RESEARCH PROGRAMS IN BIOMEDICAL SCIENCES

PhD, MD/PhD, MS DEGREES

COLLEGE OF GRADUATE STUDIES

UPSTATE
MEDICAL UNIVERSITY

2019 - 2020

WWW.UPSTATE.EDU/GRAD

STATE UNIVERSITY OF NEW YORK
SYRACUSE, NY

INVESTIGATE WITH US

TRANSFORMING STUDENTS FROM CONSUMERS OF KNOWLEDGE INTO PRODUCERS OF KNOWLEDGE

Welcome to SUNY Upstate Medical University's College of Graduate Studies. Our university is part of an academic medical center, one of only 140 in the country, and is home to a well-funded, interdisciplinary research enterprise.

This is a forward-thinking university that fosters a supportive environment that maintains high standards. Our graduate students in the biomedical sciences enjoy a student-faculty ratio of nearly one-to-one. Our students consistently praise the individual attention they receive from their advisors, and they also enjoy mentoring from upper-level graduate students and other researchers across the campus.

Right from the start, graduate students are empowered to make the best choices for their future careers. They choose three lab rotations their first year before deciding on a faculty research advisor and a lab. They are given responsibility for research projects, and take ownership of their work. Soon, the students are also the experts.

Consider joining us as we transform students from consumers of knowledge into producers of knowledge.

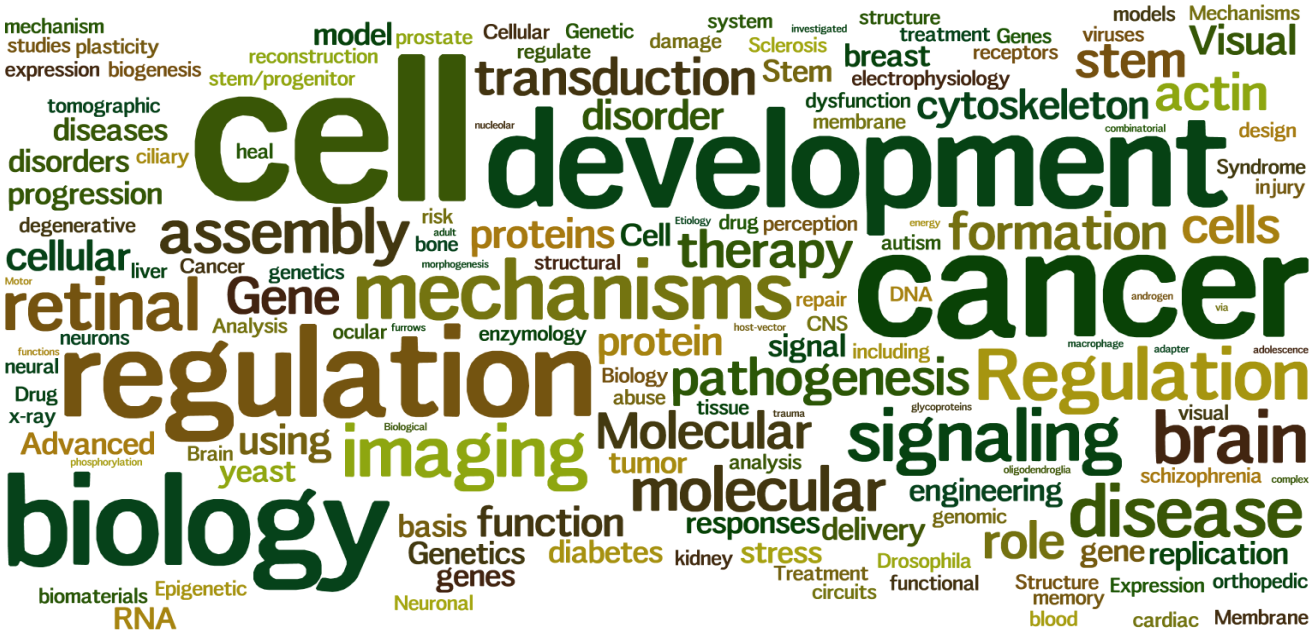
CHOOSE SUNY UPSTATE:

- Outstanding Research
- Students publish in high-level journals
- Daily Interaction with Faculty Research Advisor
- Well-Funded, Modern Labs
- Extensive Career Development Program
- Choice of Multiple Degree Programs
- Tuition Waiver and Competitive Stipend
- Teaching duties are not required but opportunities are available
- Affordable Cost of Living
- Extensive Health Benefits, including Dental and Vision
- Formal Training in Grant Writing

IN THIS GUIDE

Opposite page: Microbiology and Immunology PhD student Arturo Barbachano-Guerrero (with Professor Timothy Endy, MD MPH) received a four-year fellowship from the Mexican National Council for Science and Technology. The award helps Arturo conduct research on dengue fever with Dr. Endy and colleagues from Upstate's Center for Global Health & Translational Science.

IMPROVING HUMAN HEALTH BY LINKING



OUR MISSION

Our mission is to educate students through our biomedical science programs to be discoverers, leaders, and innovators in biomedical research. Research labs at Upstate are exploring both common and complex illnesses that affect people all over the world. These include potential treatments and cures for cancer, cardiovascular diseases, diabetes, infectious diseases, neurodegenerative disorders, blinding diseases, and many more.

Each student in the College of Graduate Studies works closely with research faculty on exciting areas of biomedical investigation. Students have three lab experiences before focusing on a specific area of study. Students ultimately will have a research project to call their own.

Our scientists use technological advances to explore diseases at a molecular and cellular level and to develop targeted treatments. Basic research in structural, molecular and systems biology informs and supports all our research, and our scientists include nationally recognized experts in these fields.

As our College is closely aligned with Upstate's College of Medicine and its teaching hospitals, our interests span the range from basic research to clinical trials. Upstate also has partnerships — from on campus to around the world — to deepen and broaden understanding and discovery.

Upstate's Neuroscience Research Building is home to several basic and clinical departments collaborating on neuroscience research.

BASIC AND TRANSLATIONAL RESEARCH

OUR RESEARCH FOCUS

Upstate has strong basic, translational and clinical research portfolios that are concentrated within five basic science departments and 13 clinically oriented departments.

Collectively, our researchers have diverse expertise with particular strengths in cancer, neuroscience, vision, molecular genetics, genomics, structural biology, infectious disease, diabetes/metabolic disorders, behavior disorders, cardiovascular disease and clinical trials. In addition, we have strong collaborative relationships with our neighboring institutions — Syracuse University, SUNY College of Environmental Science and Forestry, and the Syracuse VA.

As a result, our students have a breadth of opportunities to perform cutting-edge research in a wide range of areas with ready collaborations when new expertise is needed.

STRONG RESEARCH CENTERS AND INSTITUTES

To encourage strong collaborative and inter-disciplinary research on important medical problems, Upstate has developed focused research centers and institutes.

