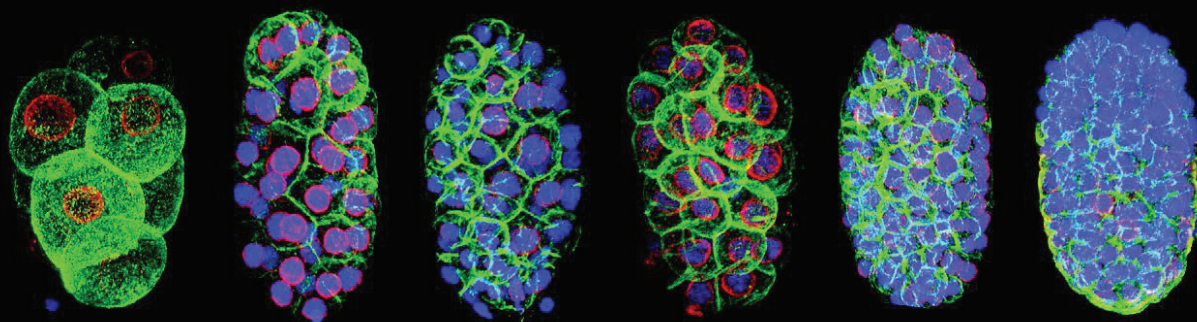




CONNECTIONS

Harvard Integrated Life Sciences



HARVARD INTEGRATED LIFE SCIENCES PHD PROGRAMS

The Harvard Kenneth C. Griffin Graduate School of Arts and Sciences (Harvard Griffin GSAS) offers life sciences PhDs in 13 areas of study across 3 Harvard faculties—Harvard Faculty of Arts and Sciences, Harvard T. H. Chan School of Public Health, and Harvard Medical School. HILS programs offer students a diverse range of options to find the best fit in regards to subject area, program structure, and size. While there is a lot to choose from, the fact that each program has its own identity allows students and faculty to be integrated into supportive communities while also being able to take advantage of all that Harvard has to offer.

Visit gsas.harvard.edu/programs/life-sciences to learn more.

Harvard Life Sciences PhD Programs

Bioinformatics and Integrative Genomics
Biological and Biomedical Sciences
Biological Sciences in Public Health
Biophysics
Chemical Biology
Chemistry and Chemical Biology
Immunology
Molecular and Cellular Biology
Neuroscience
Organismic and Evolutionary Biology
Speech and Hearing Bioscience and Technology
Systems, Synthetic, and Quantitative Biology
Virology



Studying the Life Sciences at Harvard

Harvard Griffin GSAS provides exceptional opportunities for study across the breadth and depth of the life sciences through the Harvard Integrated Life Sciences (HILS) alliance. Whether you are interested in conducting research on virus structures at the atomic level or on environmental impact in large ecosystems, you will find a good fit for your academic goals in one of HILS's 13 life sciences PhD programs.

What HILS Offers

The HILS alliance promotes interdisciplinary academic and research collaboration and builds community among students, faculty, and staff through programming across research areas, PhD programs, departments, and schools. As a HILS student, you will have access to University-wide training resources and facilities, and more than 800 affiliated faculty. HILS offers flexibility, including options to take courses, do laboratory rotations, and even choose a dissertation advisor from across HILS, subject to specific program requirements and lab availability. However you customize your training, HILS is with you every step of the way. To learn more about HILS faculty, please scan the QR code at the right to visit the HILS Faculty Directory.



[HILS Faculty Directory](#)

Harvard Integrated Life Sciences

Bioinformatics and Integrative Genomics (BIG)



The BIG program supports PhD study in bioinformatics and functional genomics, encompassing computational analysis and mathematical modeling of data generated by sequence, gene expression, structural, proteomics, and metabolomics technologies as well as integration of clinical and population data.

Biological and Biomedical Sciences (BBS)



BBS combines a broad choice of research topics and labs with the cohesiveness of special-interest communities: Biological Chemistry and Molecular Pharmacology; Cancer Biology; Cell Biology; Developmental and Regenerative Biology; Genetics; Human Biology and Translational Medicine; Microbiology and Immunobiology; Stem Cell and Regenerative Biology; and Therapeutics.

