

The Natural Sciences at Stanford

SAY YES TO SCIENCE

Create your unique future

Welcome

The Stanford School of Humanities and Sciences (H&S) is the home for the natural science disciplines—**applied physics, biology, chemistry, data science, mathematics, physics, and statistics**—and the starting point for all undergraduate students. At Stanford, you are encouraged to explore your interests and major in the discipline(s) of your choice.

At the same time, I understand that figuring out your academic path can be a little daunting, and, thus, the purpose of this guide is to highlight the landscape of opportunities for you to explore math and science at Stanford.

Looking back at my own experience, I see that my path to becoming a biochemist and research experimentalist was not a direct line of inquiry. One of the first in my family to go to college, I entered Ithaca College planning to be a physical therapist. But, for my work study program, I was placed in the biology department “prep room.” Between scrubbing dirty fly vials and setting up weekly labs, I learned the ins and outs of doing biology experiments and became hungry for more.

The faculty member who was my work study manager inspired me to get started doing research. She gave me the confidence to get outside of my comfort zone and explore. Because of her, I knocked on doors and applied for summer internships and honors research.

After my junior year, during a summer research experience at Norwich Pharmaceuticals, I learned that I love chemical biology and the translational aspects of research. Afterward, I joined a faculty lab studying bacteria that prevent disease in orchards. I quickly realized that uncovering chemical tricks employed by bacteria was the hook pulling me into the fields of biochemistry, microbiology, and plant biology. Now, as a faculty member and senior associate dean, I do research and work closely with students, teaching them the skills they need to explore the unknowns of biology and helping guide them to discover their scientific passions.

Are you interested in exploration, new directions, and diverse research experiences? If so, the natural sciences in H&S offer an exciting environment for you to learn and discover new knowledge, methodologies, and technologies; work side by side with world-class faculty mentors and research staff; and help solve today's important problems. Our departments are top ranked and offer opportunities for learning and research that will advance your understanding of the world.

Join us and see where your path takes you!



Mary Beth Mudgett
Senior Associate Dean for the Natural Sciences
School of Humanities and Sciences
Susan B. Ford Professor and Professor of Biology



Photo by LiPo Ching / Stanford University

The School of Humanities and Sciences (H&S) is the foundation of a liberal arts education at Stanford. The school encompasses more than 45 departments and interdisciplinary programs. H&S is home to fundamental and applied research, where free, open, and critical inquiry is pursued across disciplines.

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EXPLORE

**the natural sciences
at Stanford**



When someone says the word “scientist,” who do you picture? Do you see a person in a white coat alone in a lab, microscope close at hand?

This is one picture of a scientist, but there are countless others. You are a scientist when you:

- model greenhouse gas emissions using mathematical projections
- study river water and its impacts on people and ecosystems
- analyze educational data to identify instructional gaps in school systems
- interview community members about their experiences with health care
- gaze millions of light-years into the past with extraordinarily powerful telescopes
- advance scientific knowledge via research while educating future scientists in a university setting
- theorize about tiny subatomic particles, the ghosts of matter
- use statistical methods to track genetic mutations of a virus such as COVID-19 to estimate its spread
- study how molecules that might one day become a medicine interact in the human body
- experiment with the chemistries of materials to find completely new properties

Scientists do not work in isolation. They are collaborative individuals, constantly sharing information and discussing ideas with colleagues. They pursue knowledge and inspiration across disciplines, and their creativity leads to new scientific theories and methods as well as to applications and solutions that benefit all aspects of society.

At Stanford, we believe a scientist is anyone who is relentlessly curious and systematic in investigating what fascinates them. This could be you! The educational experiences you engage in here will support your scientific journey and empower you to follow any path you desire. **The first step is saying yes to science.**



**“WHAT CAN
YOU DO with
that?”**



Teresa Nguyen, '14 Chemistry, MD '20
Resident physician,
anesthesiology
Stanford Medicine

“ The chemistry major is special for how tightknit the community is, and this was crucial in helping me, the first generation in my family to go to college, to feel a sense of belonging and build my confidence. I not only gained mentors and friends, but also a family who has continued to support and uplift me far beyond my undergraduate years.

Professionally, my chemistry major helped me obtain a position immediately after college as a medicinal chemist in drug discovery at Genentech, where I co-invented and patented a drug for the treatment of neuropathic pain within my first year. Stanford’s rigorous curriculum gave me the necessary strong fundamental basis of knowledge to be able to excel and innovate. I have since completed medical school and am now an anesthesiologist at Stanford, and my foundation in chemistry plays a role in how I think about and apply pharmacology in my medical practice every day.”

Many people assume that your college major prepares you for a specific kind of job, much like a law degree trains you to become a lawyer. By this thinking, a chemistry major would train you to become a chemist in a lab and perhaps little else. At Stanford, we believe our natural science programs provide an excellent foundation for a career in any sector benefiting from scientific insight—including research, medicine, education, technology, finance, government, and so much more.