- **The Center for Global Health and Translational Science** (CGHATS) is tackling global problems in infectious disease and disease outbreak modeling including malaria, zika, dengue fever, cholera and emerging diseases such as chikungunya. In partnership with the Department of Defense, CGHATS is developing the next generation of vaccine testing protocols, including human infection models for dengue fever. In addition, CGHATS has research satellite sites in Ecuador, Thailand and Kenya, providing for student research opportunities abroad.
- **The Center for Vision Research** (CVR) includes neuroscientists from the Departments of Ophthalmology and Neuroscience and Physiology. These investigators bring to bear expertise in molecular genetics, biochemistry, biophysics, state-of-the-art imaging and stem cells to understand and develop treatments for ciliopathies, retinitis pigmentosa, birth defects of the eye, diabetic retinopathy, macular degeneration and injury recovery.
- **The Upstate Cancer Center** is the University's home for an integrated program in clinical cancer treatment and clinical, translational and basic cancer research. Based on funding, cancer research is the strongest research program at Upstate with basic and translational cancer researchers in all five basic science departments and cancer clinical research within the Departments of Medicine, Radiation Oncology and Urology. With the recent opening of our Cancer Center, the university is investing in and re-imagining our cancer research programs to create integrated research initiatives to rapidly take discovery from the bench to the bedside. Construction of a new molecular genomics laboratory will facilitate big data approaches to perform research and provide precision and personalized cancer care.

MODERN LABORATORIES

Upstate investigators have at their disposal beautiful and highly functional laboratory space that is equipped with highly advanced instrumentation. The space is located in three dedicated research buildings — Weiskotten Hall, the Institute for Human Performance and our new flagship, the Neuroscience Research Building (NRB). The NRB brings together neuroscience researchers from the departments of Neuroscience and Physiology, Ophthalmology, Psychiatry, Neurosurgery and Anesthesiology to work on important problems in neurodevelopment, neuro-oncology, neuronal stem cells, physiological basis of behavior and psychiatric genetics.

POWERFUL CORE FACILITIES

Performing cutting edge research requires access to powerful techniques and instrumentation. For this reason, Upstate has invested in research cores that provide faculty and students with the opportunities to leverage the latest technologies to advance their research programs. Capabilities within our cores include whole genome sequencing and analysis, proteomics and mass-spectrometry, confocal and two-photon imaging, super-resolution microscopy (STED), an 800MHz NMR, cryo-electron microscopy, flow cytometry, and in vivo computed tomography.

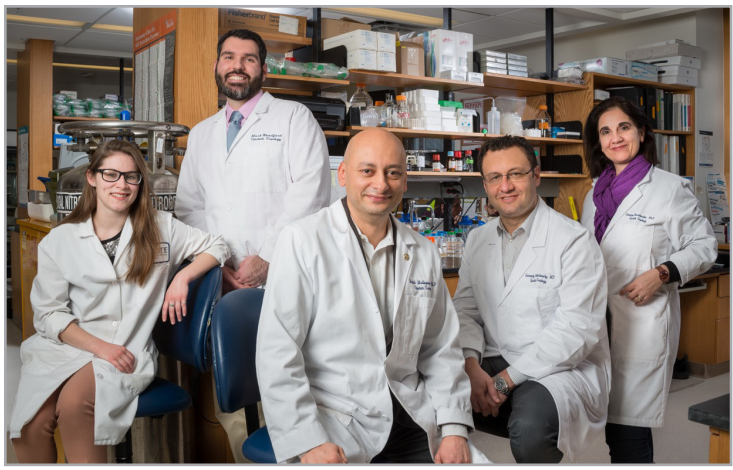
RESEARCH OPPORTUNITIES

It is impossible to summarize in such a short space all of the research opportunities available to our graduate students. Suffice to say no University will put as much emphasis as Upstate on your career development, whether your interests lie in academia, industry or using your PhD to develop a sustainable career in a related field. Upstate trains tomorrow's scientists by working on today's biomedical problems, and converting students from consumers of knowledge into producers of knowledge.

RESEARCH DEGREE PROGRAMS IN BIOMEDICAL SCIENCES

The College of Graduate Studies at SUNY Upstate educates students to be research scientists at the PhD or master's level, preparing them for careers in academic medical centers, colleges and universities, biomedical research institutes, the biotechnology industry, and government agencies. The college educates graduate students through its six biomedical science programs featured here. Upstate's previously described areas of research focus are integrated throughout its degree granting programs.

BIOCHEMISTRY & MOLECULAR BIOLOGY



Faculty researchers in Biochemistry and Molecular Biology seek to understand the molecular and cellular bases of human health and disease. We apply a broad range of tools ranging from structural biology and biophysics to cell biology and genomics. Faculty with expertise in X-ray crystallography, electron microscopy, and spectroscopy investigate protein structure, folding, and interactions in order to help define disease mechanisms and develop new therapies. Other faculty members employ modern genetics and genomic technologies to generate a broader understanding of cellular pathways and systems biology. We use a number of different model systems, including mice, flies and single-celled organisms to model disease processes and development.

Areas of focus in the Department of Biochemistry and Molecular Biology include structure and function of membrane transporters, DNA replication and repair, transcription and epigenetics, mitochondrial biology, and cellular responses to stress. These studies are relevant for many human diseases, including cancer, neurodegeneration, and infectious disease.

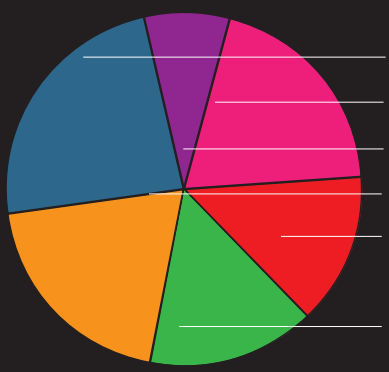
Our department boasts a robust and longstanding record of extramural funding.

This program awards a PhD and an MS.

CELL & DEVELOPMENTAL BIOLOGY

Research in the Department of Cell and Developmental Biology explores the molecular and biochemical mechanisms of cellular function and development. Faculty researchers in the department have funding for fundamental studies of: proteins and structures responsible for the assembly and dynamics of myofibrils; the genetics and cell biology of heart formation; the role of class I myosins in kidney functions; the mechanisms of actin assembly during endocytosis; the role of cell adhesion in regulating the cytoskeleton and cell motility in normal and cancerous cells; integrin regulation of the actin cytoskeleton; research on neural plasticity and spinal cord injury; the role of formins in the assembly of the actin cytoskeleton; the identification of genes important for the assembly and motility of cilia; molecular components that modulate the interface between microtubule dynamics and membrane traffic.

DISTRIBUTION OF CURRENT STUDENTS BY PROGRAM



Anatomy & Cell Biology.....22
Biochemistry & Molecular Biology....41
Microbiology & Immunology.....12
Neuroscience.....25
Pharmacology.....8

Undeclared (First-Year students).....19

TOTAL - 127 STUDENTS

Models used in the research include: zebrafish, avian embryos, the algae C. reinhardtii, cell culture lines, C. elegans, yeast, rats and mice. Students and faculty use a variety of research methods including sophisticated light microscopy (laser scanning confocal microscopy, spinning disc confocal microscopy, wide-field deconvolution imaging, real-time fluorescence microscopy, TIRF microscopy), high sensitivity digital cameras and image processing, electron microscopy, tissue culture, stereotactic surgery, and a complete range of molecular and biochemical techniques.