Biological Sciences in Public Health (BPH)



Rooted in the rich environment of the Harvard T.H. Chan School of Public Health, BPH trains students in individual fields of biological research with a focus on understanding, preventing, and treating human diseases affecting large populations. The program provides students with research training opportunities in a wide range of areas including the metabolic basis of health and disease, infectious diseases, gene-environment interactions, and immunology and inflammation.

Biophysics



The biophysics program prepares students with diverse backgrounds for independent research careers in which the concepts and methods of physical science are applied to biological problems. Applicants should have sound preliminary training in a physical or quantitative science, especially chemistry, physics, computer science, or mathematics.

Chemical Biology (ChemBio)



ChemBio is a rapidly growing field that combines the rigor and quantitative aspects of traditional chemistry and biochemistry programs with the excitement and medical relevance of modern molecular, cellular, organismic, and human biology. The ChemBio program equips PhD candidates with the appropriate experimental and theoretical knowledge to use chemical tools—such as single-molecule measurements, single-cell imaging, and the use of exogenous molecules to modulate the activity of cellular components—to understand biological processes.

Chemistry and Chemical Biology (CCB)



CCB offers a PhD in chemistry at the frontiers of research in the chemical and life sciences. Research and training opportunities are offered in many subdisciplines of chemistry, including chemical biology, inorganic, organic, physical, and theoretical. Housed at Harvard's Cambridge campus, CCB admits students with a record of classroom and laboratory training in biological, organic, inorganic, and physical chemistry.

Immunology



The immunology program offers PhD students an education in basic biology, a sophisticated training in immunology, and exposure to the immunological and non-immunological problems of disease. The program offers multidisciplinary training that exposes students to traditional fields of medical biology as well as to all major areas in the expanding field of immunobiology, including transplantation, neuro-immunology, autoimmunity, stem cell biology, infection and immunity, human translational immunology, tumor immunology, immunobiology, and mucosal immunity.

PhD Areas of Study

Molecular and Cellular Biology (MCB)



MCB hosts the molecules, cells and organisms (MCO) graduate program that trains future leaders of scientific research in all areas of modern biology. Research and teaching in the MCO graduate program is organized along four tracks: biochemistry, chemical, and structural biology (BCSB); cellular, neuro and developmental biology (CND); genetics, genomics and evolutionary biology (GGE); and systems and computational biology (SCB). MCB also hosts a program in engineering and physical biology (EPB).

Neuroscience (PiN)



The program in neuroscience (PiN) offers graduate students comprehensive training across the spectrum of neurosciences, ranging from cellular and molecular processes at the foundation of neural development and function, to integrative processing in the central nervous system, and mechanisms and treatment of human neurologic disease. PiN is an interdepartmental program and students have access to neuroscientists across the entire University, including a large group of clinical and basic science faculty at Harvard Medical School, Harvard-affiliated hospitals and research centers, and the Faculty of Arts and Sciences.

Organismic and Evolutionary Biology (OEB)



The members of the department of OEB share a common interest in understanding the structure, function, and variation of biological systems. Research interests of OEB faculty include the flow of energy and material through ecosystems; the development and structure of communities and populations; the diversity of plant, animal, and microbial groups; and the mechanisms that have permitted diversity to evolve. There is representation in anatomy, behavior, biogeochemistry, development, functional morphology, physiology, paleontology, population genetics, molecular evolution, systematics, and the biology of global change.

Speech and Hearing Bioscience and Technology (SHBT)



SHBT provides multidisciplinary PhD research training in basic, clinical, and applied approaches to the study and treatment of all aspects of human communication and its disorders. SHBT seeks students who share an interest in speech and hearing in its broadest definition; the belief that progress in this area requires the coordinated effort of engineers, scientists, and clinicians; and the understanding that real-world applications require coupling the discoveries and the people behind them with appropriate industrial partners.

Systems, Synthetic, and Quantitative Biology (SSQB)



The SSQB program engages graduate students in explaining how the higher-level properties of complex biological systems arise from the interactions among their parts. This field requires a fusion of concepts from many disciplines, including biology, computer science, applied mathematics, physics, and engineering. Students with backgrounds in any of these disciplines are encouraged to apply.