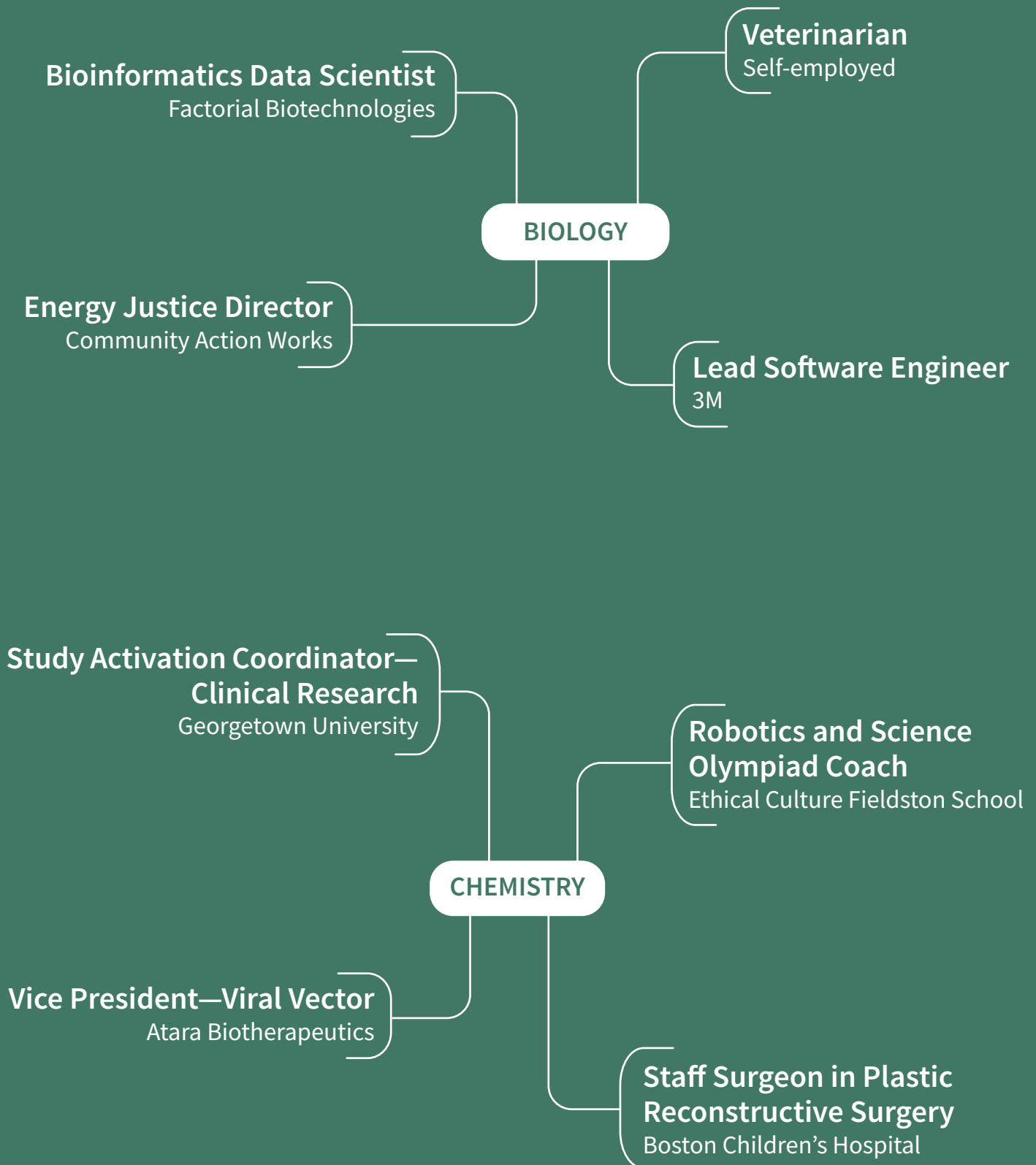
Today, people change jobs an average of 12 times, according to Stanford Career Education, the university office that helps students and recent alumni pursue fulfilling careers. So it’s important to have a major that prepares you for many possible paths. Reframe “What am I going to do for the rest of my life?” to “What skills and approaches will be my foundation?” Maybe your career path will fall in line with your major—or maybe your undergraduate studies will launch you into new territory.

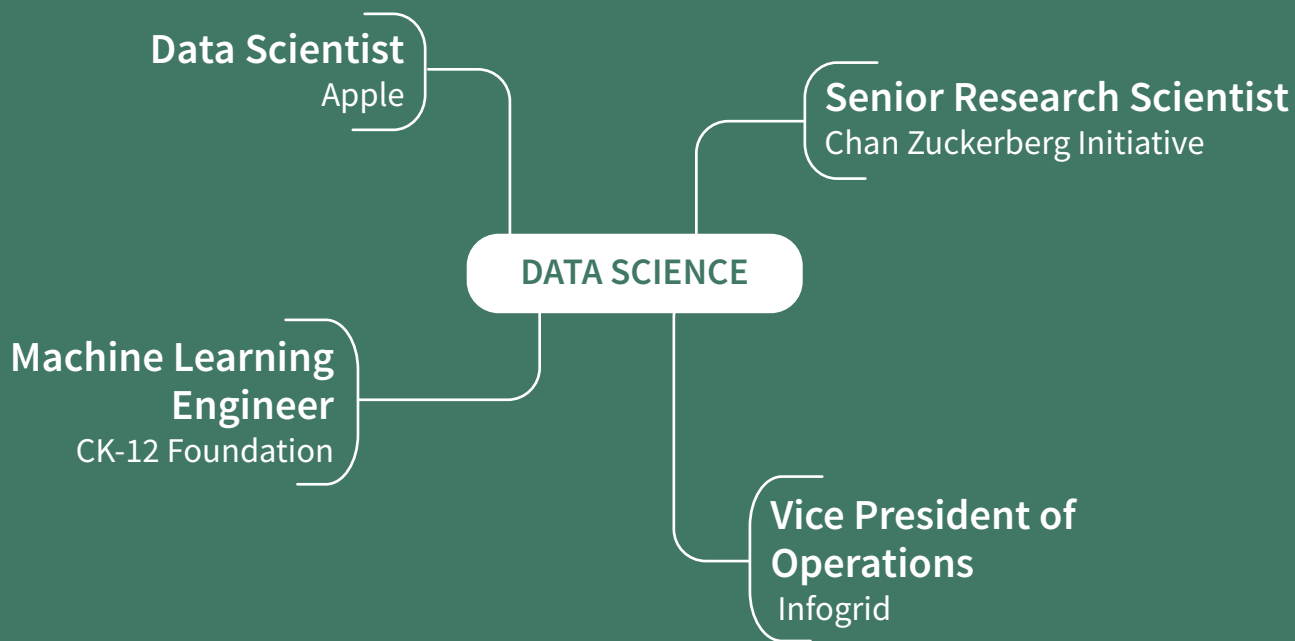
Employers in every industry want to hire innovative employees who can think conceptually, reason carefully, communicate clearly, and work well on teams. Our natural science alumni, regardless of major, embark on successful careers with these skills:

- analytical thinking and problem-solving frameworks
- a strong quantitative foundation
- a commitment to logical, evidence-based reasoning
- proficiency in researching and synthesizing information
- fluency with data collection, processing, analysis, and interpretation
- experience collaborating with other scientists and working on a team
- capacity for productive debate based on research and data
- the ability to communicate complex ideas clearly, in writing and verbally



