

Graduate Training in

Chemistry

 **SOUTHWESTERN**
MEDICAL CENTER



www.utsouthwestern.edu/chemistry



About UT Southwestern Graduate School

UT Southwestern includes a graduate school of over 700 students. Additionally, UTSW features one of the premier medical schools in the country, and a school of allied health.

The division of basic sciences at UT Southwestern includes over 250 faculty members and 8 training programs, including the chemistry training track.

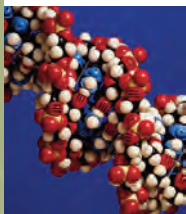
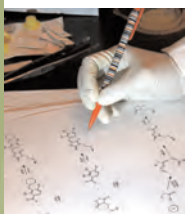
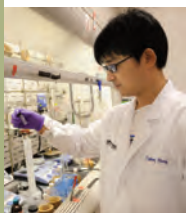
Excellence in Research

- Four Nobel laureates
- 18 members of the prestigious National Academy of Sciences
- More than 3,500 research projects annually
- More than \$400 million in research funding
- Leaders in a new era of scientific discovery in the 21st century

Welcome to UT Southwestern Chemistry Training Track

The interface between chemistry and biology continues to be a rewarding and dynamic area of research. The Chemistry Training Track at UT Southwestern was founded on this vision and is designed to prepare students to address emerging research opportunities at the crossroads of modern chemistry and discovery biology.

Research projects focus on topics at the forefronts of synthetic and mechanistic chemistry, chemical biology, and biochemistry. The program is committed to providing an educational experience that is challenging, broad based, and rigorous.



Ph.D Training in Chemistry

Training is provided through coursework, scientific presentations, and independent research. These opportunities train students to think critically, present their research, and master the field of organic chemistry.

Courses

17 Total credit hours

High Faculty/student ratio ensures individualized training.

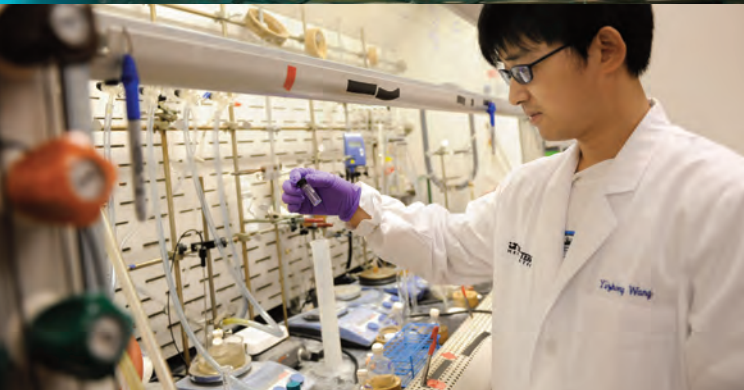
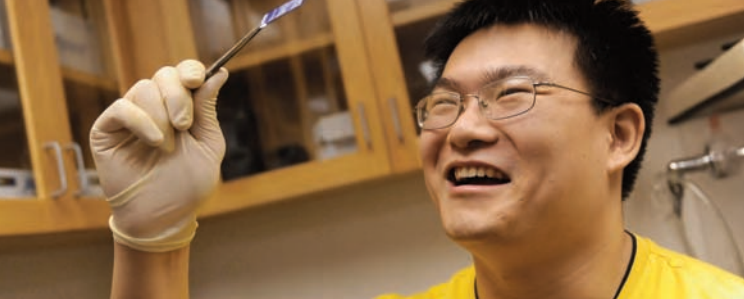
Fall, First Year

Advanced Problems in Reaction Mechanisms
Chemical Structure & Reactivity
Chemical Synthesis

Spring, First Year

Advanced Synthesis and Catalysis
Advanced Problems in Reaction Mechanisms
Small Molecule Structure & Elucidation
Medicinal Chemistry

Chemistry graduate students can also elect to take any of the other 56 courses offered by the Division of Basic Science.



Seminars in Chemistry

Students benefit from frequent interactions with multiple faculty members through several mechanisms.

Student Seminars in Chemistry

Students present seminars on their own research and on a literature topic annually.

