At Kansas, our approach to graduate education appeals to students with goals that range from teaching at colleges and universities to careers in government labs or industry. Our students can look forward to personal development in an atmosphere that emphasizes progress from collaboration and mentorship with an adviser to independent scholarship. If this program fits your needs and plans for the future, we invite you to join us.

The Adams Institute
www.adamsinstitute.ku.edu
Graduate students at KU may pursue their degrees in a number of departments, including Chemistry, Pharmaceutical Chemistry, Medicinal Chemistry, and the School of Engineering. Analytical students in these departments are affiliated with the Ralph N. Adams Institute for Bioanalytical Chemistry. The Adams Institute is an international and interdisciplinary group of researchers focused on the development of new instrumentation and methodologies that can be employed by life scientists to promote understanding of fundamental life processes. The more we know about these processes, the better we are able to develop new ways to intervene, regulate biological function, and restore health. Some areas of current focus include the development of:

- new protemic tools for a better understanding and diagnosis of cancer, AIDS, and Alzheimer’s disease;
- novel methods for high throughput screening of drugs and other bioactive molecules;
- new methods to investigate the pharmacokinetics, metabolism, and disposition of drugs that provide better data while also reducing the number of animals needed for these studies;
- new clinical diagnostic tests based on microfluidics for the detection of disease, and
- new sensors for monitoring the release of neurotransmitters that can be used to improve understanding of neurological disorders, drug addiction, and strokes.

Doctoral Degree

The Ph.D. degree is awarded through the Departments of Chemistry, Pharmaceutical Chemistry, Medicinal Chemistry, and the School of Engineering for mastering a specialty field in the discipline, learning methods of chemical investigation, and completing a substantial original research project. The degree is intended to prepare the research specialist.

Master’s Degree

Students who want a less extensive graduate program can also obtain a Master of Science (M.S.) degree through the Departments of Chemistry, Pharmaceutical Chemistry, Medicinal Chemistry, and the School of Engineering. This program, usually completed in two years, omits the intensive course concentrations required for the Ph.D. and requires a more modest research project and thesis.

Admission

Graduate students pursuing degrees in bioanalytical chemistry at KU are admitted through the Departments of Chemistry, Pharmaceutical Chemistry, Medicinal Chemistry, and the School of Engineering. Admitted students may also affiliate with the Ralph N. Adams Institute for Bioanalytical Chemistry.

To apply for admission to graduate studies at the University of Kansas, a student must submit a completed KU graduate application, one transcript of all previous college or university work, Graduate Record Examination scores, and three recommendations from individuals familiar with the applicant’s academic background and abilities. See the specific department for more information.

International students must supply an official copy (not student’s copy) of the applicant’s TOEFL scores earned not more than two years before the semester of admission, and an official copy of scores on the academic format of the International English Language Testing System (IELTS) administered by the University of Cambridge ESOL earned not more than two years before the semester of admission.

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The University of Kansas prohibits discrimination on the basis of race, color, religion, sex, national origin, age, ancestry, disability, veteran status, sexual orientation, marital status, and parental status.
Facilities
Research facilities at KU offer a range of modern instrumentation, and the physical sciences are served by an extensive research support organization, the Molecular Structures Group (www.mgs.ku.edu). Major instruments include six mass spectrometers with capabilities such as laser desorption (MALDI), high-resolution FTMS, GC-MS, LC-MS, MS/MS; six NMR spectrometers from 800-3000Hz; Bruker X-ray diffractometers for single crystal and powder analyzers; and an advanced FT-Raman spectrometer. Other general equipment includes Fourier transform infrared spectropho- tometers, other nuclear magnetic resonance instruments, and automated spectrophotometers. Individual research groups also have the advanced equipment necessary to enhance their research programs. The new 106,000 square foot Multidisciplinary Research Building is the home of the Adams Institute for Bioanalytical Chemistry, including the Adams Microfabrication Facility. This cutting-edge facility provides capabilities for photolithography, plasma etching of high surface ratio elements, glass etching, laser ablation, metal deposition, dielectric material deposition, and microchip characterization. Specialized research support facilities in Patell Hall include an electronics shop, an instrument design laboratory, a molecular graphics laboratory, a biochemical research services laboratory, a machine shop, and a staffed maintenance facility.

Faculty Members and Research Areas
Jane V. Aldrich, Professor, Ph.D., University of Michigan. Medicinal chemistry: design and synthesis of peptide and peptidomimetic analogues, primarily of opioid peptides, and examination of structure-activity relationships by both conventional and combinatorial chemistry approaches. Exploration of synthetic methodologies for the preparation of novel peptide and peptidomimetic analogues.

Cindy L. Berrie, Associate Professor, Ph.D., University of California-Berkeley. Physical and analytical chemistry: surface science, scanning probe microscopy, nanoscale patterning, biomolecule interactions.

Heather R. Desaire, Associate Professor, Ph.D., University of California-Berkeley. Analytical mass spectrometry. (biorobotics; petroleum microbiology). Robert C. Dunn, Professor, Ph.D., University of California-San-Diego. Analytical chemistry: optical spectroscopy/ microcopy, fiber optics, optical sensors, single molecule spectroscopy, model membranes.

Carey K. Johnson, Professor, Ph.D., Iowa State University. Physical chemistry: time-resolved and single-molecule laser spectroscopy, chemical and physical dynamics probed by ultrafast time-resolved laser spectroscopy and reorientational dynamics in solution.

