

GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

Your Future in Research, Today.

Antonio Fernandez-Perez
Internal Medicine Cardiology



For an **accessible version of this PDF**, please contact:

Lisa Gardner

Lisa.Gardner@UTSouthwestern.edu

Table of Contents

<i>Why UT Southwestern</i>	<i>01</i>
<i>Basic Biomedical Sciences Program: Curriculum</i>	<i>02</i>
<i>Basic Biomedical Sciences Programs: Nine Ph.D. Programs Under One Umbrella</i>	<i>03</i>
<i>Biomedical Engineering Program</i>	<i>05</i>
<i>Organic Chemistry Program</i>	<i>05</i>
<i>Ph.D. Tracks:</i>	
<i>Computational and Systems Biology</i>	<i>06</i>
<i>Mechanisms of Disease and Translational Science</i>	<i>06</i>
<i>Pharmacological Sciences</i>	<i>06</i>
<i>Medical Scientist Training Program (M.D./Ph.D.)</i>	<i>07</i>
<i>Cutting-Edge Research</i>	<i>10</i>
<i>Summer Undergraduate Research Programs</i>	<i>11</i>
<i>Graduate Career Development</i>	<i>13</i>
<i>Student Life</i>	<i>15</i>
<i>A Diverse and Inclusive Student Body</i>	<i>16</i>
<i>Life in Dallas</i>	<i>17</i>
<i>Costs/Financial Support</i>	<i>19</i>
<i>How to Apply</i>	<i>19</i>
<i>Contact Us</i>	<i>19</i>

Why UT Southwestern

A successful career as a leader in biomedical research and education begins with a strong foundation.

Propel Your Future

UT Southwestern's Graduate School of Biomedical Sciences offers students unsurpassed opportunities to collaborate with internationally recognized faculty, use state-of-the-art equipment in advanced labs, and participate in the discovery and transmission of knowledge to solve complex health challenges. Here, our investigators' discoveries form the foundation for new ways to prevent or treat disease.

At UT Southwestern, the exceptional education you receive – and the work you do – will make a difference.

More than 3,000 graduates have laid the foundation for a successful career here. Nearly 500 predoctoral students are currently enrolled in the Graduate School, building their own promising path to the future.

We offer more than 1 million square feet of state-of-the-art research space and 34 core lab facilities to support a rich, scholarly environment for graduate study.

See utsouthwestern.edu/core-facilities

Be Inspired by Your Peers

Great students are the cornerstone of our success at the Graduate School of Biomedical Sciences.

Our diverse, motivated student body will stimulate you intellectually and inspire you to reach your full potential. More than 1,000 well-qualified students will apply for admission for an average of 65 available positions in 11 Ph.D. programs.

Experience True Collaboration

The Graduate School of Biomedical Sciences has a strong tradition of collaboration among laboratories, which provides students access to expertise, techniques, and training beyond that available in their home research laboratory. Here, collaboration is not simply a buzzword. It's part of our culture and, we've found, often the most rewarding and effective means of answering important questions.

Leaders at the Bench

As a graduate student, you'll not only have access to cutting-edge research facilities, you'll also train alongside leaders in the field throughout your time here. Mentorship is essential to growing your career in the sciences and our faculty strives to foster a learning environment that allows students opportunities to observe and develop professional skills, behaviors, and attitudes of highly trained scientists and researchers.

Basic Biomedical Sciences Program

An Innovative Approach to Graduate Education: More Lab, Less Classroom

Not all students are sure of their path at this point in their education – that's why our students are not required to declare a program affiliation until after they have begun graduate school and have had the chance to explore all of the possibilities.

Nine of our basic science Ph.D. programs are united under the Basic Biomedical Sciences Program, an umbrella program that admits a single cohort of first-year students and requires them to complete a common curriculum during the first semester. The core course, a minimum of two laboratory rotations, and responsible conduct of research training comprise the common curriculum. Students in the Basic Biomedical Sciences Program typically join individual Ph.D. programs during the second semester.

Innovative Approach

We believe quality research training occurs primarily in the lab, not in the lecture hall. In most cases, students in the Basic Biomedical Sciences Program complete all required didactic coursework – receiving in-depth knowledge of the fundamentals of their chosen research area – during their first year of graduate studies. Students devote full attention to their dissertation research beginning in the second year as they refine their expert knowledge, improve their critical thinking skills, and master experimental techniques.