Chemistry Noon Seminar Series

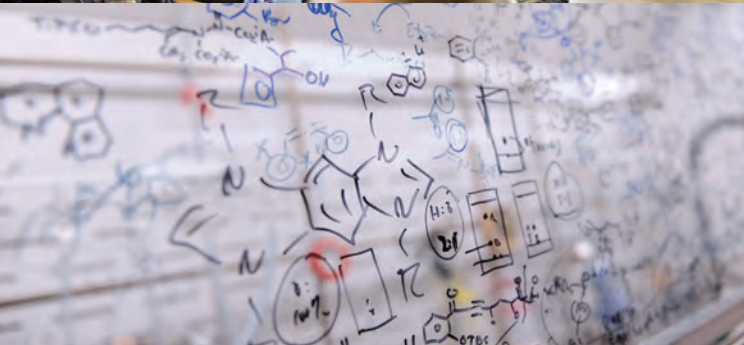
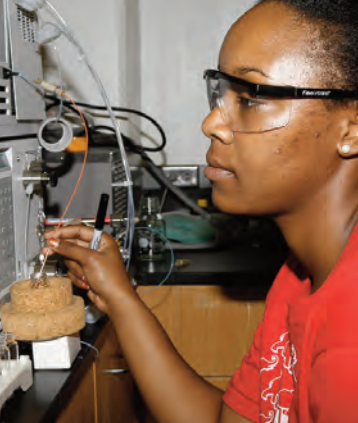
The chemistry training track hosts a unique seminar series featuring visiting expert speakers from industry and academia.

Dissertation Committee

Students meet regularly with their dissertation committee to discuss their progression toward completing their Ph.D.

Qualifying Exam

Students prepare and present an independent research proposal in their 2nd year.



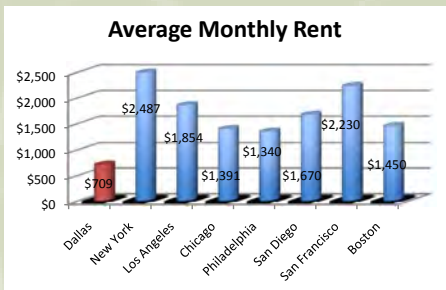
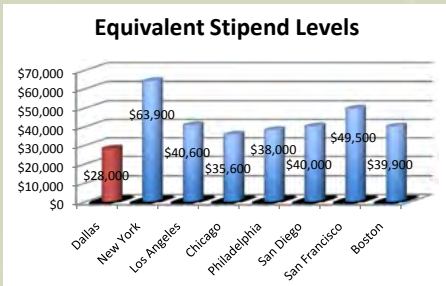
Life at UT Southwestern

Financial Assistance

All students are supported by fellowships throughout their training:

- \$28,000 (2010) stipend
- Tuition Waiver
- Health insurance

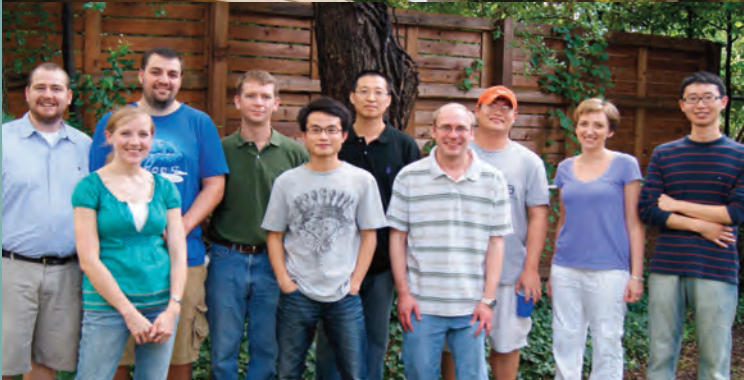
Dallas enjoys a healthy economic climate and low cost of living in comparison to other major cities in the US:



Data source: ACCRA www.costofliving.org

Teaching Opportunities

Students are not required to teach labs or courses during their training. Rather, they focus on research from their first days on campus. Special opportunities for teaching may be available for students who are interested.



