The Department of Biology at the University of Texas at San Antonio is a comprehensive academic unit that offers Bachelor of Science, Master of Science and Doctor of Philosophy degrees.

Our Faculty members conduct research in a variety of areas including: Cell and Molecular Biology, Microbiology and Immunology, Neurobiology and Plant Biology. We are dedicated to the university mission of discovery, teaching and learning, community engagement, and public service.

Our goals are to advance scientific literacy and provide modern training in the biosciences to undergraduate and graduate students, enabling them to pursue careers in scientific research, biology, and biomedical careers. Outreach to local public schools and establishing partnerships in the community serve to promote UTSA activities and increase community awareness to the role of science in our society.
It is my great pleasure to welcome you to the Department of Biology at The University of Texas at San Antonio (UTSA). Currently there are 48 tenure and tenure track faculty and 32 non-tenured, more than 147 doctoral and master’s students and 2,136 undergraduate majors. Indeed, the Biology department is the largest academic department within UTSA. The Department is committed to providing an environment that promotes inclusive excellence and diversity within faculty, staff and student populations.

We offer a rich tradition of excellence in research, education, and training within the biological sciences—boasting robust and well-supported programs. We have a vibrant and interactive faculty who perform cutting-edge research addressing questions of relevance to medicine and life sciences, biotechnology, pharmacology, agriculture and environmental change. Many of our faculty serve on scientific boards and foundations and are published in highly ranked national and international journals.

Housed within the Biology department are several nationally and internationally recognized research centers and institutes such as the South Texas Center for Emerging Infectious Diseases (STCEID), the Neurosciences Institute, and the San Antonio Cellular Therapeutic Institute (SACTI) along with the Brain Health Consortium, a cross-college initiative.

We engage with and embrace a diverse community of graduate students who join us as scientists, scholars and educators. Students benefit from up-to-date research and teaching facilities that provide access to the latest technologies and methodologies in biological research. Our state-of-the-art core facilities provide exceptional services in confocal imaging, electron microscopy, flow cytometry, genomics, including single-cell analysis, and proteomics.

I would like to take this chance to invite you to stop by the department to visit and get to know us better and take a tour of our facilities and labs.

Sincerely,

Garry Sunter, Ph.D.
Professor and Chair
Cell & Molecular Biology
J. Aaron Cassill, Ph.D.
Professor and Roland K. and Jane W. Blumberg Professorship in Biosciences
Luis S. Haro, Ph.D.
Professor
Brian P. Hermann, Ph.D.
Associate Professor
Richard LeBaron, Ph.D.
Professor
Martha J. Lundell, Ph.D.
Professor
John R. McCarrey Ph.D.
Professor and Kleberg Distinguished University Chair in Cellular & Molecular Biology

Microbiology & Immunology and Cell & Molecular Biology
Bernard Arulanandam, Ph.D., MBA
Professor and Jane & Roland Blumberg Professorship in Biology and Vice President for Research
Astrid Cardona, Ph.D.
Associate Professor
James P. Chambers, Ph.D.
Professor
Mark Eppinger, Ph.D.
Associate Professor
Thomas G. Forsthuber, M.D., Ph.D.
Professor and Jesse H. and Mary Gibbs Jones Chair in Biotechnology

M. Neal Guentzel, Ph.D.
Professor
Kirsten Hanson, Ph.D.
Assistant Professor
Hans W. Heidner, Ph.D.
Professor
Chiung-Yu Hung, Ph.D.
Assistant Professor
Karl E. Klose, Ph.D.
Professor and Robert J. Kleberg Jr. and Helen C. Kleberg College of Sciences Professorship
Soo Chan Lee, Ph.D.
Assistant Professor
Jose L. Lopez-Ribot, Pharm.D., Ph.D.
Professor and Margaret Batts Tobin Distinguished Chair in Biotechnology and Associate Dean for Research
Robert D. Renthal, Ph.D.
Professor
Stephen P. Saville, Ph.D.
Associate Professor
Janakiram Seshu, Ph.D.
Professor
Garry Sunter, Ph.D.
Professor and Department Chair
Yufeng Wang, Ph.D.
Professor
Degrees Awarded 2018-2019