Our one-year didactic curriculum includes:

First Semester

- > Proteins core course (required)
- > Genes core course (required)
- > Cells, neuroscience, or biophysics core course (required; determined by choice of Ph.D. program)
- > Introduction to Biostatistics (required)
- > Responsible conduct of research (required)
- > Two or more lab rotations (required)
- > Elective courses (determined by Ph.D. program)

Second Semester

- > Advanced program-specific courses
- > Additional lab rotations possible

UT Southwestern's faculty has received six Nobel Prizes, and currently includes 22 members of the National Academy of Sciences, 17 members of the National Academy of Medicine, and 15 Howard Hughes Medical Institute Investigators.

Students are expected and encouraged to attend graduate program-specified seminars, journal clubs, and work-in-progress presentations throughout the first year.

Advancement to Candidacy

As a graduate student, you'll be officially admitted to Ph.D. candidacy upon:

- > Successful completion of all required coursework and rotations in your first year
- > Earning a passing grade on the qualifying exam during your second year

Candidate Responsibilities

- > Conduct dissertation research
- > Present your work-in-progress annually at your program seminar
- > Attend all work-in-progress seminars for your program (weekly)
- > Attend and present regularly at journal club
- > Participate in departmental seminars
- > Participate in professional development
- > Expand your oral and written communication skills



Nine Ph.D. Programs Under One Umbrella

Biological Chemistry Ph.D.

Training in biochemistry and molecular biology focused at the interface of chemistry and biology, with an emphasis on mechanism.

Cancer Biology Ph.D.

Up-to-date training in molecular and cellular aspects of cancer research, including cancer and development, chemistry and cancer, cancer cell networks, DNA repair and radiation biology, and molecular pathogenesis and therapeutic targeting.

Cell and Molecular Biology Ph.D.

Training opportunities in the study of cellular functions ranging from basic molecular mechanisms to functional behavior in normal and disease states.

Genetics, Development, and Disease Ph.D.

Applying fundamental genetics principles to dissect problems in biology and disease, including development, growth, cancer, and aging.

Immunology Ph.D.

Training in topics that include innate immunity, host-commensal and host-pathogen interactions, autoimmune diseases, inflammatory diseases, immunodeficiencies, and adaptive immune responses.

Integrative Molecular and Biomedical Sciences Ph.D.

Training to understand the molecular and cellular basis of integrated biological systems, such as cells, tissues, organ systems, or whole animals.

Molecular Biophysics Ph.D.

Discover principles of molecular and cellular function and evolution using an interdisciplinary set of tools encompassing structure, imaging, reconstitution, cell biology, computation, and more.

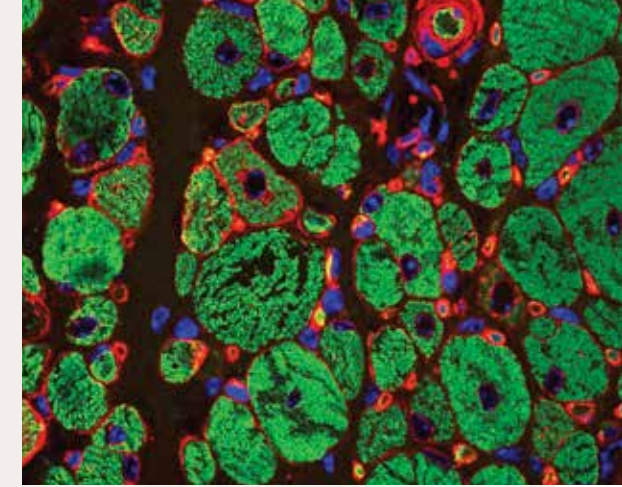
Molecular Microbiology Ph.D.

An integrated approach to the study of prokaryotic organisms and viruses and their interactions with hosts.

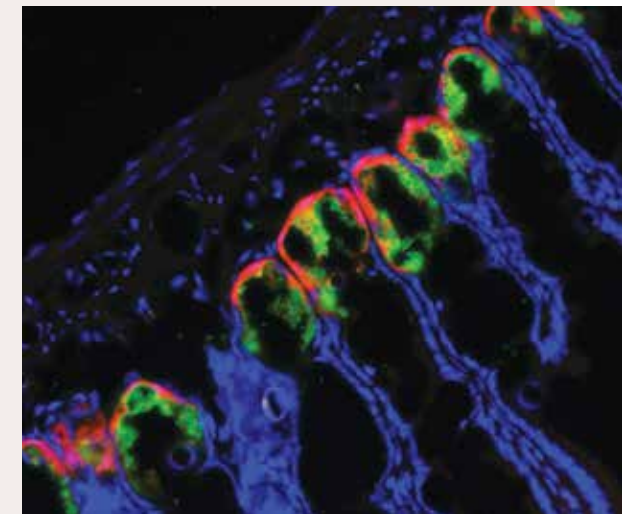
Neuroscience Ph.D.