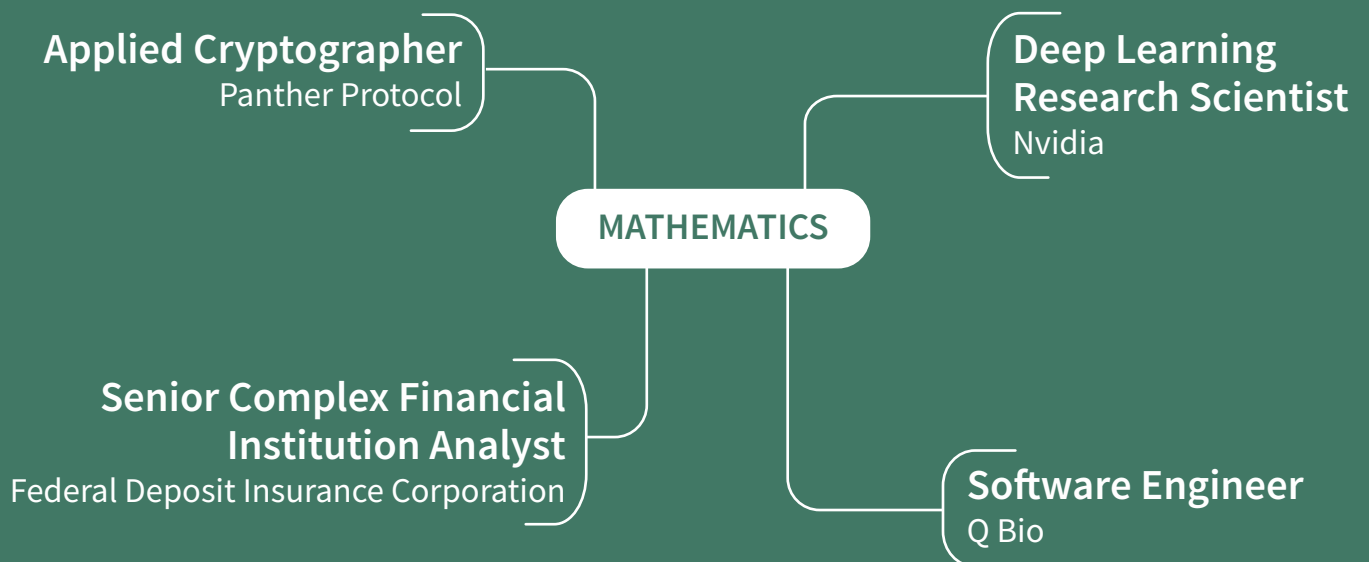
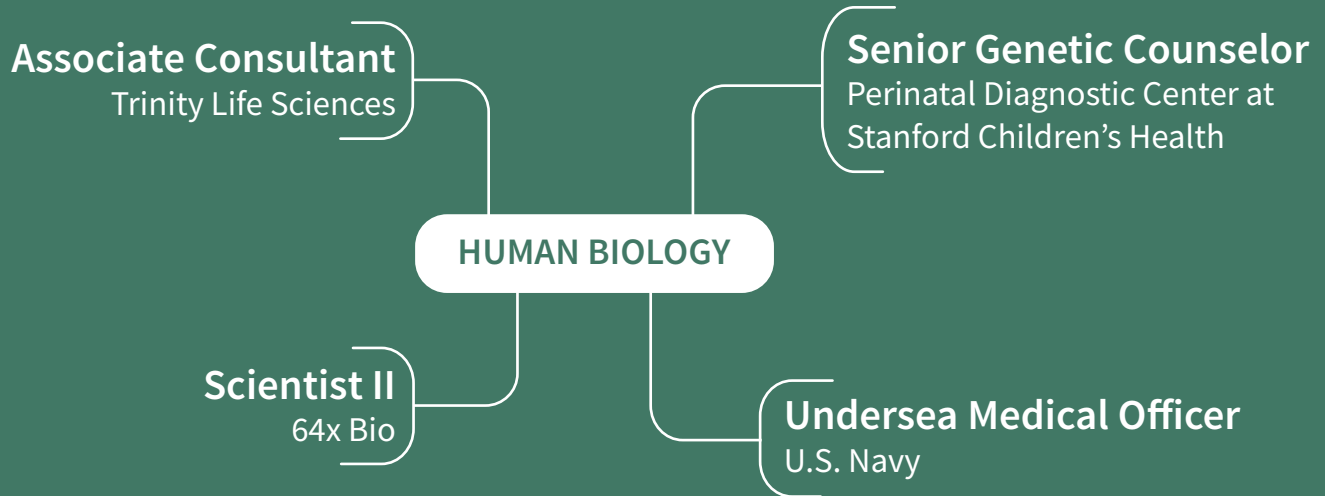
Careers of recent natural science alumni

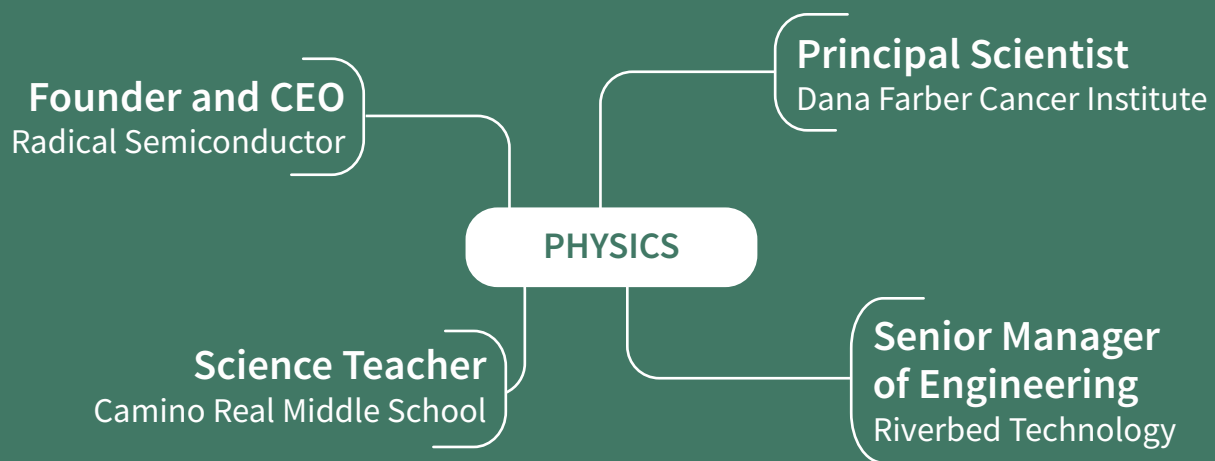




Ricardo Guajardo, '19 Biology
 Graduate student, Neuroscience
 doctoral program and Medical Scientist
 Training Program (MD/PhD)
 University of California, San Francisco

