108 plus topics of current interest. Three hours of lecture per week. Concurrent registration in H112 required. On completion of H110 and H112, the student is prepared to continue with H245-H248. Chemistry H110 and H112 may be substituted in the program for 108 and 118. Credit will not be given for both CHEM H110 and CHEM H112 and 108 and 118.

CHEM H111 General Chemistry Laboratory (1)
Staff. Prerequisite: approval of department. Corequisite: CHEM H109. Laboratory to accompany H109. Introduction to synthesis, qualitative and quantitative analyses, and instrumental techniques in chemistry. Up to six hours of laboratory per week. Concurrent registration in CHEM H109 required.

CHEM H112 General Chemistry Laboratory (1)
Staff. Prerequisite: approval of department. Corequisite: CHEM H110. Laboratory to accompany H110. A continuation of H111. Experiments in acid/base chemistry, thermodynamics and electrochemistry. Use of instrumental techniques in chemistry. Up to six hours of laboratory per week. Concurrent registration in CHEM H110 required.

CHEM H245 Organic Chemistry (3)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisites: CHEM 108 and 118, or equivalent. Corequisite: CHEM H247. The structural, chemical, and physical properties of organic compounds with particular emphasis on areas of current interest. For students who have done superior work in previous chemistry courses. Three hours of lecture per week. Concurrent registration in H247 required. Chemistry H245 and H247 may be substituted in the program for 241 and 243. Credit will not he given for both CHEM H245 and H247, and CHEM 241 and 243.

CHEM H246 Organic Chemistry (3)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisite: CHEM 241 or H245. Corequisite: CHEM H248. The structural, chemical, and physical properties of organic compounds with particular emphasis on areas of current interest. For students who have done superior work in previous chemistry courses. Three hours of lecture per week. Concurrent registration in H248 required. Chemistry H246 and H248 may be substituted in the program for 242 and 244. Credit will not be given for both CHEM H246 and H248, and CHEM 242 and 244.

CHEM H247 Organic Chemistry Laboratory (1)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisites: CHEM 108 and 118, or equivalent. Corequisite: CHEM H245. Laboratory to accompany H245. Techniques of organic synthesis and chemical and physical methods of identification of organic compounds. Four hours of laboratory per week. Concurrent registration in CHEM H245 required.

CHEM H248 Organic Chemistry Laboratory (1)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisite: CHEM 243 or H247. Corequisite: CHEM H246. Laboratory to accompany H246. Techniques of organic synthesis and chemical and physical methods of identification of organic compounds. Four hours of laboratory per week. Concurrent registration in CHEM H246 required.

CHEM H499-H500 Honors Thesis (3, 4)
For senior honors candidates. May be substituted for 401 and 402, respectively.

LECTURE AND LABORATORY COURSES

CHEM 107 General Chemistry I (3)
Staff. Corequisite: 117. An introduction to chemical principles. Stoichiometry, thermochemistry, states of matter, periodic relationships, atomic structure and bonding. Three hours of lecture per week. Concurrent registration in 117 required. Credit will not be given for both 107 and H109.

CHEM 108 General Chemistry II (3)
Staff. Prerequisites: CHEM 107 and 117. Corequisite: CHEM 118. The chemistry of solutions, equilibrium, thermodynamics, electrochemistry, kinetics. Three hours of lecture per week. Concurrent registration in CHEM 118 required. Credit will not be given for both 108 and H110.

CHEM 117 General Chemistry Laboratory I (1)
Staff. Corequisite: CHEM 107. Laboratory to accompany CHEM 107. Introduction to laboratory techniques in chemistry. Experiments dealing with stoichiometry, thermochemistry, properties of gases, and simple analytical techniques. One three-hour lab per week. Concurrent registration in CHEM 107 required. Credit will not be given for both CHEM 117 and H111.

CHEM 118 General Chemistry Laboratory II (1)
Staff. Prerequisite: CHEM 117. Corequisite: CHEM 108. A continuation of Chemistry 117. Experiments to illustrate principles of chemical equilibrium, electrochemistry, kinetics, thermodynamics, qualitative and quantitative analysis. One four-hour laboratory per week. Concurrent registration in 108 required. Credit will not be given for both CHEM 118 and H112.

CHEM 231 Quantitative Analysis (3)
Mr. McPherson, Mr. Schmehl. Prerequisites: CHEM 108 and 118, or equivalent or instructor approval. Corequisite: CHEM 233. Basic theory of gravimetric, volumetric and selected instrumental methods of analysis. Three hours of lecture per week. Concurrent registration in CHEM 233 required. Offered in alternate years.