Multidisciplinary analysis of the mechanisms underlying nervous system function.

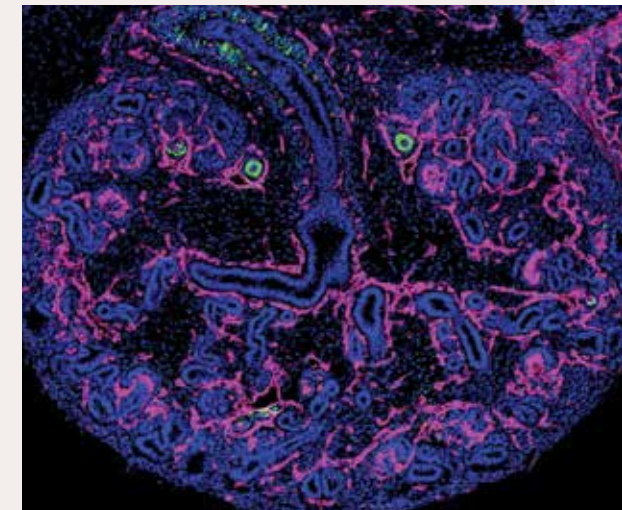
For complete descriptions, visit utsouthwestern.edu/grad-programs



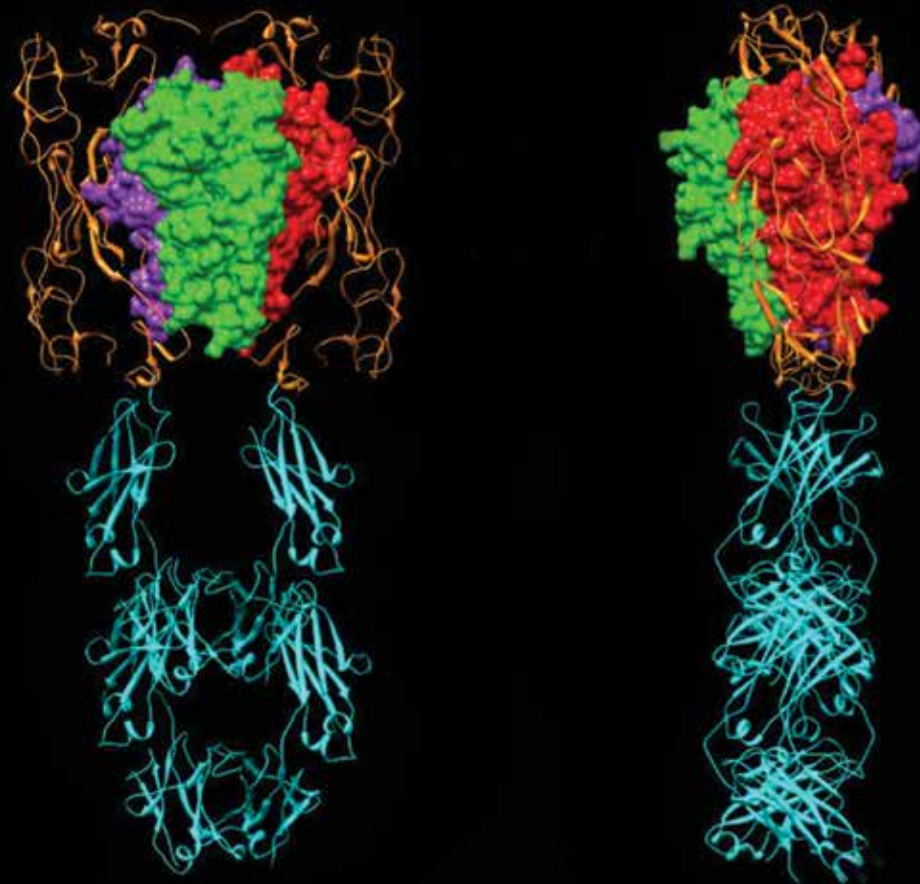
^ Regenerating muscle fibers (green: muscle contractile protein; red: plasma membrane; blue: nucleus) depicting a recuperation phenomenon that occurs upon muscle disease and muscle injury.