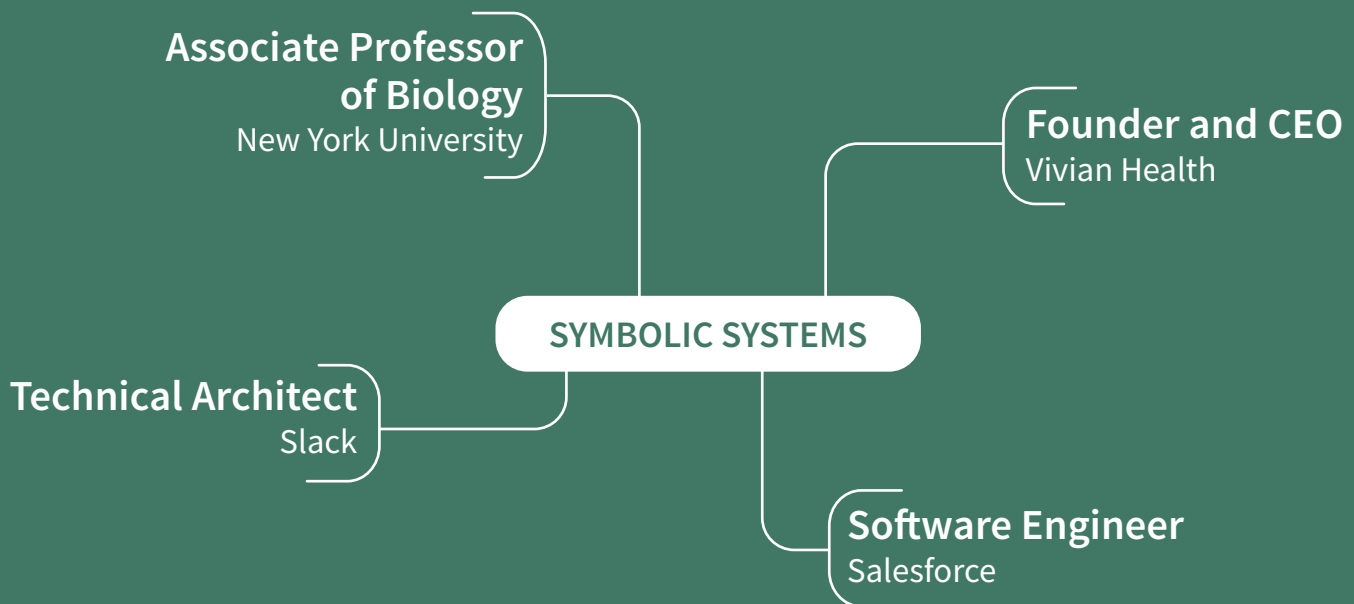
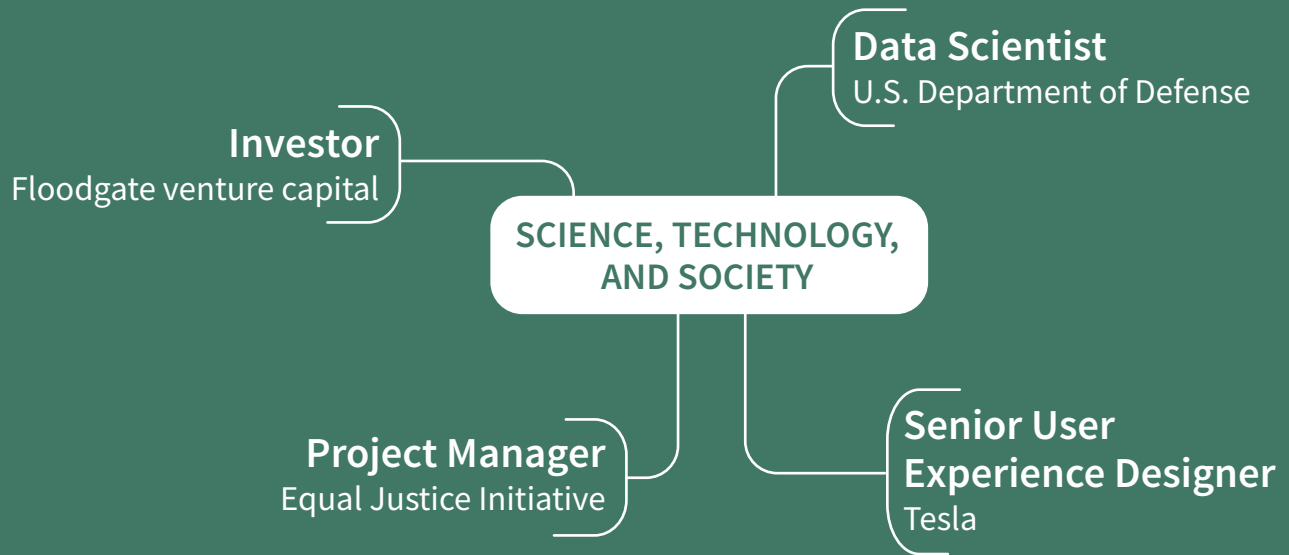
“ My years at Stanford were instrumental in my path toward becoming a physician-scientist. The coursework gave me a broad understanding of fundamental biological principles, which I leaned on consistently during the preclinical medical school curriculum. Most importantly, upper division biology courses taught me how to critically assess research papers in my field. In addition, my time as an undergraduate researcher taught me how to conduct neuroscience research and how to develop a project. I'll always be grateful to have started my scientific journey at Stanford. ”





“ Physics gave me a way to deconstruct problems that at first appeared insurmountable into smaller ones that I could maybe solve. Even though I am not a practicing physicist, I often find myself drawing from my physics toolkit, not only for the linear algebra and probability, but also for a way to resize a question so that it can fit into my field of view. I still can’t help but try to find the fundamental particles and interactions in any problem. ”

Julien De Mori '12 Physics, MS
'14 Electrical Engineering
Global data science team,
Warner Music Group



From Stanford to NASA

Margaret's Journey



Photo Credit: NASA/Bill Ingalls

“Majoring in Science, Technology, and Society (STS) was a wonderful foundation for my career journey. STS encouraged my intellectual curiosity and taught me to think critically about multidisciplinary issues.”

— Margaret Vo Schaus
Chief Financial Officer,
National Aeronautics and Space Administration (NASA)

Life lesson: You can have many positions under one roof!