This program awards a PhD in Anatomy and Cell Biology, and an MS in Anatomy.

MICROBIOLOGY & IMMUNOLOGY

Major research areas in the Department of Microbiology & Immunology are in diseases caused by viruses and parasites, the host response to infection, the development and function of the immune system, and global health.

A range of viruses are studied, including dengue, zika, Epstein-Barr virus (EBV), Kaposi's sarcoma-associated herpesvirus (KSHV), cytomegalovirus, herpes simplex virus and varicella zoster virus. The focus of virology research is on pathogenesis, gene regulation, molecular interactions between the virus and the host cell, antiviral agents, and viral replication as well as cancers caused by EBV and KSHV. Research on malaria and toxoplasma is also conducted.

Immunology research focuses on autoimmune diseases, macrophage function, T and B cell function, K cells, antigen processing and presentation, viral immunity, immunotoxicology and vaccine development. A central theme is understanding how the immune system prevents or causes diseases.

Research is conducted at the molecular, biochemical, genetic and population levels with goals of developing vaccines and therapeutics for infectious diseases. Our Department is integrated and supports the Institute of Global Health and Translational Sciences with field sites in Thailand, Ecuador, Kenya and Grenada.

This program awards a PhD and an MS degree.

NEUROSCIENCE

The graduate program in neuroscience is a multidisciplinary interdepartmental program. The program is anchored in the department of Neuroscience & Physiology but composed of faculty across multiple departments at SUNY Upstate.

The overall goal of the program is to provide students with broad foundational knowledge in the neurosciences while enabling students to tailor their curriculum toward their specific research interests and areas of expertise. We offer a very collaborative, supportive and comprehensive environment in the neurosciences that is focused toward training students to become independent scientists.

Program research has strengths in neurodevelopment and neurodevelopmental disorders, neuropsychiatric disorders and diseases, addiction, neurodegenerative disorders and neural trauma, aging, sensory and cognitive systems, eye development and disease, and neuro-oncology and neuro-immunological disorders.

This program awards a PhD.

PHARMACOLOGY

Current research in the Department of Pharmacology focuses on cancer biology, drug development and delivery, structure based drug design, cell signaling, cardiovascular electrophysiology and disease, and neurodegeneration.

This work is supported by extramural funding, particularly from NIH. To continue this excellent tradition in research and teaching and to keep pace with changes in Pharmacology, our department is enhancing its research strengths and expanding into new research areas.

This program awards a PhD and an MS degree.

WE GIVE YOU WHAT YOU NEED...

Biomedical sciences students at SUNY Upstate receive a great deal of regular, individual attention from faculty. Students can also count on advice from upper-level graduate students and other researchers, including those from other departments.

Our laboratories are structured so that new students quickly gain a sense of ownership in a project. In a relatively short period of time, students become the experts and are given opportunities to speak about their research, present posters at conferences and submit articles to scientific journals.

You're in Good Hands

After earning a master's degree in pharmacology and working as a pharmacist in his native India, Dakshesh Patel came to the United States in 2010 to pursue a doctorate.

Dakshesh earned his PhD in pharmacology from Upstate in 2016, and became a research fellow at the U.S. Food and Drug Administration's Center of Devices and Radiological Health in Silver Spring, MD.

His current research in the FDA's stem cell electrophysiology lab focuses on identifying in vivo-to-in vitro correlation of patient responses to hERG blockers. The study involves human induced pluripotent stem cell cardiomyocytes (cardiac muscular cells) derived from the blood samples of the patients enrolled in a clinical trial.

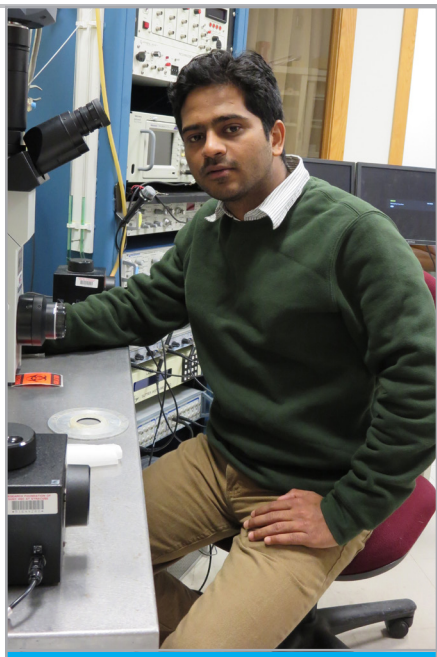
While at Upstate, Dakshesh worked in the lab of Richard Veenstra, PhD, professor of pharmacology. Dakshesh studied why certain molecules in some drugs used to treat cancer patients can be toxic to the heart.

"The goal is to find out why the molecules have an effect on the heart so in the future we can manufacture drugs with no side effects," he said.

Dakshesh was pleased with the training he received at Upstate. "The Principal Investigators are all prominent in their field. If you look at their CVs, you'll see Stanford, Harvard and Yale," he said.

The atmosphere here is congenial, Dakshesh said, and students don't need an appointment to see faculty members.

"If you want to do a PhD at Upstate, you're in good hands," he said.



DAKSHESH PATEL

The Opportunity to Forge Relationships

Upstate graduate Neva Watson's research project made the cover of the prestigious Journal of Immunology while she was a student in the College of Graduate Studies.

Neva, who accepted a post-doctoral position at Cornell University, investigated the role of a protein in a virus that causes skeletal muscle inflammation. The journal featured her research as well as her image of skeletal muscle calcification caused by a virus.

Neva's research focused on virus-induced myositis (inflammation and degeneration of muscle tissue), a disease that has emerged as a worldwide problem with few treatment options. She worked in the lab of Paul Massa, PhD, professor of Immunology & Microbiology, and professor of Neurology.

The virus can spread to the central nervous system, causing dramatically increased sickness. The Massa lab is continuing this project.

"This could have a broad range of therapeutic implications down the line," Neva said, citing chronic inflammatory diseases such as multiple sclerosis and rheumatoid arthritis as potential treatment targets.

Neva is from Connecticut but went out west to Western Washington University. After earning a bachelor's degree in biology, she came back east for graduate school to be closer to her family. Her experience at Upstate has been very positive.

"I appreciate the small environment where you interact with everyone and have the opportunity to forge relationships with all the Faculty Research Advisors in the departments throughout the school," Neva said. "You can be successful coming from Upstate."

NEVA WATSON

...TO SUCCEED

Our graduate students have many opportunities to present their research to fellow students and faculty.

Our Students Go Places!

CAREER DEVELOPMENT INITIATIVES:

- Students create an annual Individual Career Development Plan identifying professional development needs and career objectives. The plan serves as a communication tool for graduate students and their faculty advisors.
- A formal Peer Mentoring program that matches incoming students with upper-level graduate students.
- "Six Steps to Success," a discussion series designed to help incoming students get off to a strong start.
- Career Development workshops (about a dozen) throughout the year for all students in the College of Graduate Studies.
- Lunch with the Dean – feedback sessions for students to discuss suggestions, successes or concerns.