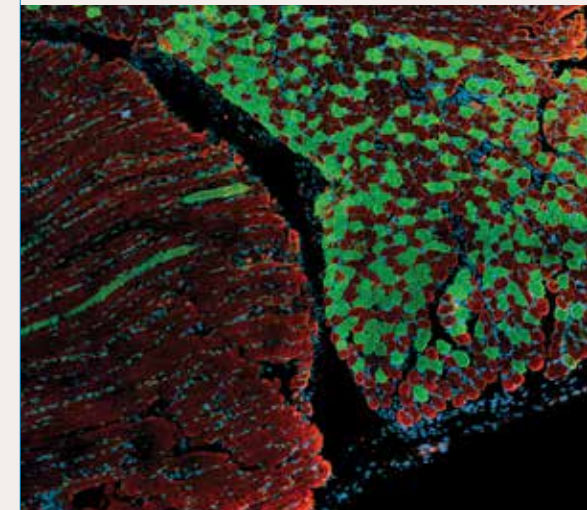
^ Highly active granule-containing Paneth cells of the small intestine (red and green) create a favorable niche for their surrounding intestinal stem cells and the entire intestinal epithelium (blue).



^ Embryonic day 14.5 wild-type mouse kidney section (green: smooth muscle cells enwrapping kidney arteries and ureter; magenta: overall vascular pattern; blue: nuclear counterstain to show overall kidney architecture)



^ Chimeric protein consisting of the extracellular domain of the human p55 TNF receptor linked to the Fc portion and hinge region of a mouse IgG1 heavy chain.



^ Precise architecture of diverse muscle fibers (red: fast; green: slow) from two different angles.

Biomedical Engineering Ph.D. Program

Emphasizes the development of advanced procedures and technologies that facilitate both basic biomedical research and the detection, diagnosis, and treatment of disease and disability.

- > Biomedical and Molecular Imaging
- > Biomaterials, Mechanics, and Tissue Engineering
- > Molecular and Translational Nanomedicine
- > Medical Physics

Organic Chemistry Ph.D. Program

A unique organic chemistry Ph.D. program in the highly collaborative, cross-disciplinary environment of an academic medical center. The program complements a strong foundation in organic chemistry with a breadth of knowledge at the interface of chemistry, biology, and all biomedical sciences.

[Learn more at utsouthwestern.edu/grad-programs](http://utsouthwestern.edu/grad-programs)

Advancement to Candidacy

As a graduate student, you'll be officially admitted to Ph.D. candidacy upon:

- > Successful completion of all required coursework and rotations in your first year
- > Earning a passing grade on the qualifying exam during your second year

Candidate Responsibilities

- > Conduct dissertation research
- > Present your work-in-progress annually at your program seminar
- > Attend all work-in-progress seminars for your program (weekly)
- > Attend and present regularly at journal club
- > Participate in departmental seminars
- > Participate in professional development
- > Expand your oral and written communication skills

Ph.D. Tracks

We offer three Ph.D. tracks that can be formally added to any of the Ph.D. programs. Students in these tracks choose one of our Ph.D. programs and complement it with the track's curricular requirements.

Computational and Systems Biology

Students learn to use mathematical and computational techniques to understand biological and biochemical processes. They apply bioinformatics, theoretical biology, and biostatistics to questions resulting in a diverse set of subjects and biological problems. This track is non-competitive and open to students in any program.



Mechanisms of Disease and Translational Science

Integrates mentored clinical research experiences into the student's chosen basic science Ph.D. program. Students gain expertise in both basic and translational research to foster bench-to-bedside advances in medicine. This curriculum is currently supported by an NIH institutional predoctoral training grant and is available to all applicants at the time of initial application to the Graduate School, regardless of the program to which they are applying.

Pharmacological Sciences

Pharmacological Sciences is an interdisciplinary area emphasizing discovery, development, and the molecular and physiological mechanisms of therapeutic agents. This curriculum aligns very closely with the Cell and Molecular Biology Program's curriculum but is also available to students in every program. Nomination and application to the Pharmacological Sciences track typically occurs during the 2nd or 3rd year. It is currently supported by an NIH institutional predoctoral training grant.

[Learn more about each track at utsouthwestern.edu/grad-programs](http://utsouthwestern.edu/grad-programs)



Medical Scientist Training Program (MSTP) – M.D./Ph.D. Program

We train tomorrow's physicians and scientists who will convert laboratory research into treatments for disease. One of just 50 M.D./Ph.D.-granting programs with financial support from the NIH, the Medical Scientist Training Program (MSTP) provides physician-scientists a rigorous but supportive program of clinical and research training.