CHEM 233 Quantitative Analysis Laboratory (1)
Mr. McPherson, Mr. Schmehl. Prerequisites: CHEM 108 and 118, or equivalent. Corequisite: CHEM 231. Laboratory to accompany CHEM 231. Practice of gravimetric, volumetric and selected instrumental methods of analysis. Two four-hour laboratory periods per week. Concurrent registration in 231 required. Offered in alternate years.

CHEM 241 Organic Chemistry I (3)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisites: CHEM 108 and 118, or equivalent. Corequisite: CHEM 243. An introduction to the structural, chemical, and physical properties of organic compounds. Three hours of lecture per week. Concurrent registration in 243 required. Credit will not be given for both 241 and H245.

CHEM 242 Organic Chemistry II (3)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisites: CHEM 241 and 243. Corequisite: CHEM 244. A continuation of 241 with emphasis on areas of current interest. Three hours of lecture per week. Concurrent registration in CHEM 244 required. Credit will not be given for both CHEM 242 and H246.

CHEM 243 Organic Chemistry Laboratory I (1)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisites: CHEM 108 and 118, or equivalent. Corequisite: CHEM 241. Laboratory to accompany CHEM 241. Introduction to laboratory techniques in organic chemistry. Synthesis of organic compounds. One four-hour laboratory period per week. Concurrent registration in 241 required. Credit will not be given for both 243 and H247.

CHEM 244 Organic Chemistry Laboratory II (1)
Mr. Alworth, Mr. Byers, Mr. Ensley, Mr. Li, Mr. Ramamurthy. Prerequisite: CHEM 243. Corequisite: CHEM 242. Laboratory to accompany 242. A continuation of 243. Includes identification of unknown organic compounds. One four-hour laboratory period per week. Concurrent registration in 242 required. Credit will not be given for both 244 and H248.

CHEM 250 Environmental Chemistry (3)
Mr. Alworth, Mr. McPherson. Prerequisite: CHEM 107, 108, or 241. An overview of the many aspects of environmental chemistry. Topics include aquatic chemistry, including water pollution and water treatment; atmospheric chemistry, air pollution and major threats to the global atmosphere; geochemistry and soil chemistry; nature, sources, and environmental chemistry of hazardous wastes; and toxicological chemistry.

CHEM 302 Survey of Biochemistry (3)
Mr. Alworth. Prerequisite: CHEM 241. Corequisite: CHEM 242. This course is a one-semester survey of biochemistry. Students can not take both CELL 401 and CHEM 302 for graduation credit. Biological Chemistry majors should take CHEM 383 and CHEM 384.

CHEM 305 Drugs and Their Actions (3)
Ms. Beckman. Prerequisites: four credits of biology and eight credits of organic chemistry, or equivalent, or permission of chair, Department of Pharmacology. Basic principles of pharmacology and selected topics of special interest, such as drugs of socioeconomic importance and socially abused drugs. Lectures only. Does not count toward the major in chemistry. Same as GPHR 605 and CELL 305.

CHEM 311 Physical Chemistry I (3)
Mr. Herman, Mr. Koplitz, Mr. Levy, Mr. Sulkes. Prerequisites: CHEM 108, 118, and MATH 224 or equivalent. Pre-requisites or corequisites: PHYS 131 and 132. Corequisite: CHEM 313. Elementary quantum mechanics, quantum theory of molecular structure and bonding, fundamentals of spectroscopy. Three hours of lecture per week. Concurrent registration in CHEM 313 required.

CHEM 312 Physical Chemistry II (3)
Mr. Koplitz, Mr. Levy, Mr. Sulkes, Ms. Wittung-Stafshede. Prerequisites: CHEM 108, 118, and MATH 221 or equivalent. Corequisite: CHEM 314. First, second, and third laws of thermodynamics, thermodynamic energy state functions, phases of pure substances, properties of mixtures, chemical equilibrium, equilibrium electrochemistry, statistical thermodynamics.

CHEM 313 Physical Chemistry Laboratory I (1)
Mr. Koplitz, Mr. Sulkes. Prerequisites: CHEM 108, 118, and MATH 244 or equivalent. Prerequisites or corequisites: PHYS 131 and 132. Corequisite: CHEM 311. Laboratory to accompany 311. Experiments in spectroscopy and spectroscopic analysis. One four-hour laboratory period per week. Concurrent registration in 311 required.