SPECIAL EVENTS

BIOMEDICAL SCIENCES RETREAT:
A day-long event sponsored by the College, featuring poster presentations by students and presentations by faculty and invited guests, including alumni. The retreat is held each fall at a beautiful lodge in the Finger Lakes.

STUDENT RESEARCH DAY:
This annual event showcases research by students from the College of Graduate Studies as well as students from Upstate's colleges of Medicine, Nursing and Health Professions. Students are selected to give platform presentations, and dozens of others give poster presentations. The day includes a keynote by a distinguished visiting researcher.

TRAVEL OPPORTUNITIES: STUDENTS ATTEND PRESTIGIOUS CONFERENCES

A well-deserved perk for students in the College of Graduate Studies is the chance to travel to prestigious conferences to present their research.

It's not just a free trip. It's a valued opportunity to improve presentation skills, learn what other researchers are doing and foster relationships with students and faculty at other universities.

Here's a sampling of places our students visited to present their research in the past year:

- Charlottesville, VA
- Chicago, IL
- Denver, CO
- Montreal, Canada
- New London, NH
- New York, NY
- Portland, OR
- San Diego, CA
- Washington, DC.

YOUR ACADEMIC PATH

EASING THE TRANSITION TO GRADUATE SCHOOL LIFE

Each new cohort in Upstate's College of Graduate Studies can count on help from fellow students like Angelina Regua.

Angelina, a student in the Biochemistry & Molecular Biology program, was a panelist on "Six Steps to Success," a series of discussions designed to help new students get off to a strong start.

The discussions cover a wide range of topics (including critical reading skills, bioethics and preparing for qualifying exams) and address common questions among first-year graduate students.

"I had a lot of questions about lab rotations, how to choose a Faculty Research Advisor, research, social life," Angelina said. "It really helped answer a lot of that. We had access to Faculty Research Advisors and students who had gone through it the year before. I felt like I was talking to friends."

Mark Schmitt, PhD, Dean of the College of Graduate Studies, said students often feel overwhelmed when they first get here, "and the first week of orientation is so packed they rarely remember much."

"Six Steps to Success" came out of a mentoring retreat, Dr. Schmitt said, with the idea of meeting with first-year students and discussing various critical topics after their arrival on campus.

"Student feedback has been excellent and has helped us to keep modifying and improving it," Dr. Schmitt said.

Indeed, after six meetings her first year, Angelina felt at ease. "It helped calm me down a lot," she said. "I wasn't worried so much, and I could focus on school."

Upstate's size and atmosphere help new arrivals as well. "It's a very cooperative institution," Angelina said. "I know most of the grad students here."

Angelina said she considered going to medical school, but that changed the summer after her junior year at Molloy College, a small school near her home on Long Island.

"I love research, the whole aspect of asking questions and taking time to find answers," Angelina said. "I could do this forever."

PHD DEGREE TIMELINE

FIRST YEAR

All first-year students participate in three lab rotations of their choosing. Lab rotations expose students to diverse research environments and help them select a mentor for their dissertation research.

First-year students also participate in a core curriculum that provides the essentials of an education in the basic biomedical sciences and develops community and collegiality.

First-year students also take electives and participate in Journal Club, where they practice analyzing papers and giving oral presentations. At the end of the first year, students select a mentor and become affiliated with a degree-granting program.

SECOND YEAR

By the start of the second year, most PhD students have begun work on the research project that will lead to their dissertation. Students take the Responsible Conduct of Scientific Research course, which examines the moral and philosophical issues confronting scientists, and continue to take electives based on their research interests as well as courses required by their program.

In Grant Writing, students learn to write grant applications under the supervision of a professor.

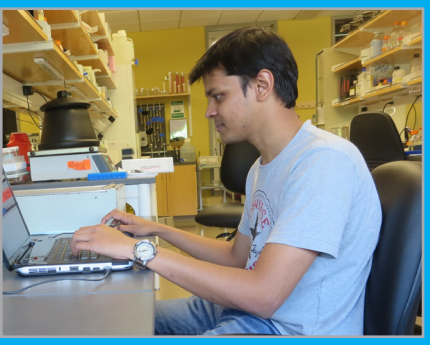
Students pass a qualifying exam to become candidates for the doctoral degree. This exam is scheduled by the end of the second year.

LATER YEARS

Immediately after passing the qualifying exam, students put together a dissertation advisory committee of three to six faculty members from different departments. The committee meets every six months to review the student's progress, make suggestions and provide direction. After completing their research projects, students write a dissertation and defend it.

MOST STUDENTS COMPLETE THEIR PHD REQUIREMENTS IN FIVE TO SIX YEARS.

SUPPORTIVE ENVIRONMENT MAKES THE DIFFERENCE



Ashis Sinha is glad he chose Upstate's College of Graduate Studies to pursue his doctorate in neuroscience. "I've always been intrigued by the brain, how it shapes our personalities, our sense of self," he said.

Ashis is a student in the lab of Russell "Rick" Matthews, PhD, associate professor of neuroscience and physiology.

"Our faculty is wonderful – we are part of a group with three Faculty Research Advisors and about 10 students, plus post-docs and techs," Ashis said. "We meet and present our research. It's hard, but extremely helpful. The Faculty Research Advisors are very patient and guide you. They are very, very helpful."

Ashis has a master's degree in biochemistry from the University of Calcutta in his native India, and worked for two years at the Institute of Genomics and Integrative Biology in Delhi, studying brain tissues.

"The brain is fascinating," he said. "I focus on the extracellular matrix or ECM of the brain, particularly a special kind which looks like nets and is wrapped around some neurons. Their function is unknown; they might protect neurons from stress or help form memories."

The clinical applications for this research include potential treatments for neurodegenerative diseases such as Parkinson's or for cancer like glioblastomas. Ashis said his mentors, the state-of-the-art facilities and friendly atmosphere at Upstate all contribute to a rewarding experience.

EXCELLENT EDUCATION

The College of Graduate Studies has a long history of providing an excellent education. Our institution is dedicated to the development of independent, competitive and well-trained professionals who can succeed in the biomedical research field. The specific programs are designed to provide graduates with the necessary skills and knowledge to pursue high-end research in either academic or industrial careers. We focus on core competencies in Scientific Knowledge, Critical Thinking, Research Skills, Professionalism and Responsible Conduct of Research, Communication Skills, Career Development and Mentoring Skills.

Our graduate students receive training in the latest scientific techniques using modern technology and instrumentation. Our research focuses on some of the most critical diseases that affect human health, and our outstanding faculty features international experts in many areas – neuroscience, diabetes, cardiovascular disease, molecular genetics, stem cell research, structural biology, infectious disease and cancer.

FOCUS ON RESEARCH

Unlike many graduate programs, most of our PhD candidates are not required to teach undergraduate or lower level graduate courses. This means our students focus on what they came to do: research. However, there are opportunities for our students to gain teaching experience if they wish. For example, some graduate students assist in medical school laboratory courses.