Each year, 10 outstanding students from across the country and around the world are selected for the MSTP. The highly competitive curriculum consists of:

- > 18 months of introductory courses dealing with the biology of disease, followed by clinical clerkships that introduce the student to the bedside

- > An average of four years of graduate study and dissertation research in an area of basic biomedical science, leading to the Ph.D. degree
- > Clinical studies in the final two years of medical school, leading to the M.D. degree

For more information, visit utsouthwestern.edu/mstp

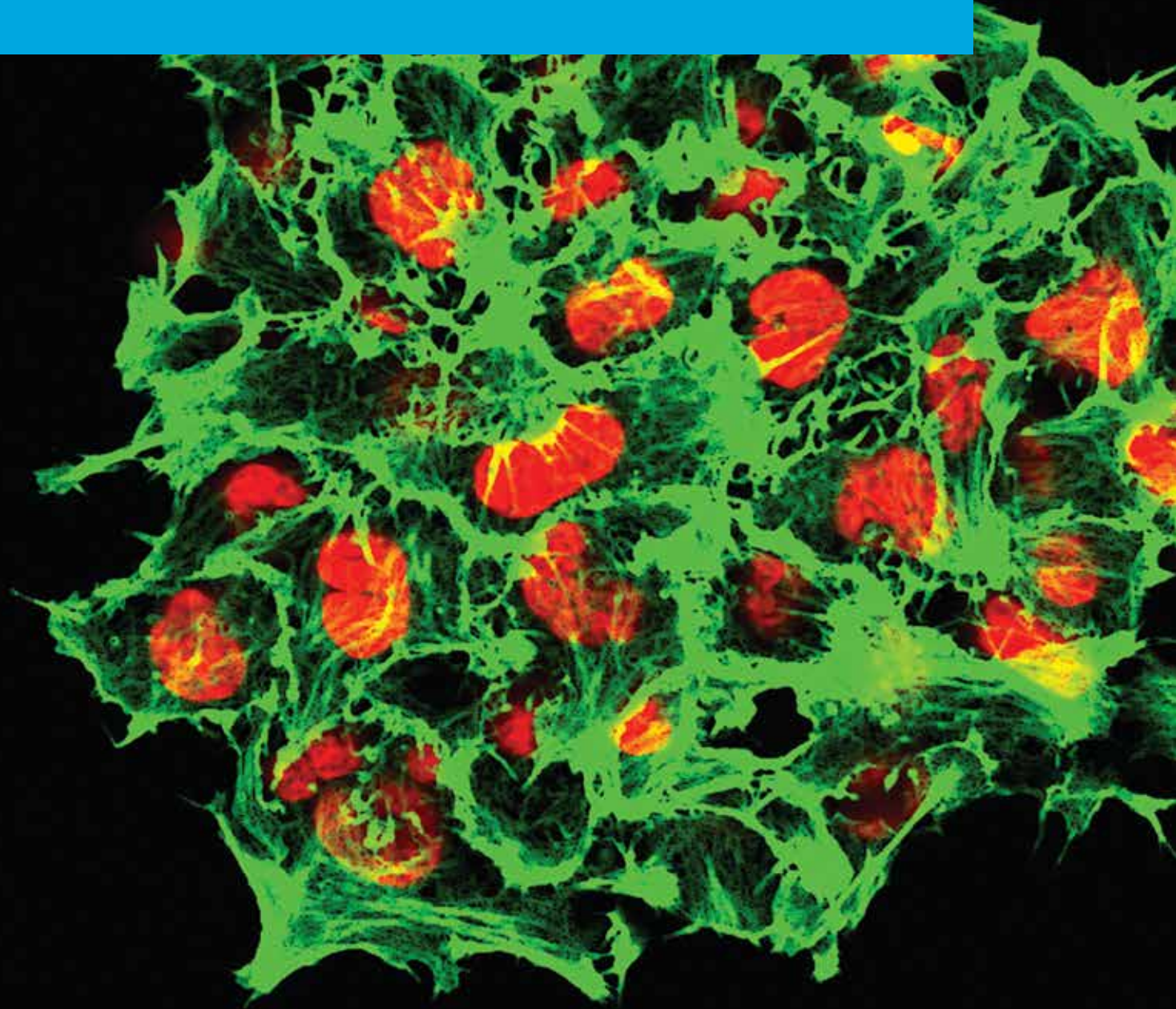


“Our program is distinctive because it provides participants with top-notch clinical training and with mentoring by world-class scientists in a highly collaborative, nurturing environment.”

– Andrew Zinn, M.D., Ph.D., Dean, Graduate School of Biomedical Sciences
Associate Dean, Medical Scientist Training Program

“The highly supportive and nurturing environment at UT Southwestern has made it possible for us to focus on making original discoveries that are impactful.”