BA, English and Science, Technology, and Society, '02

MS, Management Science and Engineering (cotermin), '03

Analyst → Senior Analyst
The Advisory Board Company

Analyst → Senior Analyst
U.S. Government Accountability Office

Team Lead → Chief Operations Officer,
Geothermal Technologies Office →
Senior Adviser for Renewable Power
U.S. Department of Energy, Office of
Energy Efficiency and Renewable Energy

Acting Deputy Assistant Commissioner
for Data Transparency
U.S. Department of Treasury,
Bureau of Fiscal Service

Senior Adviser → Acting Chief of
Staff → Deputy R&D Director
U.S. Department of Energy,
Office of Fossil Energy

Director of Business Operations
U.S. Department of Defense,
Office of the Under Secretary for
Research and Engineering

★ Chief Financial Officer
National Aeronautics and
Space Administration

Senate-confirmed presidential appointee

★ Before NASA, I was a civil servant, an employee hired, not appointed, by the government.



Study what fuels your

CURIOSITY





College is different. Subjects you studied in high school will take on greater depth and creativity at Stanford. Your professors will be experts in their fields who also work across disciplines to create new knowledge and solve some of the world’s most complex problems. Many of them have won national and international awards, such as the Nobel Prize and the MacArthur “Genius” Fellowship, and they are members of renowned academic organizations, such as the National Academy of Sciences. Many are award-winning teachers. For you, this means multidimensional learning and mentorship from some of the brightest minds in science.

We believe that your first two years at Stanford should be about exploration, so consider venturing into new territory, even into subjects you might have disregarded previously. You’ll also want to take the time to research the diversity of topics within each natural science degree program. For example, within physics, you could be studying atoms—or you could be studying the universe. In chemistry, you could be measuring molecular interactions or making molecules the universe has never seen before.

Picking a major is a way to choose a home base, but it does not limit your choices. You can double major, add a minor, do a coterm (see p. 50), join a research project in another field, or take an elective to explore new ideas and move beyond your comfort zone. **This is your Stanford experience.**



“Stanford has plenty of opportunities for students to explore their interests and understand what they may be attracted to or what may not really be the right path for them. In my case, I started studying physics because I was fascinated by the connections between physics and music. And when I realized that maybe the formalized study of physics wasn’t for me, I jumped over into mathematics, and I also started researching. Stanford makes these opportunities so accessible. I think it’s very easy for students to find a niche and find things that they’re genuinely interested to do here.”

Jadon Geathers, '24 Mathematics and Computer Science

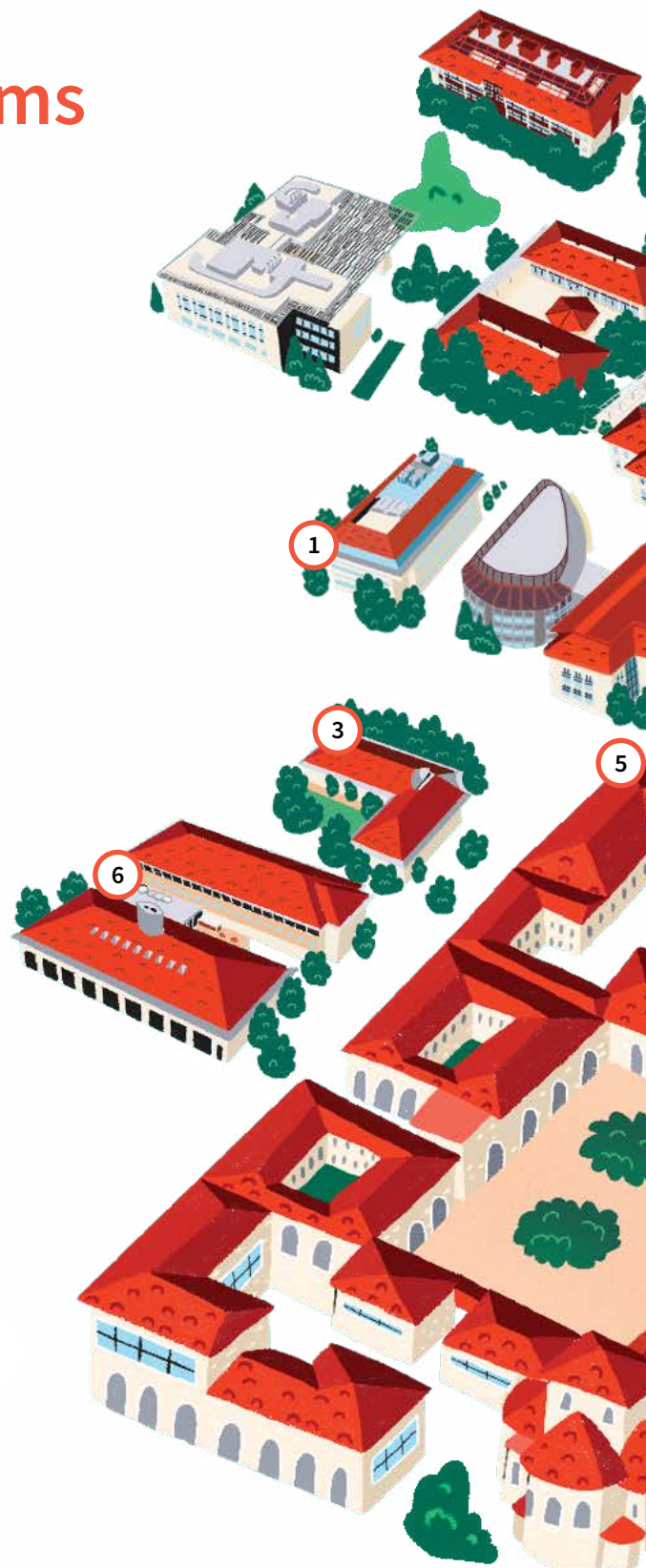
H&S Natural Science Departments and Programs