MASTER'S DEGREE

TWO TO THREE YEARS

Three programs in the College of Graduate Studies offer master's degrees: Biochemistry and Molecular Biology, Cell and Developmental Biology, and Pharmacology. The master's degree program typically takes two to three years. Master's students participate in selected parts of the core curriculum along with PhD students.

Unlike PhD students who usually affiliate with a degree-granting program at the end of their first year, master's students join a program from the start. Master's students write and defend a thesis, but they don't take a qualifying exam. Additional requirements vary depending on the program.

NEW COURSES FOR DIVERSE CAREERS

'NANOCOURSES' EXPLORE NEW TERRITORY

Nanocourses are short courses that meet for a total of about eight hours and typically address a new or evolving area not covered by the standard graduate curriculum. The course could be given in a week, or two days or even over several weeks. Each Nanocourse is worth 0.5 credit and is graded Satisfactory/Unsatisfactory.

We currently offer 17 courses covering an array of topics and techniques, including: vaccine development, manuscript submission, single-molecule fluorescence microscopy, radiobiology and research planning and development.

Complete list: http://www.upstate.edu/grad/curriculum/nanocourses.php

TEACHING FOR THE BASIC SCIENTIST

This course prepares the graduate student who desires to pursue an academic track to teach by exploring the process for the design, delivery and assessment of any academic course for adult learners. The student will learn to write objectives and plan content as well as deliver content with an emphasis on active learning. The student will also learn appropriate assessment methods that fit the delivery and objectives of the course.

YOUR ACADEMIC PATH

MD/PHD PROGRAM

Upstate's MD/PhD program combines the graduate program in biomedical sciences with medical school. Graduates pursue careers in medical research and academic medicine. The program offers a wide selection of research areas.

Incoming MD/PhD students matriculate with the entering class of medical students and take the first two years of the medical school curriculum. Students work in a lab of their choosing during the summer before their first year of medical school, and between their first and second years. Students select mentors and research projects before the end of the second year, and resume lab work after sitting for Part 1 of the USMLE exam.

The program is committed to the recruitment of students with diverse educational and cultural backgrounds who, having a passion for research in the biomedical sciences and clinical care, are dedicated to becoming caring academic physicians.

After approximately three years of lab work and successful defense of their dissertation, MD/PhD students complete the last two years of medical school. Students accepted into the program receive tuition waivers and a stipend of $26,572 per year (as of 2018).

For more information on the MD/PhD program, visit www.upstate.edu/mdphd or contact the MD/PhD office at 315-464-7719 or MDPHD@upstate.edu.

MD/PhD student Nick Huang has received a prestigious Rheumatology Research Foundation Future Physician Scientist Award.

The award is $30,000 a year for two years, to be used for expenses related to Nick's research. He's a student in the lab of Andras Perl, MD PhD, distinguished professor of medicine and division chief of rheumatology.

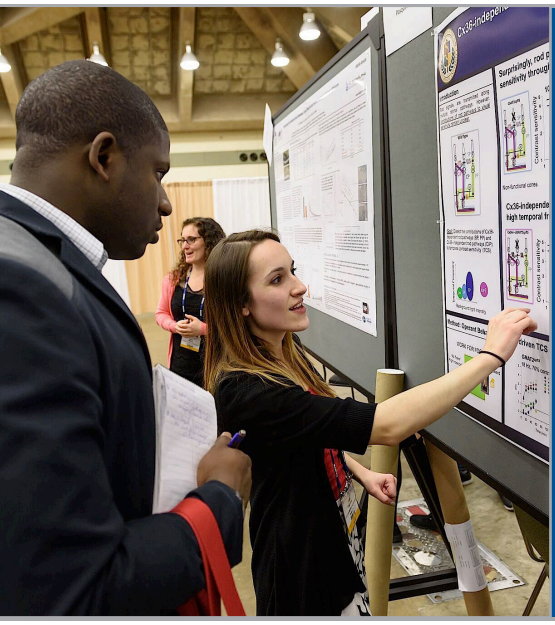
"I've always liked research," Nick said. "What drew me in is the way I think – 'Why?' I always want to know the 'why.' Sometimes it's painful, and you have to take things at face value, which can be frustrating."

Nick's grant application centered on his primary research project, which investigates the role of a protein, Rab4a, in the development of lupus and other autoimmune diseases.

"Our lab is one of the few working on Rab4a and autoimmunity," he said. "My project is unique – no one has linked this gene to metabolism and immunological development.

Lupus, or Systemic Lupus Erythematosus (SLE), is a chronic disease that causes systemic inflammation affecting multiple organs, according to the American College of Rheumatology.

"I've always found immunology to be fascinating," Nick said. "Immunology is involved in everything from birth and through time as we age."



STUDENT WINS TOP PRIZE FOR VISION RESEARCH

Neuroscience PhD student Rose Pasquale was awarded the top prize in a poster competition at the 2017 meeting of the Association for Research in Vision and Ophthalmology (ARVO).

Rose presented her research on determining how rod and cone pathways in the retina process visual information and allow us to see.

"It was exciting – I've never won anything like this before," Rose said of her Members-in-Training Outstanding Poster award. "I was proud and excited."

Rose's abstract was chosen among the five finalists in the Visual Neuroscience section, one of 16 sections. About 6,000 abstracts in all were submitted.

Rose's research explores the contributions of rod and cone pathways to "temporal contrast sensitivity," to determine conditions in which rod and cone pathways allow us to see. Her work shows that rods are doing a surprising amount of work in "upper mesopic" conditions (mid-range lighting in which both rods and cones are being used).

FIRST-AUTHOR STUDENT PUBLICATIONS

2019

SUNY Upstate graduate students frequently publish first-author articles in professional journals and books. The list below is a sampling. For the full list of our student first-authors, visit www.upstate.edu/grad/students/publications.php.

Alexander Baker-Williams et al. Co-chaperones TIMP2 and AHA1 Competitively Regulate Extracellular HSP90: Client MMP2 Activity and Matrix Proteolysis. Cell Rep. 2019 Aug 13;28(7):1894-1906.e6. doi: 10.1016/j.celrep.2019.07.045.

Ashleigh Jackobel et al. DNA binding preferences of S. cerevisiae RNA polymerase I Core Factor reveal a preference for the GC-minor groove and a conserved binding mechanism. Biochim Biophys Acta Gene Regul Mech. 2019 Aug 2:194408. doi: 10.1016/j.bbagrm.2019.194408.

Cameron MacQuarrie et al. Adaptor protein Bbc1 regulates localization of Wsp1 and Vrp1 during endocytic actin patch assembly. J Cell Sci. 2019 Aug 7. pii: jcs.233502. doi: 10.1242/jcs.233502.

Jameson Patak et al. MAGEL2-Related Disorders: A study and case series. Clin Genet. 2019 Aug 9. doi: 10.1111/cge.13620.

Anna Hegsted et al. Functional importance of an inverted formin C-terminal tail at morphologically dynamic epithelial junctions. Cytoskeleton (Hoboken). 2019 Jun 19.

Erica Colicino et al. Chromosome misalignment is associated with PLK1 activity at cenexin-positive mitotic centrosomes. Mol Biol Cell. 2019 May 1:mbcE18120817. doi: 10.1091/mbc.E18-12-0817.