– Zhijian “James” Chen, Ph.D., Professor of Molecular Biology and Director of the Center for Inflammation Research
Member, National Academy of Sciences
Investigator, Howard Hughes Medical Institute
Recipient, 2019 Breakthrough Prize in Life Sciences



Cutting-Edge Research

At UT Southwestern, our physicians and scientists are at the forefront of discoveries in a number of areas that have significant implications for the future of human health. Here are just a few:

Aging/Alzheimer’s

Dr. Marc Diamond has identified the precise point at which a healthy protein becomes toxic but has not yet formed deadly tangles in the brain. The revelation offers the potential for a new strategy to detect the devastating disease before it takes hold.

Cancer/Biomarkers

Advancing personalized medicine, Dr. John Minna looks for changes in lung cancer cells that can be used as biomarkers to detect lung cancer earlier and develop new therapies.

Cancer/Stem Cells

In an important step toward increasing the safety and effectiveness of bone marrow transplantation, Dr. Sean Morrison identified the environment in which blood-forming stem cells survive and thrive within the body.

Cardiology/Regeneration

Dr. Eric Olson’s lab has used CRISPR/Cas9 methods to cure Duchenne muscular dystrophy in mice as a proof of principle for human gene therapy.

Cholesterol

Discovery of the gene responsible for familial hypercholesterolemia by Drs. Michael Brown and Joseph Goldstein contributed to their 1985 Nobel Prize in Physiology or Medicine for their research uncovering the underlying mechanisms of cholesterol metabolism.

Diabetes/Obesity

Dr. Philipp Scherer discovered adiponectin’s potent anti-diabetes effects of blocking glucose production in the liver and improving insulin sensitivity in muscle. Drugs that increase adiponectin may be effective in fighting diabetes and other obesity-related diseases.

< A typical colony of human induced pluripotent stem cells, or iPSCs (green: the cytoskeleton actin; red: OCT4, a specific pluripotent marker).

Human Genetics

Drs. Helen Hobbs and Jonathan Cohen developed a new class of cholesterol-lowering drugs – PCSK9 antibodies – that are saving the lives of patients who do not tolerate or respond adequately to statins. Dr. Hobbs received the 2016 Breakthrough Prize in Life Sciences for this discovery.

Innate Immunity

Dr. Zhijian “James” Chen explores how a cell detects harmful or foreign threats and mounts an appropriate response to restore homeostasis. His discoveries of the cytoplasmic DNA sensor cGAS and its product cGAMP, a novel cyclic dinucleotide second messenger involved in innate immune response, have earned him the 2019 Breakthrough Prize in Life Sciences.

Dr. Bruce Beutler received the 2011 Nobel Prize in Physiology or Medicine for his discovery that the Toll-like receptor 4 (TLR4) is the membrane-spanning component of the mammalian lipopolysaccharide receptor complex that senses microbial infection and triggers septic shock.

To learn more about our research, visit utsouthwestern.edu/research

“This is a remarkable environment in which to do science, with many inspiring colleagues.”

– Sean Morrison, Ph.D., Professor of Pediatrics and Director of the Children’s Medical Center Research Institute at UT Southwestern
Member, National Academy of Medicine
Investigator, Howard Hughes Medical Institute

Summer Undergraduate Research Programs

Seize a chance to get started in research – now.

As a summer undergraduate research fellow at UTSW, you'll work on an individual research project for 10 weeks under the supervision of a faculty member. Outside the lab, you'll attend world-class lectures and presentations, produce a poster presentation for review by faculty, and have the opportunity to enjoy social activities in the Dallas-Fort Worth area.

Summer Undergraduate Research Fellowships

Amgen Scholars U.S.: A national research program hosted at 13 of the most prestigious educational institutions in the country, Amgen Scholars includes any discipline related to the discovery, development, manufacture, and delivery of human therapeutics, as well as the overall biomedical and biotechnology enterprise. Students participate in a mid-summer symposium in California to discuss their research and network with other Amgen Scholars across the U.S. and Canada. (amgenscholars.com)

Summer Undergraduate Research Fellowship program (SURF): Encompasses all biomedical sciences, including biochemistry, cancer biology, cell biology, molecular biology, immunology, microbiology, neuroscience, molecular physiology, genetics, and development. (utsouthwestern.edu/surf)

Quantitative and Physical Sciences SURF program (QP-SURF): Includes research in biophysics and structural biology, computational and systems biology, biomedical engineering, and synthetic organic chemistry. (utsouthwestern.edu/qp-surf)

Summer Undergraduate Research Institute for the Study of Kidney Disease program (SURISKD): Focuses on biomedical research with a special emphasis on kidney-related research, ranging from embryonic development and physiology to kidney cancer and imaging. (utsouthwestern.edu/suriskd)

SURF Stem Cell: Focuses on understanding the fundamental mechanisms and developmental principles of tissue formation and pioneering new approaches to rejuvenate and regenerate damaged organs. Students will gain a comprehensive understanding of the exciting and important field of stem cell biology. (utsouthwestern.edu/surf-stem-cell)

[Learn more at utsouthwestern.edu/undergrad-research](http://utsouthwestern.edu/undergrad-research)

“SURF facilitated my growth as a scientist and independent thinker. I enjoyed the emphasis on bench research while also providing opportunities for professional and personal development. My summer at UTSW prompted me to apply to Ph.D. programs and begin a career in molecular biology.”