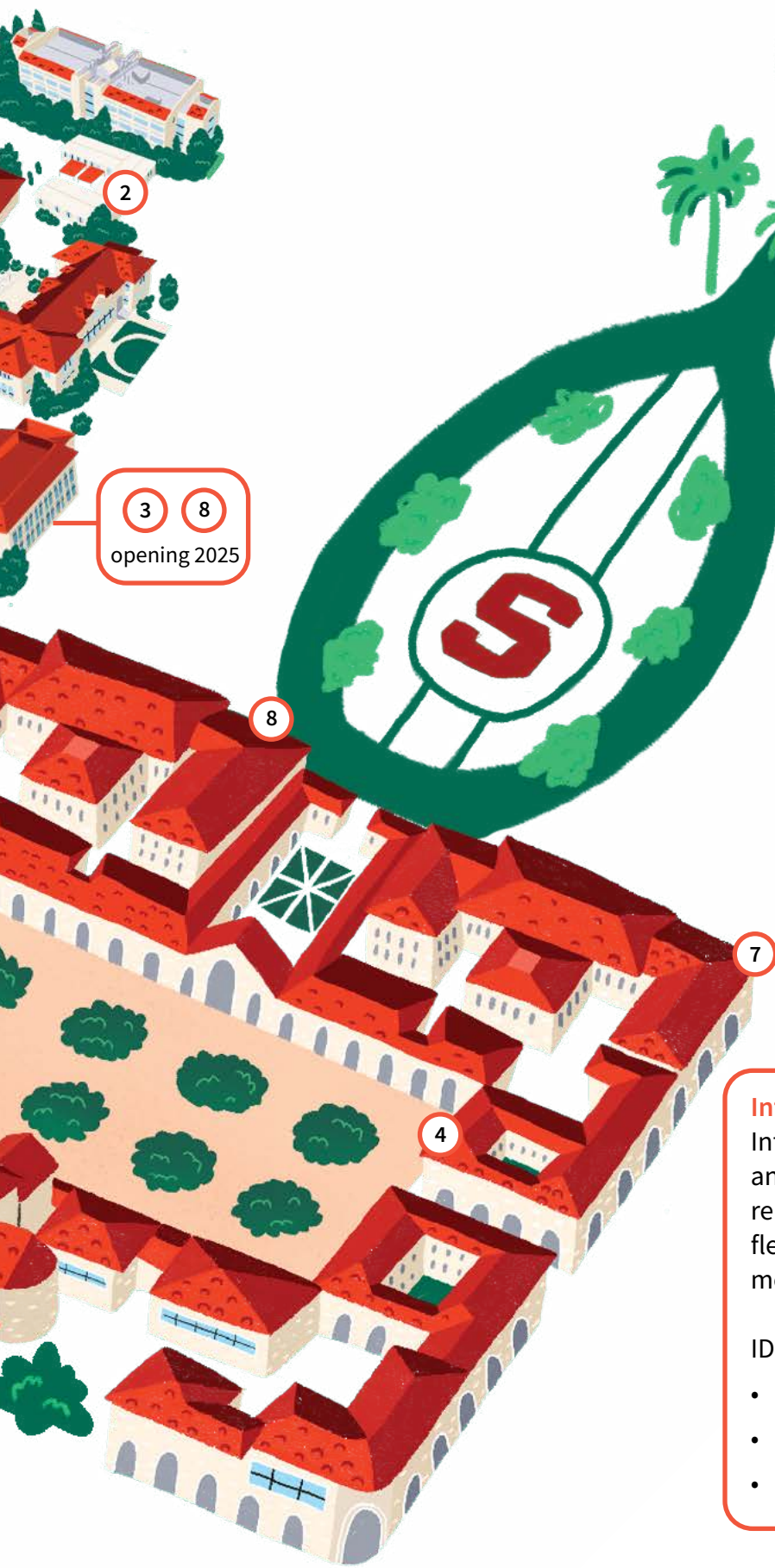
Undergraduate Majors

- 1 [Biology](#)*
Bachelor of Science
- 2 [Chemistry](#)*
Bachelor of Science
- 3 [Data Science](#)*
Bachelor of Arts in Data Science and
Social Systems
Bachelor of Science
- 4 [Human Biology](#)*
Bachelor of Arts
Bachelor of Science
- 5 [Mathematics](#)*
Bachelor of Science
- 6 [Physics](#)*
Bachelor of Science
- 7 [Science, Technology, and Society](#)
Bachelor of Arts
Bachelor of Science
- 8 [Symbolic Systems](#)*
Bachelor of Science

*offers a minor. The Department of Statistics [offers a minor](#) but not an undergraduate major.

Illustration not to scale





Don't see what you're looking for?

Most natural science majors have multiple subdisciplines that give you the option to choose a focus or combine multiple interests.

Some examples include:

- Astrophysics within the physics major
- Biological chemistry within the biology and chemistry majors
- Computer science theory/ discrete mathematics within the math major
- Ecology, evolution, and environment within the biology major

In addition, the School of Engineering offers an [engineering physics major](#) that combines most of the requirements of a physics degree with engineering studies. Majors have a faculty adviser from both H&S and Engineering.

Interdisciplinary programs

Interdisciplinary programs (IDPs) bridge knowledge and methods from multiple fields. IDP students report being drawn to these programs for the flexibility to study across departments and to merge expertise in creative ways.

IDPs connected to the natural sciences:

- Data Science
- Human Biology
- Science, Technology, and Society

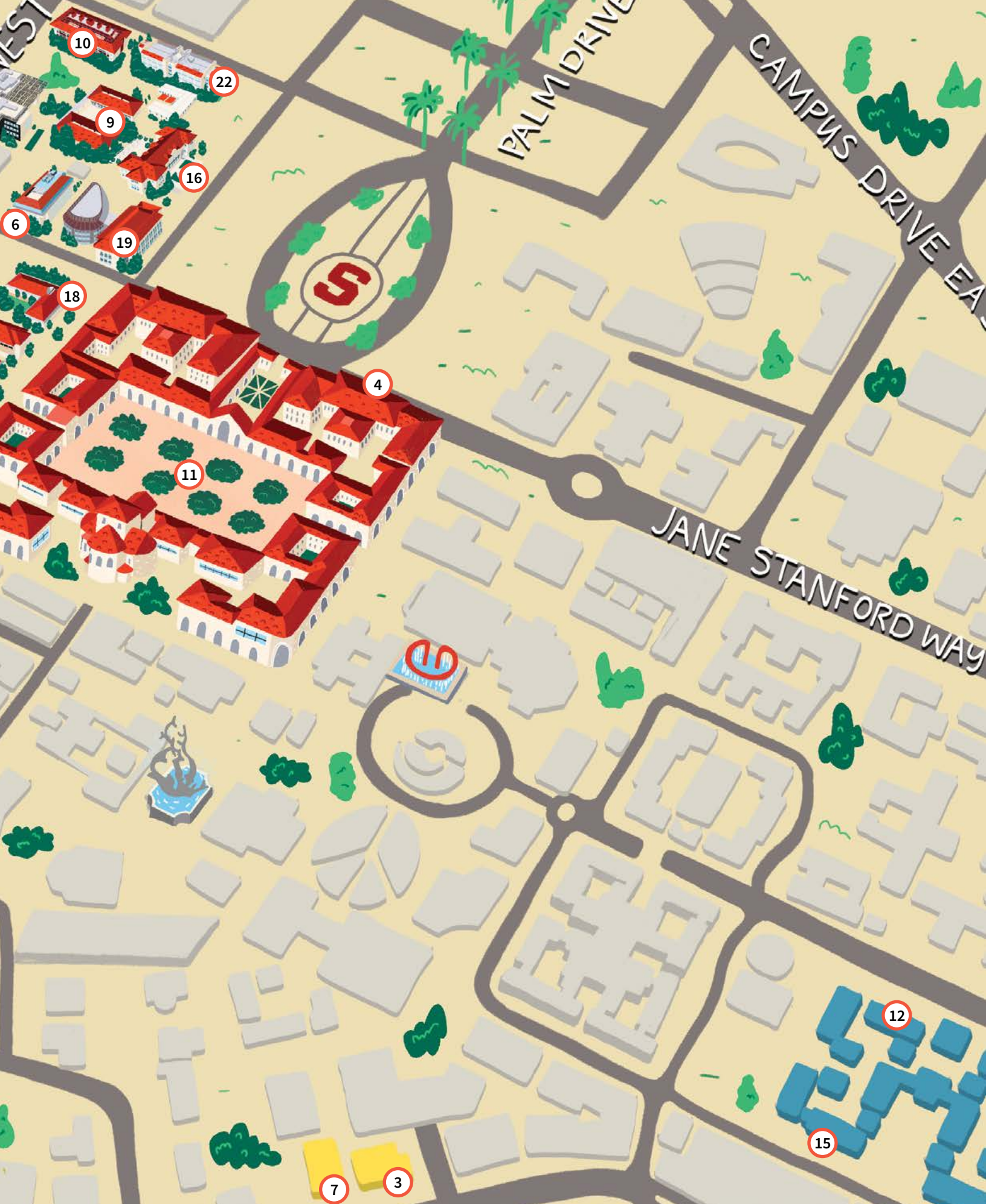
Key Natural Science Locations

- 1 Anne T. and Robert M. Bass Biology Research Building
- 2 Bio-X
- 3 Career Education Center (CareerEd)
- 4 Center for Spatial and Textual Analysis (CESTA)
- 5 Explore Energy House (not pictured)
- 6 Gilbert Biological Sciences Building
- 7 Haas Center for Public Service
- 8 James and Anna Marie Spilker Engineering and Applied Science Building, home of Applied Physics
- 9 John Stauffer Chemistry I & II
- 10 Lorry I. Lokey Laboratory Building
- 11 Main Quad
- 12 Outdoor House
- 13 Physics and Astrophysics Building
- 14 Precourt Institute for Energy
- 15 Public Service and Civic Engagement House
- 16 Sapp Center for Science Teaching and Learning
- 17 Sarafan ChEM-H
- 18 Sequoia Hall
- 19 Stanford Data Science and Computational Complex (opening 2025)
- 20 Stanford Institute for Human-Centered Artificial Intelligence (HAI)
- 21 Varian Physics Building
- 22 William M. Keck Science Building
- 23 Woods Institute for the Environment
- 24 Wu Tsai Neurosciences Institute

Residences Resources

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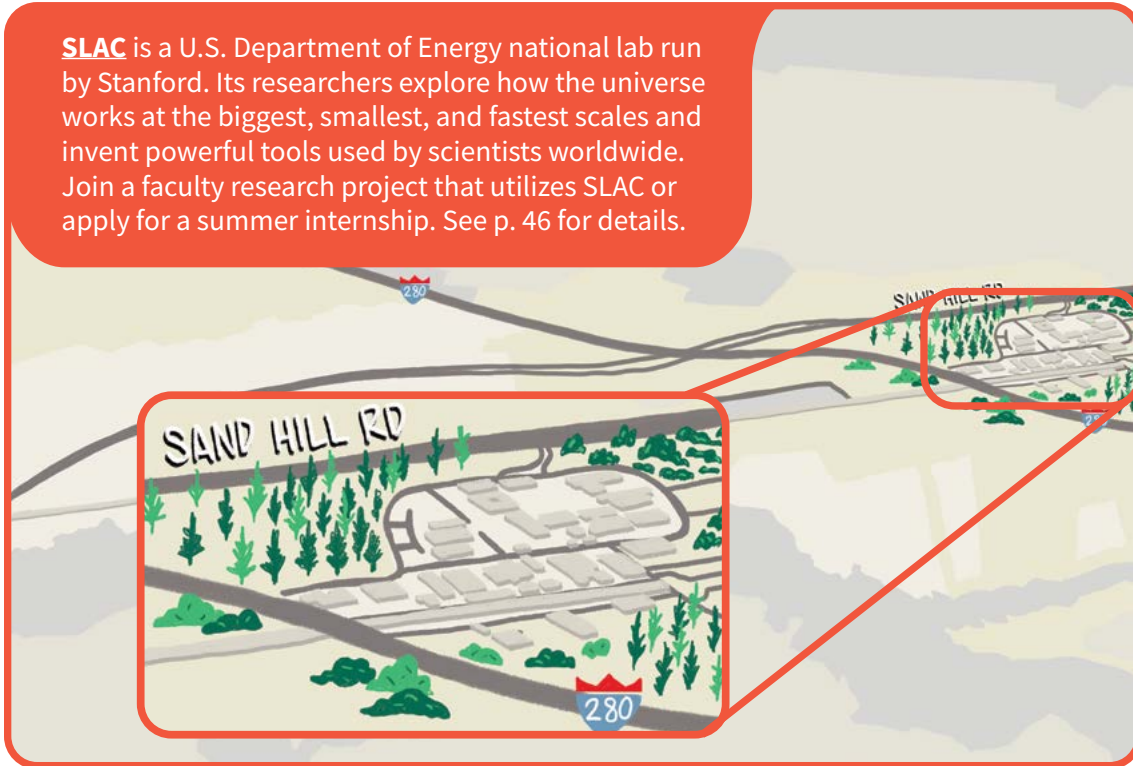