Jacqualyn Schulman et al. Bok regulates mitochondrial fusion and morphology. Cell Death Differ. 2019 Apr 11. doi: 10.1038/s41418-019-0327-4.

Eric Miller et al. The carboxy-terminus of the formin FMNL1γ bundles actin to potentiate adenocarcinoma migration. J Cell Biochem. 2019 Apr 11. doi: 10.1002/jcb.28694.

Siyu Wei et al. Calcium-Calmodulin Gating of a pH-insensitive isoform of Connexin43 Gap Junctions. Biochem J. 2019 Mar 25. pii: BCJ20180912. doi: 10.1042/BCJ20180912.

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NOBEL LAUREATE MEETS WITH GRADUATE STUDENTS

Students in the College of Graduate Studies welcomed a distinguished guest at an on-campus breakfast.

Thomas Südhof, MD, the 2013 Nobel Laureate in Physiology or Medicine, took time to meet with our students before giving a Grand Rounds presentation.

"As a young scientist, meeting Dr. Sudhof was not only inspiring, but also cultivating," said Fiza Hashmi, a student in the Biochemistry & Molecular Biology program. "It was an extraordinary opportunity to learn firsthand about his professional journey and to gain wisdom from one of the brightest minds in the world, which encouraged my own eagerness to contribute to the scientific community."

Dr. Südhof is the Avram Goldstein Chair and Professor of Molecular and Cellular Physiology at Stanford University's School of Medicine. He also is an investigator at the Howard Hughes Medical Institute.

His presentation was "Towards Understanding the Molecular Logic of Synapse Formation and Specification: Neurexins."

Dr. Südhof shared the Nobel Prize with James E. Rothman (Yale University) and Randy W. Schekman (University of California-Berkeley and Howard Hughes Medical Institute) for their discoveries of machinery regulating vesicle traffic, a major transport system in cells.

AN ENVIRONMENT THAT HELPS STUDENTS PUBLISH

The College of Graduate Studies offers great opportunities for students to publish in scientific journals, and Dandan Guo is a classic example.

Dandan has become a prolific author while conducting research in the lab of her faculty advisor, Juntao Luo, PhD, assistant professor of pharmacology.

Dandan is first author of a paper on her research project involving a more efficient method of delivering cancer-fighting drugs that stay in blood circulation longer to reduce toxic side effects and increase treatment efficacy.

She also is co-author of 10 other journal papers with Dr. Luo and with other collaborators at Upstate and other institutions. She and Dr. Luo share two patents.

Dandan's first-author paper, "Riboflavin-containing telodendrimer nanocarriers for efficient doxorubicin delivery: High loading capacity, increased stability, and improved anticancer efficacy," was published in Biomaterials (Vol. 141, October 2017). In addition, she was co-first author on a publication in Nature Communications (Vol. 6, July 2015), "A drug-specific nanocarrier design for efficient anticancer therapy."

"The lab environment is very good with interdisciplinary research and expertise," Dandan said. "Dr. Luo is very serious about research. He guides me and teaches me about both the large picture and small details of research. He's a really great scientist and a good mentor."

She credits Dr. Luo with helping her to think critically and logically. She appreciates that Dr. Luo forces her to learn and explore something out of her comfort zone, which significantly broadens her view and knowledge. They talk just about every day, discussing her projects and the merits of her data. She receives regular feedback on her writing and presentation skills.

"My experience at Upstate has made me independent," Dandan said. "I love this school and I love my lab. The experience of PhD training has made me a better person, a better researcher. I think more critically, more logically. It helped me with time management and being able to work on different projects at the same time…It will go with me my whole life."

MAKE FRIENDS, PURSUE YOUR INTERESTS

GRADUATE STUDENT ASSOCIATION

This organization is devoted to increasing interaction among graduate students. Events sponsored include new student orientation, class get-togethers and socials, the GSA-sponsored annual speaker in May, and end-of-the-year picnic and interdepartmental softball tournament for students, faculty, family and friends.

UPSTATE STUDENT GOVERNMENT

The student government organization represents all Upstate students. It provides a forum for student opinion, facilitates cooperation and communication with the administration, faculty and community and allocates the student activity fee.

FACULTY-STUDENT ASSOCIATION

The Faculty-Student Association administers scholarships, loan funds and student activity fees, and sponsors special projects.

INTERNATIONAL STUDENT ASSOCIATION

Our International Student Association (ISA) is very active. The ISA promotes the diversity of the International student population through cultural meetings and events, including the annual International Festival. SUNY Upstate also has a designated International Student advisor.

SYRACUSE: A COLLEGE TOWN

Syracuse is an affordable, medium-sized city with big city sports, arts and recreation. The SUNY Upstate campus sits on the edge of downtown, next to Syracuse University and the SUNY College of Environmental Science and Forestry on University Hill — home to restaurants, theatres, shops and the Carrier Dome.

Combine our three campuses with nearby LeMoyne College and Onondaga Community College, and you have a city filled with students, academics, research centers, libraries and great sports. Add abundant, affordable housing and a cost of living below the national average, and you have a great place to go to graduate school.

Just outside the city you will find numerous parks, lakes and mountains with golf courses, ski slopes, hiking trails and beaches. Syracuse is just a 4- to 5-hour drive from New York City, Boston, Toronto and Montreal.

CAMPUS ACTIVITIES

SUNY Upstate offers dozens of student clubs and organizations and an intramural sports program. The Campus Activities Governing Board schedules social, cultural and recreational programs for students, including a guest lecture series, comedy hours, weekend trips and discount tickets to local sports and cultural events.

The Campus Activities Building (CAB), has a computer lounge, snack bar, bookstore, TV lounge, pool, sauna, gym, treadmills, ellipticals, Nautilus, tennis courts, billiards, ping pong and more.

CAMPUS HOUSING

The renovated Geneva Tower opened in 2012 as housing for students, post-docs and medical residents at SUNY Upstate. The apartments are fully furnished, including a flat-screen television in each unit. Geneva Tower has a fitness facility, social rooms and laundry facilities, and is a non-smoking, pet-free environment. The residence is only for the Upstate community and provides a clean, modern place to call home. It is a short walk from campus.

Geneva Tower:
Housing for Upstate students.

OFF-CAMPUS HOUSING

Most graduate students choose to live off-campus in apartments near the university. The College of Graduate Studies maintains a list of off-campus apartments, duplexes and houses to help students searching for housing.

STUDENT SERVICES

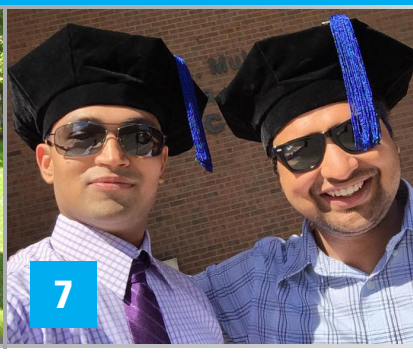
SUNY Upstate offers numerous student services including 24-hour security and escort service to all on-campus locations; a child care center with an elite accreditation that reserves spaces for the children of students; and a student health service providing primary care for acute conditions, illnesses and injuries to all students.
A complete listing of student services can be found at www.upstate.edu/currentstudents/support

WE'RE SUNY

SUNY Upstate is part of the State University of New York, the largest university system in the world, with 460,000 students on 64 campuses. SUNY is one of the top 10 U.S. institutions for patents issued each year.