Virology



Virology includes research on biochemical mechanisms of cell growth control, transformation, signal transduction, and transcriptional regulation; the molecular genetics, molecular biology and molecular pathogenesis of latent, persistent, or cytolytic virus infections; the characterization of virus-receptor interactions and the mechanisms of cell entry; structural studies of viruses and viral proteins; the use of viruses vectors for heterologous gene expression and for gene therapy; the interaction of viruses with cells involved in non-specific or specific immune responses; the pathogenesis of viral infection; and rational antiviral drug design.

STUDENT NAME:

Lisa Awaitey

PROGRAM:

Chemistry and Chemical Biology

ACTIVE IN:

Former GSAS Research
Scholar

"The programs and people of the GSAS Office of Equity, Diversity, Inclusion & Belonging have allowed me...to build a network of friends and colleagues that help me to thrive."



SCHOOL OF LIFE

The daughter of Ghanaian immigrants, Lisa Awaitey learns from biological processes with the aim of building synthetic models that mimic them. The PhD student in chemistry and chemical biology focuses on nitrogenases, the class of enzymes that enables nitrogen to transform into ammonia.

In nature, this change takes place at an ambient temperature. The industrial production of ammonia, on the other hand, takes enormous amounts of energy, heat, and pressure that leave a large carbon footprint. To study the biological reaction more closely, researchers must build a synthetic model. And to do that, they need to know more about metal hydrides—materials that consist of metals like iron bonded to hydrogen. That's where Awaitey's research comes in.

"For nitrogenase to spur the reaction to ammonia, a metal hydride must be formed," she says. "The same thing applies to the industrial process. That means that there's something special about metal hydrides in the transformation from nitrogen to ammonia. I want to know what that is."

Awaitey says she chose GSAS because she knew that the School and her advisor, Professor Ted Betley, would be committed to advancing the careers of underrepresented minorities in science. At Harvard, she's not only found brilliant people and outstanding facilities, but also a community that enables her to succeed.

"Ted is incredibly supportive of my research and my career," she says. "Along with my advising relationship, the programs and people of the GSAS Office of Equity, Diversity, Inclusion & Belonging have allowed me to meet people trying to achieve the same things academically that I am and to build a network of friends and colleagues that help me to thrive."

Are Harvard Life Sciences Right for You?

We are looking for creative people from a variety of backgrounds who are passionate about the life sciences, who have enjoyed a previous research experience and are ready to dedicate time to identifying and investigating new ideas. If this describes you, we encourage you to explore the cutting-edge science and training opportunities in the HILS programs and apply.

A Diverse Scholarly Community

Different points of view are critical to life sciences research, where advancing knowledge often requires bringing a new perspective or approach to a problem. At Harvard Griffin GSAS, we strive to create an inclusive community where all students can thrive and grow academically and personally. The School is proud of its diverse community representing many races, ethnicities, belief systems, nationalities, abilities, socioeconomic statuses, genders, and sexual orientations and welcomes applications from individuals from underrepresented or disadvantaged backgrounds.

Visit gsas.harvard.edu/diversity to learn more or contact the Harvard Griffin GSAS Office of Equity, Diversity, Inclusion & Belonging at minrec@fas.harvard.edu or 617-495-5315.



STUDENT NAME:

Anita Reddy

PROGRAM:Biological and Biomedical
Sciences**ACTIVE IN:**Minority Biomedical Scientists
of Harvard*"I feel incredibly supported by the
people in my lab."*

SIGNAL OF STRENGTH

Let's say you go to the gym and lift weights. The strain creates microtears in muscles that signal to a wide variety of cell types, including immune cells, motor neurons, and satellite cells that play a role in muscle regeneration. But what are those signals? Where do they come from? And what is their vehicle? Those are some of the questions that GSAS student Anita Reddy and her colleagues in the lab of Harvard Medical School Assistant Professor Edward Chouchani wanted to investigate.