CHEM 314 Physical Chemistry Laboratory II (1)
Mr. Koplitz, Mr. Sulkes. Prerequisites: CHEM 108, 118, and MATH 221 or equivalent. Corequisite: CHEM 312 or 612. Knowledge of FORTRAN recommended. Laboratory to accompany 312. Experiments illustrate thermodynamic and statistical mechanical principles. One four-hour laboratory period per week. Concurrent registration in CHEM 312 or 612 required.

CHEM 321 Inorganic Chemistry (3)
Mr. Fink, Mr. Mague, Mr. McPherson, Mr. Schmehl. Corequisite: CHEM 323. Periodic relationships, types of bonding, coordination complexes, acid-base concepts, inorganic reaction mechanisms. Three hours of lecture per week. Concurrent registration in CHEM 323 required.

CHEM 323 Inorganic Chemistry Laboratory (1)
Mr. Fink, Mr. Mague, Mr. McPherson, Mr. Schmehl. Prerequisite or corequisite: CHEM 311 and 313. Corequisite: CHEM 321. Laboratory to accompany 321. Synthetic methods in inorganic and organometallic chemistry. Use of instrumental methods in inorganic chemistry. One four-hour laboratory period per week. Concurrent registration in CHEM 321 required.

CHEM 331 Instrumental Analysis (3)
Mr. McPherson, Mr. Schmehl. Prerequisites: CHEM 108, 118, and either CHEM 241 and 243 or CHEM H245 and H247. Corequisite: CHEM 333. Introduction to modern methods of instrumental analysis including separation techniques and spectroscopic and electrochemical methods. Three hours of lecture per week. Concurrent registration in CHEM 333 required. Offered in alternate years.

CHEM 333 Instrumental Analysis Laboratory (1)
Mr. McPherson, Mr. Schmehl. Prerequisites: CHEM 108, 118, and either CHEM 241 and 243 or CHEM H245 and H247. Corequisite: CHEM 331. Laboratory to accompany 331. Practice of separation techniques and spectroscopic and electrochemical methods of analysis. Two four-hour laboratory periods per week. Concurrent registration in CHEM 331 required. Offered in alternate years.

CHEM 383 Introduction to Biochemistry (3)
Mr. Alworth, Mr. Byers, Ms. Wittung-Stafshede. Prerequisite: CHEM 242. Properties of biological compounds. Bioenergetics, basic metabolic pathways, general biochemical mechanisms. Same as CHEM 683.

CHEM 384 Intermediate Biochemistry (3)
Mr. Alworth, Mr. Byers, Ms. Wittung-Stafshede. Prerequisite: CHEM 383. Intermediary metabolism with emphasis on the integration of lipid, saccharide, and amino acid metabolism. Electron transport and oxidative phosphorylation. Photosynthesis. Purine and pyrimidine metabolism. Same as CHEM 684.

CHEM 385 Introduction to Biochemistry Laboratory (1)
Mr. Alworth, Mr. Byers. Corequisite 383 (exemption by approval of instructor). Eight hours of laboratory per week. Offered both semesters. Same as CHEM 685.

CHEM 391 Special Topics (3)
Staff. Special topics in chemistry. For description, consult department.

CHEM 401 Research and Seminar (1 or 3)
Staff. Prerequisite: junior standing or approval of department. Individual research supervised by the faculty. Students are expected to present a short seminar based on their research. At least ten hours of research effort per week. A maximum of three credits may be taken.

CHEM 402 Research and Seminar (1 or 3)
Staff. Same as Chemistry 401 in organization. A maximum of three credits may be taken.

CHEM 423 Organometallic Chemistry - The Transition Elements (3)
Mr. Fink, Mr. Mague. Prerequisites: CHEM 242, H246, or approval of instructor. The chemistry of compounds containing transition metal and carbon bonds. A survey of major classes of transition metal compounds, their chemistry, and their role in homogeneous catalysis.

CHEM 424 Organometallic Chemistry - The Main Group Elements (3)
Mr. Fink, Mr. Mague. Prerequisites: CHEM 242, H246, or approval of instructor. The chemistry of compounds containing main group element carbon bonds. A survey of major classes of main group organometallic compounds and applications to organic synthesis, structural, and electronic materials.

CHEM 683 Introduction to Biochemistry (3)
See Chemistry 383 for description.

CHEM 684 Intermediate Biochemistry (3)
See Chemistry 384 for description.

CHEM 685 Introduction to Biochemistry Laboratory (1)
See Chemistry 385 for description.