- 298 Undergraduate degrees
- 32 Masters degrees
- 4 Doctoral degrees
- 185 Degrees earned by Minorities

Graduates

- 54% Female
- 46% Male

Student Enrollment

- 2019
  - 2,136 Undergraduates
  - 147 Graduates
- 2018
  - 2,212 Undergraduates
  - 144 Graduates
- 2017
  - 2,134 Undergraduates
  - 161 Graduates
Student Enrollment

<table>
<thead>
<tr>
<th>Year</th>
<th>Undergraduates</th>
<th>Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>2,136</td>
<td>147</td>
</tr>
<tr>
<td>2018</td>
<td>2,212</td>
<td>144</td>
</tr>
<tr>
<td>2017</td>
<td>2,134</td>
<td>161</td>
</tr>
</tbody>
</table>

Publications

- 177 Publications by Faculty
- 134 Publications by PhD students

Faculty

- 48 Tenure & Tenure Track
- 32 Non Tenure

Source: 1. Office of Institutional Research Dashboard
2. 18 Characteristic Report 2018-2019
APRIL 1973
Dr. Bernard Sagik was appointed first Dean of the College of Sciences and Mathematics.

MAY 1973
President Peter Flawn announced that a Master of Science degree will be offered in biology.

JUNE 1973
A historic day at UTSA as more than 50 faculty members and 671 graduate students attend the University’s first day of classes.

AUGUST 1974
Two grants were awarded to UTSA by the NSF: $71,300 and $11,400. Both were administered by Dr. Bernard Sagik.

OCTOBER 1984
The UT System Board of Regents had approved a new master’s degree programs in biotechnology.

MAY 1986
Dr. Neal Guentzel was one of the top ten professors from across the state to receive the Minnie Stevens Piper Professorship award.

JULY 1987
Dr. Andrew Tsin, associate professor of biology, received a $80,000 grant from San Antonio Foundation to study the causes of retina deterioration due to diabetes.

WINTER 1988
Dr. James Chambers, associate professor, was one of five scientists nationwide to receive a Distinguished Services Award from the U.S. Army due to his research on a device that can detect toxic substances.

JUNE 1987
Dr. Robert P. the President research...
History

FALL 1982
Dr. Matthew Wayner, Director of the Division of Life Sciences was named the first recipient of the Jane and Roland Blumberg Professorship in Biology.

SUMMER 1983
Dr. Neal Guentzel received the Amoco Outstanding Teacher Award. The $1,000 award honors the year’s outstanding professor.

WINTER 1984
Dr. Deborah Armstrong, assistant professor of neurophysiology, checks the effects of neurotoxins on mouse brain slices.

FALL 1992
UTSA offered its first stand-alone doctoral program and accepted its first students in the doctoral program in biology, specializing in neurobiology.

SPRING 1997
Helen Ojesky was recognized with a Colonel’s Way award for achievements in education. Ojesky spent forty years as a microbiology professor and a role model for other women in South Texas.

AUGUST 1997
A major milestone in the University’s 25-year history was when Karla Kopec and James Colston became UTSA’s first doctoral graduates in biology with emphasis in neurobiology.
NEUROSCIENCES INSTITUTE

The UTSA Neurosciences Institute is a multidisciplinary research organization for Neurosciences. The Institute offers resources for the studying of human experiences and behaviors, and the origin and treatment of nervous system diseases.

Areas of special emphasis include:
• Nervous system development;
• Neuronal and network computation;
• Sensory, motor and cognitive function;
• Learning and memory, and the disease processes that impact them;
• Implementing mathematical and computational tools in experimental neurobiology;
• Mathematical theory of neurons and nervous systems.