"We found that during exercise, the metabolite succinate is selectively released from exercising muscles," Reddy says. "It signals to non-muscle cells—specifically stromal cells—that play an important role in muscle repair. When succinate is released, there is an increase in the muscle motor neurons and the strength of mice in our experiments. That's really important because increased muscle innervation leads to increased strength—and increased strength helps with the prevention of arthritis and bone fractures."

The daughter of Indian immigrants, Reddy says she chose GSAS because she wanted to work with brilliant people at facilities as good as any in higher education. As a student of color, she also wanted to be part of a community in which she felt she belonged. Fortunately, Reddy says she's found both at GSAS.

"We can run some experiments in a day that might take a month at other institutions," she says. "And as a member of the Minority Biomedical Scientists of Harvard group, I've found people that I can really look up to and confide in as well, even about non-lab-related things."



Why Choose Harvard?

Harvard and Harvard Griffin GSAS Support Your Academic and Scholarly Goals

PhD students are guaranteed full financial support including stipends and grants for tuition and health insurance. In addition, Harvard Griffin GSAS resources to support your growth as a scholar and a scientist include:

- Exceptional breadth of cutting-edge research, access to state-of-the-art facilities, and the opportunity to learn from and work with faculty at the forefront of their fields;
- Professional development assistance for enhancing writing, research, and teaching skills and for planning academic and nonacademic career paths;
- Access to a large, vibrant, and diverse alumni network for mentorship, career exploration, and social, cultural, and intellectual engagement;
- Connection to Boston's scientific hub, where students in HILS programs are well positioned to network with colleagues at other local institutions, such as MIT, and interact with scientists at any of the more than 1,000 life sciences and biotech companies based in the Greater Boston area.

STUDENT NAME:

Sydney Stanley

PROGRAM:

Biological Sciences in Public Health

ACTIVE IN:

Recipient of the 2023 Edgar Haber Award for outstanding achievement in the biological sciences

"It was a wonderful experience working with such amazing scientists who happen to be even better people."



TACKLING TB

Sydney Stanley, PhD '23, is fascinated by the way small organisms can have a big impact on public health. As a student at Harvard Griffin GSAS, Stanley explored the evolutionary genetics of the bacteria that cause tuberculosis (TB). She says her work is motivated by a desire to mitigate global health disparities.

"TB therapy includes multiple antibiotics that have to be taken over a course of several months, and infection is difficult to detect," she says. "The shortcomings of these tools are compounded in resource-limited settings—which contributes to the spread and ultimately the mortality of the disease."

Stanley studied a family of TB strains from Southeast Asia whose mutations rendered them more susceptible to newly developed drugs. She and her colleagues collaborated with a research group in Vietnam to sequence the bacterial genomes, analyze their mutations, and assess their fitness in the face of different challenges that simulate infection.

"Studying these mutations can enable the design of better diagnostics and drug combinations to detect and treat infections," she explains. "TB can be genetically distinct in different regions of the world, so we should tailor diagnostics and antibiotics accordingly."

Stanley says the support she received from Professor Sarah Fortune, her mentor and principal investigator, enabled her to develop as a researcher. "I appreciate how she entrusted me with compelling projects while also encouraging me to explore my scientific interests and creativity," she says. The postdoctoral fellows and colleagues in Fortune's lab were also instrumental to Stanley's success. "It was a wonderful experience working with such amazing scientists who happen to be even better people."

Why Choose Harvard?

Harvard and Harvard Griffin GSAS Support Your Personal Growth and Well-Being

In addition to access to unparalleled facilities, faculty, and academic resources at Harvard, Harvard Griffin GSAS supports your physical, social, and mental well-being through resources including:

- Health and wellness services, such as comprehensive health care and a range of resources promoting physical and mental wellness;
- A supportive and inclusive community fostered by Harvard Griffin GSAS and supported in part by Harvard Griffin GSAS Office of Equity, Diversity, Inclusion & Belonging and the Disability Access Office;
- Opportunities to connect with a community of students who share common interests and goals through graduate student groups such as GSAS Minority Biomedical Scientists of Harvard, Under-represented Scholars in Neuroscience, Harvard Graduate Women in Science and Engineering, and LGBTQ@GSAS, and more;
- The Student Center at Harvard Griffin GSAS, where students and faculty from multiple disciplines interact with one another and participate in activities such as dinners, discussion groups, language tables, dances, concerts, ski trips, and other outings.