– Andrew Moehlman
Cell and Molecular Biology Graduate Student





Career Development

Graduate school isn't the end of the line; in fact, in many ways, it's just the beginning. At UT Southwestern, the Graduate School of Biomedical Sciences is committed to helping our students achieve their ultimate goal: a promising and successful career in science.

Our Office of Graduate Career Development provides robust resources and opportunities, including seminars, internships, workshops, and one-on-one advising appointments to help our students:

- > Prepare for the academic job search
- > Explore occupations and industries beyond academic research
- > Identify and develop the practical skills required for a range of science careers

- > Assess and reflect on personal factors, including values, strengths, and skills in order to assist in choosing your career path

[Learn more at utsouthwestern.edu/grad-career](https://utsouthwestern.edu/grad-career)



“One thing I think is exceptional about career services is how they dig deep into you as a professional and a person, identify your strengths and weaknesses, and help identify growth opportunities that would best accelerate your career. Regardless of what career path you are looking for, understanding your capabilities first is particularly valuable to your future career development.”

– Lauren Tyra, Ph.D., Analyst, Green Park and Golf Ventures, Graduated 2017



Student Life

The Graduate School of Biomedical Sciences partners with departments across campus to provide opportunities for students and postdocs to engage beyond the lab. Through partnerships with the Office of Student Diversity and Inclusion, the Wellness and Counseling Center, and Student Life, graduate students have access to resources and opportunities such as:

- > Intramural sports leagues
- > Mindfulness classes
- > Community engagement opportunities
- > Fitness facilities
- > 100+ registered student organizations
- > Academic resources
- > Workout classes
- > Stress and anxiety management

Student Wellness

The UT Southwestern Student Wellness and Counseling Center provides personal counseling, psychotherapy, group therapy, and psychiatric services for UT Southwestern students in the Medical School, Graduate School of Biomedical Sciences, and School of Health Professions. Our goal is to help students main-

tain wellness, discover ways of thriving, and strengthen tools that encourage continual development.

Graduate Student Organization

The Graduate Student Organization (GSO) is the official graduate student governing body. The GSO promotes the welfare of graduate students by addressing the advocacy, professional, and social needs of students. The GSO:

- > Advocates for students' interests
- > Promotes educational and professional achievement with travel scholarships and the annual GSO Poster Session
- > Facilitates community building among the student body by sponsoring social activities and organizing volunteer service opportunities

All graduate students enrolled in the Graduate School of Biomedical Sciences at UT Southwestern are members of the GSO.

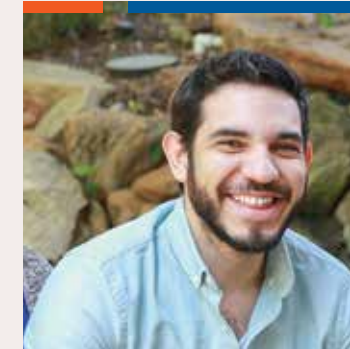
Student Diversity, Inclusion, and Equity

Diversity and inclusion are essential for all students to achieve their full potential.

Maintaining a diverse student population is central to the UT Southwestern mission of scientific discovery. The UT Southwestern Graduate School of Biomedical Sciences is firmly committed to the recruitment of a diverse student population and maintaining a supportive community in which diverse students are mentored in their intellectual pursuits and professional goals. We believe that advanced biomedical research and academic scholarship are enriched when informed by a diverse population composed of graduate students and postdoctoral scholars with different perspectives, backgrounds, cultural experiences, thoughts, and ideas.

At UT Southwestern, the Graduate School of Biomedical Sciences, in conjunction with the Office of Student Diversity and Inclusion, strives to foster a culture of inclusion throughout our student body through a wide range of programs, events, and student organization support. We provide academic support, advising and mentoring, assistance in preparing fellowships, participation in diversity organizations and events, and opportunities for attendance at national diversity conferences. Our goal is to provide a climate where all students feel supported and can succeed.