The Neurosciences Institute conducts weekly seminars that invite researchers and scientists from around the globe to present their work. In addition, weekly podcasts are recorded and made available on their website: http://snrp.utsa.edu/podcast/podcast.html

SOUTH TEXAS CENTER FOR EMERGING INFECTIOUS DISEASES

The South Texas Center for Emerging Infectious Diseases (STCEID) specializes in research in the fields of molecular microbiology, immunology, medical mycology, virology, microbial genomics, vaccine development, and biodefense.

STCEID brings special attention to research in pathogenic mechanisms of emerging and infectious diseases and the immune response to infectious diseases.

STCEID is a one-of-a-kind center with a group of highly specialized faculty and researchers from UTSA that investigate various diseases that impact humans including bacterial, fungal, viral and autoimmune diseases. The center also provides hands-on experience to both undergraduate and graduate students who intend to pursue careers in microbiology and immunology.

STCEID holds weekly seminars by national and international speakers. STCEID hosts a weekly podcast series: Microtalk. The podcasts are made available on the American Society of Microbiology (ASM) website, as well as the STCEID website. Visit: https://www.asm.org/index.php/podcasts/microtalk or http://stceid.org/

SAN ANTONIO CELLULAR THERAPEUTICS INSTITUTE

The San Antonio Cellular Therapeutics Institute (SACTI) conducts research in the areas of cell and molecular biology in nonhuman primates, focusing on primate embryology, stem cell biology, biogenesis research, regenerative medicine and basic developmental biology.

THE BRAIN HEALTH CONSORTIUM

The UTSA Brain Health Consortium (BHC) is a bold research collaboration across Sciences, Engineering, and Psychology designed to revolutionize brain health and treat disease. Starting with an individual’s cells, the BHC aims to discover precision therapeutics—individualized therapy—tailored for an exact condition. The BHC uses advances in genomics and emerging methods for “disease-in-a-dish” models (which re-create the process of human disorders using the patient’s own stem cells and offers new opportunities for basic research and the development of therapeutic compounds) to accelerate discoveries which lead to cures.

The BHC focuses on innovative new treatments for brain diseases such as mental illness, depression, epilepsy, traumatic brain injury, and Alzheimer’s disease. The BHC also aims to educate and provide hands-on experience to the next generation of scientists, propelling them into a career of novel scientific and human therapeutic discovery. Establishing the BHC at UTSA was aligned with the 2013 initiative of the Obama Administration called the Brain Research through Advancing Innovative Neurotechnologies, or the BRAIN Initiative.

Leading this initiative is UTSA Biology Professor Jenny Hsieh, Ph.D., a nationally recognized researcher and Semmes Foundation Chair in Cell Biology. Dr. Hsieh’s group is the first in the University of Texas system to pioneer the use of 3D cerebral organoids (“mini-brains”), derived from human induced pluripotent stem cells, to discover the root causes of Alzheimer’s disease, epilepsy, and mental illnesses.

The Biology department in conjunction with the BHC is working to expand scientific expertise in neurodegenerative and neurodevelopmental disorders, disease in a dish models, neuroinformatics and gene editing.
There are two microscopes in this core. Two-photon microscopy is a type of fluorescent technology that can be used to track biochemical signaling, such as calcium in sub-cellular compartments. The same equipment can be used to image very small cellular structures, live or fixed, deep into the tissue. The equipment has a higher sensitivity than normal confocal microscopes and can be used to image for prolonged periods. Both microscopes are fitted with micromanipulators that can be used to perform electrophysiological recordings of neurons at the same time as imaging. One of the microscopes can be used for imaging of live slices and the other can be modified for imaging of cells in whole organisms.

The Cell Analysis facility provides centralized services, training, access and support to researchers in the usage of flow cytometry equipment. Its mission is to establish an active training and consultation program to support the use of cytomics to impact not only research productivity but the competitiveness of students and fellows trained on our campus. Services provided by the Cell Analysis core include: Imaging flow cytometry (ImageStream MK-II), cell sorting (FACSARIA-II), Immunophenotyping (LSR-II, FACSCelesta), basic flow cytometry education, training, consultation and data analysis.