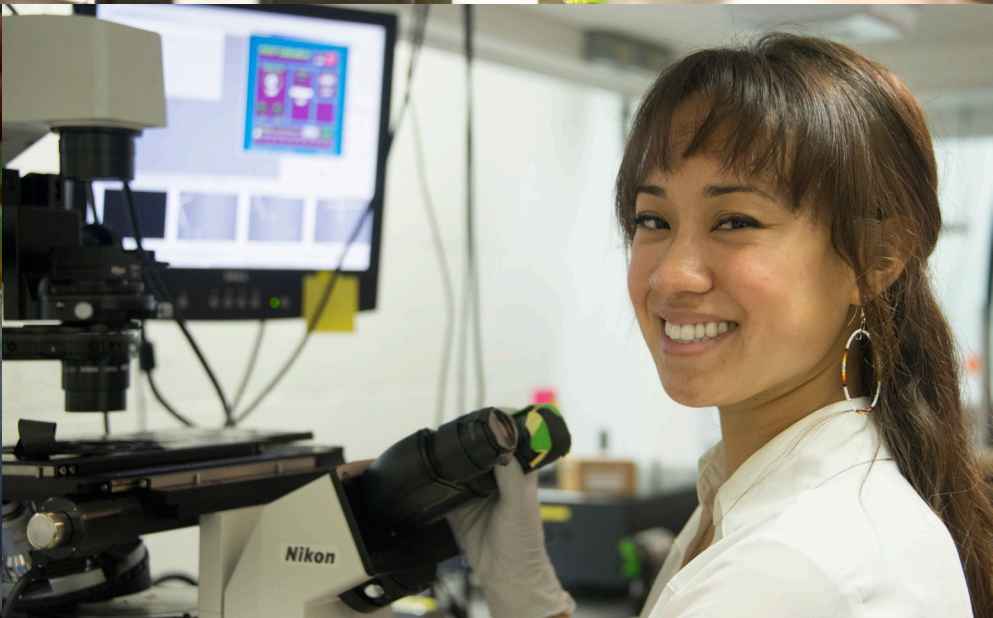
How to Apply

Interested students should visit gsas.harvard.edu/programs/life-sciences to identify the program that best suits their interests and research experience, and to learn more about the application process and requirements. Some factors to consider to find the best fit include: subject area, curriculum, program size, learning environment, and affiliated faculty. You can visit the individual program websites and compare each program's offerings and requirements.

One of the benefits of applying to study at Harvard is the ability to truly explore the scope of the life sciences by expressing interest in more than one area. Applicants may apply to up to three programs and pay only one application fee. If you elect to apply to three programs, only two may be programs in the Division of Medical Sciences (bioinformatics and integrative genomics, biological and biomedical sciences, immunology, neuroscience, speech and hearing bioscience and technology, and virology). You may submit a maximum of three applications to Harvard Griffin GSAS during the course of your academic career, which includes applications to multiple programs in the HILS federation, regardless of whether you submitted them under a single application fee.

While each program has its own admissions requirements and committee, all HILS programs take an integrated look at each application, holistically evaluating all aspects of the application rather than relying on any single factor to determine admission. Visit gsas.harvard.edu/apply to apply.





CONNECTIONS

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HILS

For More Information about Harvard Integrated Life Sciences:

PROGRAMS gsas.harvard.edu/programs/life-sciences

APPLY gsas.harvard.edu/apply

DIVERSITY gsas.harvard.edu/diversity

CONTACT HILS hils@fas.harvard.edu

Professor Rosalind Segal, Co-Director

Professor Elena Kramer, Co-Director

Samantha Reed, Executive Director

Xavier du Maine, PhD, Assistant Director of Equity, Diversity, Inclusion, and Belonging



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GRADUATE SCHOOL OF ARTS AND SCIENCES



Express Your Interest in HILS