FACES & PLACES

1. Annual Graduate Studies Picnic
2. Heart Walk
3. Annual Biomedical Sciences Retreat
4. International Festival
5. Gone Fishing
6. Dedicated Mentors
7. Graduation Day



ENJOY LIFE!

It's true that the demands upon students in the College of Graduate Studies are rigorous. But there are also many opportunities to have fun at SUNY Upstate and in the community. From well-organized activities on campus (picnics, free or inexpensive comedy shows and concerts), to spontaneous outings with friends and short day trips, our students know how to find healthy releases from the laboratory. Central New York's four seasons, numerous cultural offerings and wide range of entertainment options help our students lead well-balanced lives. As one of our PhD students said, "If you're going to spend four or five years somewhere, it's important to have some fun."

LOTS OF THINGS TO DO — CENTRAL NEW YORK ATTRACTIONS AND EVENTS

Adirondack Mountains
Armory Square
Balloon Fest
Beaver Lake Nature Center
Chittenango Falls
Clark Reservation State Park
Destiny USA
Downtown Arts and Crafts Festival
Everson Museum of Art
Finger Lakes Wine Country
Green Lakes State Park
Highland Forest
Labrador, Toggenburg and Song Mountain Ski Areas
LaFayette Apple Festival
Multicultural Festivals
Museum of Science and Technology
New York State Fair
Old Forge
Onondaga Lake Parkway
Regional Farmers Market
Rosamond Gifford Zoo at Burnet Park
Salmon River Fishing
Skaneateles Lake
Symphoria
Syracuse Chiefs AAA Baseball
Syracuse Crunch Hockey
Syracuse Jazz Fest
Syracuse Opera
Syracuse Stage
Syracuse University Athletics at the Carrier Dome
Whitewater Rafting
Winterfest

ADMISSIONS

HOW TO APPLY

Visit upstate.edu/grad/admissions for step-by-step instructions for applying online.

ADMISSION REQUIREMENTS

Candidates for admissions are selected holistically on the basis of their record and qualifications for independent scholarship in a specialized field of study.

All PhD and Master's applicants should have:

- Bachelor's degree or its equivalent.
- Official Graduate Record Examination (GRE) scores. The institutional code is 2547.
- GRE Subject Tests in the sciences are recommended. The institutional code is 2547.
- The average GPA for the incoming Fall 2019 class is 3.5 and the average cumulative GRE is 307; however, we holistically review applications with a wide range of scores and GPAs.
- Three original letters of recommendation from people familiar with your academic record and potential for investigative research. These can be emailed or mailed from the recommender to admissfa@upstate.edu or to:
  Student Admissions and Financial Aid Processing
  SUNY Upstate Medical University
  766 Irving Avenue
  1213 Weiskotten Hall
  Syracuse, NY 13210
- Transcripts from all undergraduate and graduate schools attended.
- Competitive applicants will have prior research experience.
- Prerequisite courses for students without a degree in Science, Technology, Engineering or Math
  - Biology, 1 year
  - Mathematics, 1 year
  - Chemistry, 1 year
  - Physics, 1 year

Selected domestic applicants will be invited to visit SUNY Upstate to meet with faculty and students and view the campus, community, and research facilities.

APPLICATION DEADLINES

PhD: The Biomedical Sciences **PhD program application deadline** for full consideration is **January 15**.

Requests for submitting an application beyond this date will be considered until the class is full. All students interested in the Biomedical Sciences PhD program apply to the undeclared program. If accepted, their first year at Upstate includes core classes and three lab rotations, of the student's choosing, before deciding on a research program, lab, and mentor.

Master's: The three Biomedical Science **Master's programs** in:

- Anatomy
- Biochemistry
- Pharmacology

have an **application deadline of April 1**.

*Application Fee waivers are available for both Master's and PhD applications; email biosci@upstate.edu to receive one.

MD/PhD: Applications for the **MD/PhD program** require the AMCAS application to be completed by **October 1** and the Upstate supplemental application by November 1.
For more information on the MD/PhD program, see page 10.

INTERNATIONAL STUDENTS

In addition to the documents listed on the website in "How to Apply," international students who completed their bachelor's degree abroad must also submit an official copy of the Test of English as a Foreign Language (TOEFL) score. The institutional code number is 2547.

Our Global Ambassadors Program connects prospective international students with current students in the College of Graduate Studies. The program's goal is to help accepted international students successfully transition to the PhD program and the United States, and to provide new students a mentor from their home country or with similar research interests.

INCOMING CLASS SCORES

	GPA	GRE (Q+V)
2019	3.51	307
2018	3.55	316

ONE OF SUNY'S BEST

In addition to earning her PhD and graduating with honors in Cell & Developmental Biology, Heather Nelson received a 2018 Chancellor's Award for Student Excellence from the State University of New York.

The Chancellor's Award is presented to a student who has demonstrated and been recognized for the integration of academic excellence (which may include leadership, campus involvement, athletics, community service, creative/performing arts or career achievement).

Heather completed her doctoral research in the lab of Michael Roe, PhD, associate professor of Cell & Developmental Biology and of Medicine.

Her research is focused on molecular mechanisms that regulate intracellular calcium signal transduction, with implications for the treatment of diabetes and other diseases.

Heather also is a leader in student government, a triathlete and marathon runner.

She finished first in the 2016 Syracuse Iron Girl sprint triathlon and has run the Boston Marathon, Wineglass Marathon and the Two Rivers Marathon, with a personal best of 3 hours, 14 minutes.

Heather is leaning toward a career in industry (research & development).

WEISKOTTEN HALL This Classical Revival building with comfortable lecture halls and some of SUNY Upstate's most advanced research laboratories is the College of Graduate Studies' central academic and research facility.

STIPENDS, TUITION, FEES AND FINANCIAL AID

PHD PROGRAM

All PhD students receive a full-tuition scholarship and are paid a 12-month stipend that can be viewed at www.upstate.edu/grad/abouit/faq.php. By receiving stipends, PhD students become part of the SUNY Graduate Student Employees Union, which provides periodic and automatic increases in stipend awards in addition to other benefits including a low-cost health care package.

The comprehensive health benefits include: coverage for medical services; hospitalization; prescription drugs; and mental health, dental, and eye care.

Student stipends are derived from a variety of university sources including departmental and university fellowships, research grants and research assistantships.

Students are encouraged to apply for individual predoctoral fellowships from the National Institutes of Health (NIH), National Science Foundation, the Howard Hughes Medical Institute and the American Heart Association which could lead to higher stipends. In fact, some of our current students receive their own extramural funding.

The SUNY Graduate Diversity Fellowship Program was enacted with the expressed goal of enhancing diversity and academic excellence in SUNY's graduate programs by recruiting outstanding students from different backgrounds, including individuals from groups that have been historically underrepresented, and providing them with the support necessary for achieving academic success. The State University of New York offers graduate fellowships to students who have been admitted to graduate or professional study and who will contribute to the diversity of the students in the graduate or professional program in which enrollment is sought.