Research Opportunities

As a chemist at UT Southwestern, you will address problems at the forefront of chemistry and biomedical sciences. UT Southwestern combines a focus on individual excellence with opportunities to engage in interdisciplinary research.

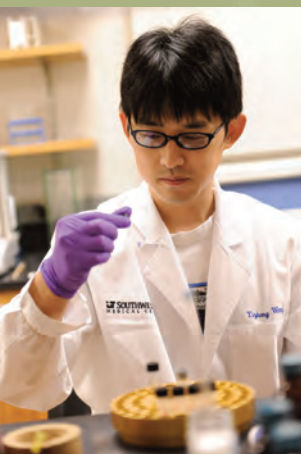
Research in Chemistry

Research groups focus on problems of fundamental importance to the chemical community:

- Asymmetric catalysis
- Isolation of natural products
- Medicinal chemistry
- Organometallics
- Synthesis of natural products
- Synthetic methodology

Interdisciplinary Research Opportunities

UT Southwestern fosters collaborative, interdisciplinary science. Students have exciting opportunities to work with researchers ranging from clinicians to basic scientists on topics at the forefront of biomedical research.



Recent Collaborative Projects Involving UT Southwestern Chemists

Identification of small molecules that regulate the hedgehog signaling pathway, a pathway important in cancer and development

Nature Chem. Biol. 2009, 5, 100-107

Discovery of an anticancer agent operating through a novel mechanism

Science 2004, 305, 1471-1474

Discovery of a small molecule to treat neurodegenerative diseases

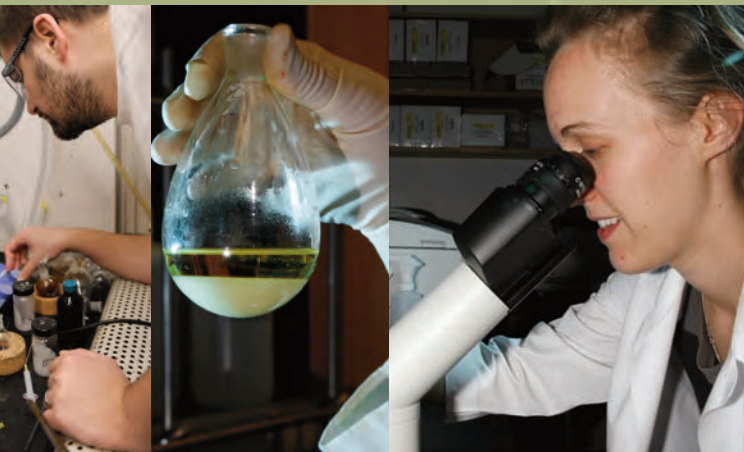
Cell 2010, 142, 39-51

Biological studies on a potent anticancer natural product

J. Am. Chem. Soc. 2010, 132, 371-383

Discovery of a potent antibiotic operating through a novel mechanism

Science 2008, 321, 1078-1080



Chemical Research Facilities

UT Southwestern is equipped with state of the art instrumentation for chemical research. Shared instrumentation includes:

Autosampling 400 MHz NMR

500 MHz NMR

Tandem HPLC/600 MHz NMR

800 MHz NMR

UV/Vis, IR, Fluorescence spectrometers

High-pressure hydrogenation equipment

Small molecule X-ray diffractor

Individual labs are equipped with:

Gas chromatographs

Tandem gas chromatograph/mass spectrometer

Tandem HPLC/mass spectrometers

Microwave reactors

Gloveboxes

Solvent purification systems

Automated chromatography

The University supports several labs to aid chemical research:

X-ray crystallography facility

High-throughput screening facility

Pharmacology facility

Medicinal chemistry facility



	MW	dens	mass	vol	mmol	g
IKT-085	250.16		60mg		0.242	1
aniline	93.13	1.032		25	0.2570	1.2
BCEs	315.34		7mg		0.0214	0.1
cyclohexan				40µL		
Cmc 0.1M						

added epoxide
 to reflux
 over

added BCEs, aniline
 for 1 hr, then stirred
 work-up partition btw
 wash w/ brine, dried over Na₂S₂O₈
 filter. Concentrate. Chromatographed (S.O.)
 distillate



UT Southwestern and Dallas/Ft. Worth

UT Southwestern is located a few minutes from the modern urban center of Dallas, a vibrant and diverse city that has something for everyone. Dallas is the third largest city in Texas and the ninth largest city in the US. The Dallas/Fort Worth Metroplex is home to over 5 million residents. Many apartment complexes are available within walking and cycling distance of the campus.