To learn more about diversity at UT Southwestern, visit utsouthwestern.edu/grad-diversity



“When I talk about diversity, I always think about ‘inclusion’. It is not only about your gender or your culture, but also your cultural heritage, your style, your age, your visions and dreams – the way you live. UT Southwestern understands this and incorporates all our experiences into our campus, our community. Thanks to this, we emerge from our studies standing tall and with strength to face our future.”

– Antonio Fernandez-Perez
Genetics, Development & Disease Graduate Student

“For the last five years, graduate students from diverse and underrepresented populations have made up 26 percent of our incoming class of U.S. students.”

– Nancy Street, Ph.D., Associate Dean, Graduate School of Biomedical Sciences

Dallas-Fort Worth: Experience Life in One of America's Most Vibrant Areas

UT Southwestern is located in the heart of one of the most dynamic areas of the country. The Dallas-Fort Worth Metroplex is a contemporary, exciting area with a diverse population featuring various neighborhoods that play host to art galleries, marketplaces, parks, community centers, co-working spaces, restaurants, theaters, and venues. It's all here.

Sports

Few areas can match the endless sports excitement found in the Metroplex, which is one of only eight U.S. metro areas with teams in all five major professional sports. The NFL's Cowboys, NBA's Mavericks, MLB's Rangers, NHL's Stars, WNBA's Wings, and MLS's FC Dallas all play here.

Vibrant Arts Scene

Residents and visitors alike enjoy the city's rapidly growing array of artistic possibilities. The 68-acre Dallas Arts District, adjacent to Klyde Warren Park and located close to the UT Southwestern campus, is the largest urban arts district in the country.

Easy Access to Anywhere

Dallas is centrally located and within a four-hour flight from most North American destinations. It is served by two airports – Dallas-Fort Worth International and Dallas Love Field – that combined provide more than 1,900 flights daily. AMTRAK also provides daily service to Dallas via Union Station.

A Thriving Economy

For over a decade, the DFW employment rate has outpaced the national average. Dallas's steadily rising population, numerous institutions of higher education, growing economy, vibrant cultural scene, and sprawling cityscape mean there are endless opportunities for your interests to flourish in Dallas.

Low Cost of Living

The cost of living in Dallas-Fort Worth is lower than many other cities of comparable size and amenities, including New York, San Francisco, Boston, Philadelphia, Los Angeles, and Chicago.

"I moved from New England to Dallas, and I love being able to spend as much time as I can outside. I also really enjoy trying different types of food, and Dallas offers a wide variety of restaurants with different cuisines. Our student stipend, combined with the low cost of living, conveniently helps to fuel my food habit."

*– Jennifer Gibson
Neuroscience Graduate Student*



^ *Downtown Dallas is just minutes from the UT Southwestern campus. The Dallas-Fort Worth Metroplex is a contemporary, exciting area with a diverse population and low cost of living. It's also the fourth largest U.S. metro area – and rising.*





Costs/Financial Support

Tuition and fees are fully covered for all students in the Basic Biomedical Sciences, Biomedical Engineering, and Organic Chemistry programs. Additionally, these students all enjoy a nationally competitive stipend of \$34,500 to cover living expenses.

Learn more at utsouthwestern.edu/grad-financial

Ready to Apply?

Apply to the Basic Biomedical Sciences, Biomedical Engineering, and/or Organic Chemistry programs at utsouthwestern.edu/applygrad

Each program will make its own independent admission decision. Acceptance into one does not have any implication on acceptance into another. If you receive an invitation to interview from more than one program, all interviews will be conducted during one visit to UT Southwestern. Application deadline is December 1.

Apply at: utsouthwestern.edu/applygrad

Questions? Contact Us:

Nancy Street, Ph.D., Associate Dean
nancy.street@utsouthwestern.edu

Stuart Ravnik, Ph.D., Associate Dean
stuart.ravnik@utsouthwestern.edu

Lisa Gardner, Ph.D., Assistant Dean
lisa.gardner@utsouthwestern.edu

Deborah Evalds, Education Coordinator
deborah.evalds@utsouthwestern.edu

Or visit us online: utsouthwestern.edu/graduateschool

UT Southwestern Graduate School of Biomedical Sciences

Division of Basic Science

5323 Harry Hines Blvd.

Dallas, TX 75390-9004

214-648-0007

utsouthwestern.edu/graduateschool

Admissions

UT Southwestern Medical Center

Office of Enrollment Services

5323 Harry Hines Blvd.

Dallas, TX 75390-9162

214-648-3606

admissions@utsouthwestern.edu