The UTSA Behavior Core provides a location and equipment to conduct behavioral assays in mice and rats. Having a centralized Behavior Core will help increase throughput while promoting rigor and reproducibility in behavioral testing.

The facility provides a battery of behavioral tests to assess potential basal differences in behavior in genetically modified mice, and rodents transfected with constructs and/or receiving viral injections. Behavioral testing can also be coordinated among users to increase throughput of data without unnecessary duplication and overuse of animals.
BIOSAFETY LEVEL-3 LABS

The Biology department houses two Bio-Safety Level-3 labs. These are high containment laboratories designed for working with biological agents that can cause potentially lethal disease through the inhalation route of exposure.

Research that is conducted in these labs is designed to develop therapeutics and vaccines to protect mankind against illicit use of these organisms. These labs are highly regulated by numerous local and federal agencies.

GENOMICS CORE

UTSA researchers can access state-of-the-art instruments to perform a number of common genomics applications (e.g., RNA-seq, whole-genome sequencing, etc.), enabled by an Illumina MiSeq and Ion Torrent PGM.

A particular strength of the core is in single-cell genomics, including qRT-PCR, RNA-seq, DNA-seq, ATAC-seq and methylome using the Fluidigm C1 and 10X Genomics Chromium (Drop-seq). In addition, a suite of instruments is available from Fluidigm (BioMark HD and three IFC controllers, Access Array) to enable high-throughput PCR and genomics library preparation.

Lastly, the core also maintains other genomics-related instruments for use by the UTSA community, including a Q5 qPCR machine (ThermoFisher), 2100 Bioanalyzer (Agilent), 4200 Tapestation (Agilent), Milo Single-cell Western blot (Protein Simple), BioRuptor (Diagenode), Synergy II plate reader (BioTek), and a Countess II FL automated cell counter (ThermoFisher).

The core also maintains CLC Genome Workbench and Ingenuity Pathway Analysis software packages.

STEM CELL CORE

The Stem Cell Core provides access to a streamlined, IRB-approved consenting process for acquisition of patient samples and generation of pluripotent stem cells (iPSCs) and stem cell-derivatives for basic and preclinical research.

Clients of the Core have access to cutting-edge stem cell core technology, including instrumentation and customized procedures.

Pluripotent stem cells also hold great promise for the treatment of diseases ranging from diabetes to Parkinson’s disease, epilepsy, and other brain disorders.

The Facility is housed in the Science Research Laboratories (SRL) building and is administered by Christopher Navara, PhD. Under the direction of Dr. Navara, the Stem Cell Core (https://www.utsa.edu/bhc/core/stem-cell-core/) produces iPSCs for both UTSA researchers and outside clients.

Dr. Navara has been working with pluripotent stem cells since 2003 and has been generating iPSCs since 2012, creating iPSCs from 30+ cell sources, with a large focus on neurodegenerative and neurodevelopmental diseases.
**DEVELOPING A SAFE VACCINE FOR HUMAN Q FEVER**

Q fever is considered one of the most infectious diseases in the world because it can spread very rapidly – it only takes one *Coxiella burnetii* bacterium to infect others. Q fever is a zoonotic infection, meaning it originates in animals, particularly goats, sheep and cattle. The bacteria is found in the placenta, amniotic, urine, feces and milk of the infected animal. People usually contract the disease by breathing in the dust that has been contaminated by the infected animal feces, urine, milk and birth products. It is a significant occupational hazard among veterinarians, meat processing plant workers, and farmers.

Q fever can be acute or chronic in human beings, and symptoms are highly similar to that of the flu. More often than not physicians tend to misdiagnose it due to the prevalence of flu. Attempts to develop a vaccine to combat the infection has led to side effects such as severe skin reactions in those vaccinated. Thus, people must be tested and screened before vaccination, which makes it costly, time consuming and unavailable for a mass vaccination program.