Dallas is known for its barbecue, authentic Mexican, and Tex-Mex cuisine. But the city is also home to a diverse array of cuisine from around the world.

If you can not find what you're looking for in Dallas, the city of Fort Worth is a quick drive from the campus. As the seventeenth largest city in the US, Fort Worth is one of the cultural and social centers of Texas. For more information, go to:

www.visitdallas.com

Sports and Entertainment

Dallas is home to professional teams in all the major sports, including:

- Dallas Cowboys (Football)
- Dallas Mavericks (Basketball)
- Texas Rangers (Baseball)
- Dallas Stars (Hockey)
- FC Dallas (Soccer)



UT Southwestern South Campus



T. Boone Pickens Biomedical Building and UT Southwestern Outpatient Building



UT Southwestern North Campus



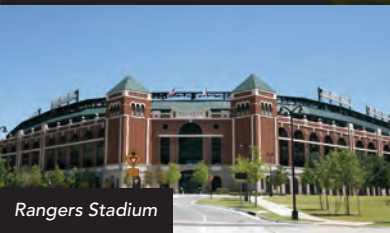
Downtown Dallas



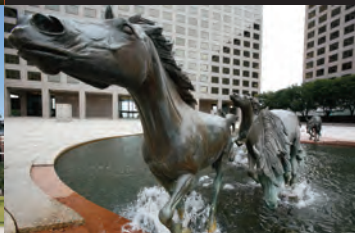
Dallas Cowboys Stadium Arlington



Downtown Fort Worth Sundance Square



Rangers Stadium



UT Southwestern Chemistry Faculty

UT Southwestern is considered to be one of the premier research institutions in the nation. Among our internationally recognized faculty are four Nobel Laureates and eighteen members of the National Academy of Sciences. On the basis of federal individual research grant support, UT Southwestern consistently ranks among the top universities. We are proud to have one of the largest concentrations of organic chemists in any one department in the country.

Richard Auchus, MD, PhD

Professor

MD, Ph.D. Washington University 1988

Richard.auchus@utsouthwestern.edu



The Auchus group is interested in understanding the mechanisms of steroid-metabolizing enzymes. To this end, the lab uses chemical probes, kinetic experiments, and structural biology.

- Steroid hormones
- Kinetic isotope effects
- Enzyme mechanisms

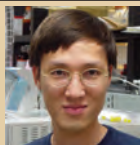
Chuo Chen, PhD

Associate Professor

Ph.D. Harvard University 2001

Website: www4.utsouthwestern.edu/chuochen/

Chuo.chen@utsouthwestern.edu



The goals of our research program are to develop new strategies and methods to facilitate the chemical synthesis of small molecules, and to use these small molecules to help advance our understanding of cancer biology. We are focusing on (1) the target-oriented synthesis of structurally unique and biologically significant natural products, and (2) the function-oriented synthesis of small-molecule inhibitors of the Hedgehog (Hh) and Wnt signal transduction pathways.

- Total synthesis of natural products
- Hedgehog and Wnt signaling pathways

David Corey, PhD

Professor

Ph.D. University of California, Berkeley 1990

Website: www4.utsouthwestern.edu/coreylab/

David.corey@utsouthwestern.edu



The Corey lab is interested in studying chemically modified nucleic acids and nucleic acid mimics designed to modulate gene expression.

- Oligonucleotides
- RNA
- Peptide nucleic acids

Jef K. De Brabander, PhD

Professor

Ph.D. University of Ghent, 1993

Website: <http://www4.utsouthwestern.edu/jdebralab/>

jef.debander@utsouthwestern.edu



Research in De Brabander laboratory focuses on the synthesis of designed and naturally occurring substances. The De Brabander group develops methodology for the construction of functionality found in complex natural products. His group has integrated molecular pharmacology and biochemical studies to understand and create biologically active small molecules.