Michael A. Johnson, Associate Professor, Ph.D., University of Virginia. Analytical chemistry. Microresor development and instrumentation; characterization of neurotransmitters, fluorescence microscopy, microbial ecology, neurodegenerative disorders, oxidized lipids, and reactive oxygen species.

Jeffrey P. Krise, Associate Professor, Ph.D., University of Kansas. Pharmaceutical chemistry: Medicinal chemistry: analysis of intracellular drug sequestration and trafficking events in mammalian cells. Evaluation of the physiochemical properties of drugs with their organellar accumulation capacity. Proteomic approaches and gene silencing techniques are used to identify and characterize proteins that play a role in these processes.

Jennifer S. Laurence, Assistant Professor, Ph.D., Purdue University. Pharmaceutical chemistry: Analysis of protein structure and dynamics using multidimensional NMR and computational methods to elucidate correlations between catalytic and biological function and the proteins’ structure and dynamics. Examination of protein-protein, protein-membrane, and protein-ligand interactions using biophysical, biochemical, chemical, and spectroscopic tools.

Craig E. Lunte, Professor, Ph.D., Purdue University. Analytical chemistry: Monitoring living systems, micro-separation techniques, electrochemistry, electrochemical detection for liquid chromatography and capillary electrophoresis, drug transport, pharmacokinetics, anticancer drugs.

Susan P. Lunte, Ralph Adams Distinguished Professor, Ph.D., Purdue University. Bioanalytical Chemistry. Liquid chromatography, capillary electrophoresis, electrochemical and laser-induced fluorescence detection, microarray sampling, neuroscience: protein and peptide analysis, microchip analytical systems and mass spectrometry.


Karen J. Northonden, Professor, Ph.D., University of Illinois at Urbana-Champaign. Chemical & Petroleum Engineering: Development of synthetic processes for wide bandgap semiconductors such as SiC, GaN, and ZnO. Development of microchip analytical systems.

Mario Rivera, Professor, Ph.D., University of Arizona. Bioanalytical Chemistry. NMR spectroscopy, electrochemistry, recombiant DNA methodology and structural biochemistry aimed at understanding structure-function relationships in heme containing proteins and at elucidating the mechanism of oxygen activation at heme active centers. Christian Schönich, Professor and Chair, Ph.D., Technical University Berlin (Germany). Pharmaceutical chemistry. Reaction mechanisms of free radicals with the reactive oxygen species with biomolecules such as lipids, peptides, and proteins. Investigation of the importance of free radical processes in biochemistry and pathology and possible pharmaceutical interventions.

G. Sitta Sittampalam, Professor, Courtesy Professor of Analytical Chemistry, Ph.D., University of Arizona. Toxicology & Therapeutics: developing innovative tools for quantitative biology and pharmacology and its applications to High Throughput Screening (HTS) and drug discovery; the integration of state-of-the-art cell technologies and 3D imaging of engineered tissues to identify and validate drug targets in cancer, metabolic and neurodegenerative diseases.

John F. Stobaugh, Professor, Ph.D., University of Kansas. Pharmaceutical Chemistry: Liquid chromatography, based trace analysis of drugs, peptides, and proteins in biological samples. Development of fluorescent and electrochemical derivatization reagents. The development of capillary electrophrosis as a microanalytical technique for biological samples, the resolution of optical isomers, and protein separations. Evaluation of capillary electrochromatography, including new supports, as a separation technique in pharmaceutical and biomedical analysis.

David D. Weis, Assistant Professor, Ph.D., Indiana University, Bloomington. Analytical Chemistry: the mechanisms by which intrinsically disordered proteins mediate interactions with their binding partners. Amid H2O exchange coupled with HPLC and time of flight mass spectrometry is used to probe these interactions.

George S. Wilson, Higuchi Distinguished Professor of Chemistry and Pharmaceutical Chemistry, Ph.D., University of Illinois. Analytical chemistry: structural effects of cytochrome electron transfer, redox biochemistry, implantable biosensors, flow injection immunocchemistry.

Financial Support
Essentially every graduate student receives financial support while pursuing a graduate degree. Undergraduates from many departments take chemistry courses each semester, and our need for graduate teaching assistants is high. Also, faculty members are active in pursuing research support, which allows their students to be paid from grants as research assistants. Nearly all graduate students whose research focus is bioanalytical chemistry are supported as research assistants.

In addition to T.A. and R.A. support, several types of fellowships and traineeships are available. Detailed information can be obtained when you apply. Fellowships for summer support are available in the affiliated departments through contributions from various endowment and industrial sources.

The University
The University of Kansas is a major educational and research institution with 30,000 students and 2,300 faculty members. The university includes the main campus in Lawrence, the Medical Center in Kansas City, the KU Edwards Campus in Overland Park, a clinical campus of the School of Medicine in Wichita, and educational and research facilities throughout the state. KU has 13 major academic divisions: the College of Liberal Arts and Sciences and the Schools of Allied Health, Architecture and Urban Planning, Business, Education, Engineering, Fine Arts, Journalism and Mass Communications, Law, Medicine, Nursing, Pharmacy, and Social Welfare. Visit KU’s Web site, www.ku.edu.

Graduate Research in Bioanalytical Chemistry
The University of Kansas