Dr. Guoquan Zhang, a UTSA professor in the Biology department, is working on developing a vaccine that is safe, effective and licensed by the United States Federal Drug Administration. He uses a mimotope-based vaccine, which is based on the concept of reverse vaccinology, in which protective antibodies can be used as probes to identify mimetic peptides that can re-induce protective antibody responses in hosts. Dr. Zhang’s research team aims to find and test a peptide mimic of a protective PI-LPS epitope (a “mimotope”) as proof of concept for this approach.

“We are using the development of a Q fever mimotope vaccine as the model system to demonstrate the concept that mimotope vaccine technology can be utilized as a broad platform against other bacterial pathogens such as *Mycobacterium tuberculosis*, *Salmonella typhimurium* and *Psuedomonas aeruginosa*,” said Dr. Zhang. “We hope to establish the “proof of principle” not only for Q fever vaccine but also for a broad vaccine platform against other microbial pathogens”.

Dr. Zhang is funded by the National Institute of Health to further prove the feasibility of using mimotopes of *C. burnetii* and ultimately develop a safe and effective vaccine against human Q fever.
Our behavior is driven by two primary goals: seeking out the good and avoiding the bad. These actions are learned through a process of trial-and-error. For example, we readily learn that paying the barista will result in obtaining a cup of coffee. Similarly, after getting pulled over for speeding one learns to slow down to avoid getting another ticket. One’s ability to learn about rewarding and aversive outcomes is heavily influenced by stress. Dr. Matthew Wanat’s research studies the neural circuits involved with how stress impacts learning and motivation.

A primary focus of the Wanat lab is on the neurotransmitter dopamine and how its release regulates behavior. Recent findings from the lab have identified innate patterns of dopamine signaling that can predict whether one will learn (or fail to learn) how to avoid an aversive outcome.

Ongoing research is studying how a single exposure to stress enhances the ability to learn about rewards, which is controlled by dopamine acting in specific subregion of the striatum.

Dr. Wanat says, “The ultimate goal of our research is to understand why we do what we do, or rather motivation. Changes in motivation contribute to the behavioral symptoms that are present in neuropsychiatric disorders such as drug addiction and depression. With our research we hope to identify and reverse the neural signals that underlie maladaptive changes in motivation.”
What is the Sophomore Research Initiative (SRI)?

The Sophomore Research Initiative (SRI) is an incredible program that offers research experience to students pursuing a B.S. degree in Biology or Microbiology and Immunology. This is an optional program that gives sophomore students the opportunity to spend their second year working in one of several course-based research labs. Students will work in teams and conduct their own research projects on a specific biological problem over two semesters. The premise behind this initiative is two-fold; retention and research experience. Students who participate in programs like this one will more likely stay in college and are better equipped to graduate and pursue higher degrees with hands-on research experience under their belts. In addition, students are acclimated to laboratory and research procedures early in their undergraduate career, which will hopefully lead to opportunities for experience in one of the many faculty research laboratories on campus.

To pilot the program, the Biology department launched a set of three CURE (Course-based Undergraduate Research Experience) lab courses in Summer and Fall 2019. These CURE labs gave undergraduate students an opportunity to engage in authentic research with faculty and graduate students. Currently, the three different research topics that can be explored are: (1) Stem cells- lead by Dr. Michael Hanna, (2) Neurobiology- lead by Dr. William Ramos, and (3) microbiology- lead by Dr. Rishein Gupta. More labs will be added in Spring 2020, while the program will initiate fully in Fall 2020.
Three Biology undergraduate students spoke about their own experiences in a CURE lab during the Summer and Fall 2019 pilot sessions.