- Synthesis
- Natural Products
- Mode-of-Action

J. R. Falck, PhD

Welch Professor

Ph.D. Colorado State University 1974

Website: <http://www4.utsouthwestern.edu/falcklab/index.html>

j.falck@utsouthwestern.edu



The main theme of research in the Falck group is the application of synthetic and bioorganic chemistry to problems of biochemical and medicinal relevance.

- Total synthesis
- Antibiotics
- Medicinal chemistry
- Isolation of natural products

László Kürti, PhD

Assistant Professor

Ph.D. University of Pennsylvania 2006

Website: <http://kurttilabs.com>

Laszlo.kurti@utsouthwestern.edu



The Kürti group focuses on the development of new methods for the enantioselective assembly of highly functionalized molecules.

We are interested in applying our reactions to the preparation of complex bioactive natural products and their derivatives. We will work with our colleagues to identify molecules that have the potential to become drugs for a variety of major as well as neglected diseases.

- Asymmetric catalysis
- Total synthesis
- Heterocyclic chemistry
- Medicinal chemistry

Wen-Hong Li, PhD

Ph.D. University of California, San Diego, 1996

Website: www4.utsouthwestern.edu/lilab/

Wen-hong.li@utsouthwestern.edu



Research in the Li laboratory aims to develop photonic probes to enable biological discovery. The biological focus of our study is on the regulation of insulin secretion in pancreatic beta cells and on the regulation and therapeutic application of small non-coding RNAs including microRNAs.

- Probe development
- Insulin secretion and diabetes
- Fluorescence and molecular imaging

John MacMillan, PhD

Assistant Professor

Ph.D. University of California at Davis, 2004

Website: www4.utsouthwestern.edu/macmillanlab/home.html

John.macmillan@utsouthwestern.edu



The MacMillan lab is interested in the discovery of biomedically relevant natural products derived from marine bacteria. We accomplish this goal through: 1) a combination of high-throughput screening (HTS) technology, microbiology and analytical chemistry to identify and isolate natural products and 2) the use of 1- and 2-D NMR, MS and organic synthesis to determine the structure of new molecules. Through collaborations with other UTSW scientists, we have active programs to identify novel antibiotics and anti-cancer therapeutics.

- Natural Products
- Marine microbiology
- Determination of Stereochemistry

Joseph Ready, PhD

Associate Professor

Ph.D. Harvard University 2001

Website: www4.utsouthwestern.edu/readylab

Joseph.ready@utsouthwestern.edu



The Ready group is interested in the synthesis and application of biologically active small molecules. We develop methods and strategies to prepare complex natural products and designed molecules. We collaborate with groups at UTSW and beyond to explore the utility and mechanisms of these molecules' biological activity.

- Synthetic methodology
- Medicinal chemistry
- Synthesis of natural products

Uttam Tambar, PhD

Assistant Professor

Ph.D. California Institute of Technology, 2006

Website: www4.utsouthwestern.edu/tambarlab

Uttam.tambar@utsouthwestern.edu



The Tambar Group is developing new strategies and concepts in synthetic chemistry. Our discoveries will be applied to the synthesis of complex biologically active natural products and their unnatural analogs. Additionally, we are taking advantage of the unique opportunities in biomedical research at UT Southwestern.

- Natural products synthesis
- Medicinal chemistry
- Enantioselective catalysis
- Tandem methodology

D. Gomika Udugamasooriya, PhD

Assistant Professor

Ph.D. Wayne State University 2006

Gomika.Udugama@utsouthwestern.edu



The Udugamasooriya group is exploring an emerging class of molecules called 'Peptoids' as novel cancer therapeutics as well as diagnostic agents. We have recently developed a novel on-bead combinatorial cell screen to directly identify highly specific peptoids. These peptoids are further modified, improved and evaluated in both therapeutic and imaging applications targeting cancer and cancer stem cells.

- Peptoids
 - Image-guided cancer therapy
 - Combinatorial cell screen
-



Application is free online:
www.utsouthwestern.edu/chemistry

Summer Undergraduate
Research Fellowships:
www.utsouthwestern.edu/SURF