MASTER'S PROGRAM

The tuition for master's studentscan be found at www.upstate.edu/current students/financial_resources/accounts/.

ADMISSIONS ADVISING

Pre-advisement appointments are available in person or by phone to help you apply to any of our programs. E-mail biosci@upstate.edu to set up an appointment.

SYRACUSE COSTS LESS

Syracuse was recently named the most affordable mid-size city in America, according to *The Simple Dollar* website.

Syracuse topped the list of the personal finance website's list of the 150 most affordable mid-size cities in the U.S. (50,000 to 150,000 pop.).

The affordability rankings were based on median house prices, average rent of a one-bedroom apartment, median household income, and a cost of living index that considers housing, utilities, groceries, transportation and healthcare costs.

The rankings also took into account quality of life, including climate, job opportunities, cultural and recreational facilities.

CONTACT US

For more information on any of our programs, please contact:
College of Graduate Studies Admissions Office
315-464-7719 or 315-464-4538, or e-mail biosci@upstate.edu.

For more information on financial aid, please contact:
The Office of Financial Aid
315-464-4329 / finaid@upstate.edu
Tuition and fees are subject to change without notice.

GREAT CAREERS AHEAD

THESE SUCCESSFUL CAREERS...

Georgia Tomaras, PhD, is Professor of Surgery, Immunology, and Molecular Genetics and Microbiology at Duke University Medical Center. She earned her doctorate from the Microbiology & Immunology Program in 1998.

Dr. Tomaras was honored as the College of Graduate Studies 2017 Distinguished Alumni lecturer, and was introduced by her faculty research advisor, Steven Taffet, PhD.

In addition to her teaching duties, Dr. Tomaras is Director of Research for the Duke Human Vaccine Institute and Director of the Training and Mentoring Program and principal investigator for the HIV Vaccine Trial Network Laboratory Center.

She is an experienced scientific leader directing multi-institution grants through the Bill & Melinda Gates Foundation and the National Institutes of Health / Division of AIDS. She is principal investigator of a research program project grant to decipher HIV-1 immune correlates of protection to bridge preclinical and human clinical vaccine studies.

Dr. Tomaras has published 180 peer reviewed publications on the identification of humoral immune correlates for preventative vaccines, interrogation of the ontogeny and breadth of humoral immunity, and identification of the CD8+ T cell subsets and mechanisms responsible for potent virus inhibition. Notably, her laboratory defined potential HIV-1 antibody correlates of protection and breadth of HIV-1 immunity (New England Journal of Medicine 2012, et al). Dr. Tomaras has received awards including the NIH NIAID HIV Vaccine Trials Network Mentoring Award (2014), the Norman L. Letvin Faculty Award (2014) and the Duke Ruth and A. Morris Williams Faculty Research Prize (2016).

... BEGAN AT SUNY UPSTATE

Sami Noujaim, PhD, is at the forefront of cardiac research.

Dr. Noujaim earned his PhD from Upstate's Pharmacology program in 2007 under the guidance of Jose Jalife, MD, PhD.

Dr. Noujaim is Associate Professor of Cardiology and Assistant Professor of Molecular Pharmacology & Physiology at the University of South Florida, where he directs the Cardiac Electrophysiology Research Laboratory.

The lab focuses on finding more effective drugs to treat atrial fibrillation, the most common irregular heart rhythm and a condition for which prevalence rises markedly after age 65.

Dr. Noujaim returned to the Upstate campus as the 2018 Distinguished Alumni Lecture Series speaker. In addition to giving a lecture -- "From Potassium Channel Structure, to the Patient Heart: How an Antimalarial Became an Antiarrhythmic" – he met with students and faculty.

"It is here that I became a scientist," he told his Upstate lecture audience.

Dr. Noujaim investigates how age-related changes in specific potassium ion channels known as GIRK may trigger a cascade of molecular events leading to atrial fibrillation. His research, supported by a five-year $2.14 million RO1 grant from the National Heart, Lung and Blood Institute employs techniques including structural biology, molecular simulations, and cellular and whole organ electrophysiology.

100% JOB PLACEMENT

PhD STUDENTS WHO GRADUATED IN 2017 AND WERE SEEKING PLACEMENT, RECEIVED JOBS OR POST-DOCTORATE POSITIONS IN THEIR FIELDS.

The College of Graduate Studies AT A GLANCE

(Numbers as of Fall 2019)

DEGREE-GRANTING PROGRAMS:
- **Biochemistry & Molecular Biology**
- **Cell and Developmental Biology**
- **Microbiology & Immunology**
- **Neuroscience**
- **Pharmacology**
- **Physiology**

AREAS OF CONCENTRATION:
- **Cancer**
- **Neuroscience**
- **Vision**
- **Molecular Genetics**
- **Structural Biology**
- **Infectious Disease**
- **Diabetes**
- **Behavioral Disorders**

DEGREES OFFERED:
PhD, MS, MD/PhD

STUDENTS: 127
(55% women, 13% from unrepresented populations, 38% international)

FACULTY: 91

SUNY UPSTATE CURRENT FUNDING:
Approximately **$35 million**

SUNY UPSTATE RESEARCH PROJECTS: 578

STIPEND/TUITION:
All PhD students receive a full tuition scholarship and an annual stipend.

Master's students pay tuition at the SUNY rate (see page 15).

ON THE COVER

WEISKOTTEN HALL:

This Classical Revival Building is the College of Graduate Studies' main academic and research facility. The building is named in honor of former Syracuse University College of Medicine dean (1922-1951) Herman Gates Weiskotten, MD, PhD. In 1936, President Franklin Delano Roosevelt presided over the cornerstone ceremony. Weiskotten is home to SUNY Upstate's administrative offices and health sciences library, plus lecture halls, classrooms and laboratories.

MESSAGE FROM THE DEAN

As dean of the College of Graduate Studies, I am often asked what career options there are with a PhD in biomedical research.

The labor market for a biomedical scientist is one of the best in the country. Their unemployment rate runs at less than half of the national average, and the growth rate for jobs is projected at a healthy 31% over the next 10 years.

Many of our graduates follow the traditional academic track leading to faculty positions at both research and teaching universities. However, an increasing number of graduates are landing in biotechnology, pharmaceutical or start-up research settings.

Another growth area for our graduates has been in non-research scientific careers. These include patent law, national and international science policy, national defense and homeland security, journal editors, management consulting and finance. The training we provide our students opens doors to opportunities that would otherwise be difficult to achieve.

We hear back from our alumni often. Their excitement over their occupations and lives is clear. They are working at what they love, which makes a job fun instead of a burden.

I would encourage you to apply to Upstate. You will receive a first-rate education from faculty dedicated to your intellectual growth, career development and long-term success. I hope you will take time to examine this brochure and see for yourself what we have to offer. I promise you will be impressed and want to join our endeavor to be part of our noble mission.

Mark E. Schmitt, PhD
Dean, College of Graduate Studies