“I am really thankful for this research experience because I feel I have learned a lot. It is one thing to sit in a lecture and learn about procedures and why we do them, and it’s another to actually do it yourself and get a feel for it. This course introduced me to cutting-edge research techniques like the 10x Genomics platform single cell analysis and the Single Cell Western Blotting.”

“Working in a real research lab has helped me gain experience that I otherwise wouldn’t have gained in a teaching lab. I learned how to perform new and different lab protocols related to the specific areas of research, and also the purpose of each step being performed in greater detail than I would get from a regular teaching lab. Taking this course has placed me in a better position in deciding what to do after graduation.”

“This opportunity was extremely interesting and beneficial. I have learned a lot when it comes to stem cells, sterile techniques and other laboratory techniques. I am hoping this experience will help me after I graduate because I plan to seek a career in research.”
Tribeta is a national honor society which helps students with an interest in biology reach their career goals. The organization is dedicated to enhancing scientific knowledge through stimulating interest in biological research, outreach, and service. The members of the organization are all from different walks of biology and sciences and is open to anyone who is interested in joining. The society hosts speakers from different research areas from the UTSA College of Sciences in order to provide an opportunity for networking and scientific discussions. A beneficial aspect of joining Tribeta includes engendering friendship between all of the members. As a national society, they have lifelong, national membership recognition as well as many scholarship opportunities to aid students in reaching their goals.
AMERICAN SOCIETY FOR MICROBIOLOGY AT UTSA

The American Society of Microbiology at the University of Texas at San Antonio is a Texas branch student organization that seeks to promote student interests and further improve the quality of the Microbiology program at the University. The organization also attempts to attract middle school and high school students to UTSA through their STEM outreach program and promote their interests in microbiology. The society provides academic assistance to students in microbiology at UTSA and encourages their participation in local, state and national ASM meetings thus enhancing networking opportunities.
Jesus Romo is currently a postdoctoral scholar at Tufts University, school of medicine, in the molecular biology and microbiology department. Romo graduated from UTSA with a PhD in Cell and Molecular Biology in Spring 2018. As a graduate student, Jesus was attached to Dr. Jose Lopez-Ribot’s laboratory where he gained invaluable experience in technical laboratory skills, science communication, in addition to mentoring and teaching.

“Dr. Jose Lopez-Ribot was extremely supportive during my doctoral training,” said Jesus. “He did not see graduate students as free labor but an opportunity to develop oneself as a scientist. This was the first time I had heard this way of thinking and it completely changed the way I approached my training and mentoring of other students.”

Now as a faculty member running his own lab, and mentoring the next generation of underrepresented scientists, Jesus attributes his success to a lot of hard work, perseverance, and the support provided to him by the faculty at UTSA.
Timothy Sears - Spring 2018

As a graduate student, Sears completed two internships at the Texas Biomedical Research Institute. He is currently employed as a Quality Assurance Technical Writer at BioBridge Global.

“I was given the opportunity to get an intimate look at quality assurance and regulatory compliance. This is an overlooked career path by many in my field, but it’s definitely worth it,” says Tim. “I’m positive it contributed to my current gainful employment.”

In addition to his education, Sears gained valuable experience with quality management systems and documentation. He advises prospective students to take advantage of their instructors’ office hours to always seek assistance when needed.

“Iternship is crucial and could be your guarantee to employment when the time comes,” he said.

Tim also recommends getting to know people and networking because they could be your next employer or letter of recommendation.

Tim Sears completed his undergraduate degree in Molecular Biosciences and Biotechnology from Arizona State University in 2009. Following that, he worked for six years in laboratories doing shipping, receiving and data entry, when he decided to go back to school. He enrolled in the Master’s of Science degree in Biotechnology at UTSA.
ENDOWMENT REVENUE

FY 2016: $403K
FY 2017: $482K
FY 2018: $438K
FY 2019: $559K

TOTAL GRANT EXPENDITURES

FY 2016: $6.5M
FY 2017: $8.3M
FY 2018: $5.5M
FY 2019: $7.5M