Off-campus learning

SLAC National Accelerator Laboratory

2.8 miles to Stanford's Main Quad

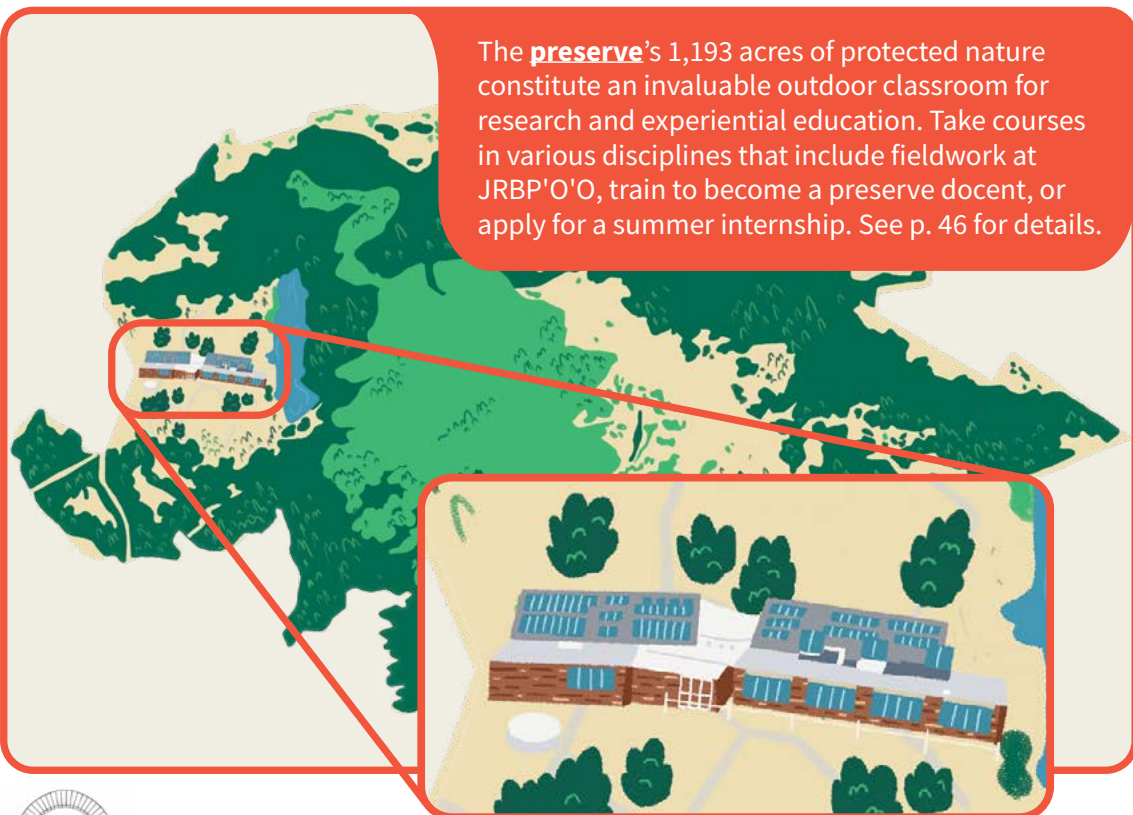
SLAC is a U.S. Department of Energy national lab run by Stanford. Its researchers explore how the universe works at the biggest, smallest, and fastest scales and invent powerful tools used by scientists worldwide. Join a faculty research project that utilizes SLAC or apply for a summer internship. See p. 46 for details.



Jasper Ridge Biological Preserve 'Ootchamin 'Ooyakma

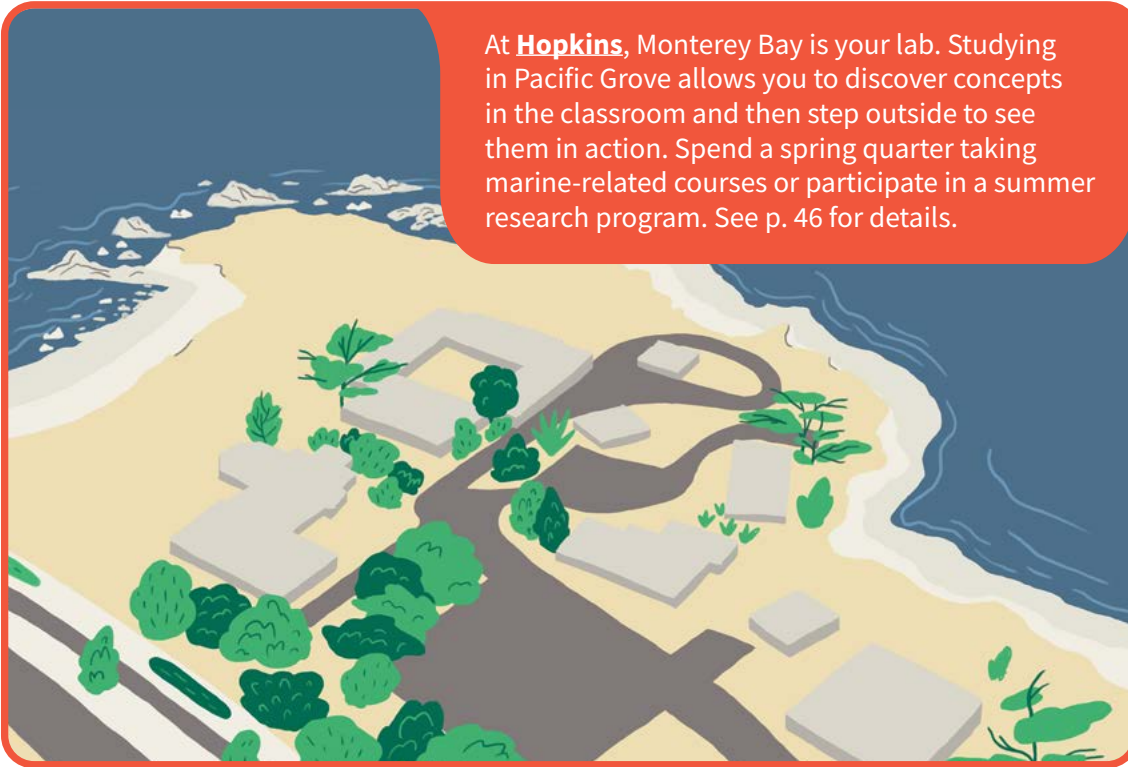
5.5 miles to Stanford's Main Quad

The **preserve's** 1,193 acres of protected nature constitute an invaluable outdoor classroom for research and experiential education. Take courses in various disciplines that include fieldwork at JRBP'O'O, train to become a preserve docent, or apply for a summer internship. See p. 46 for details.



Hopkins Marine Station—Pacific Grove, CA

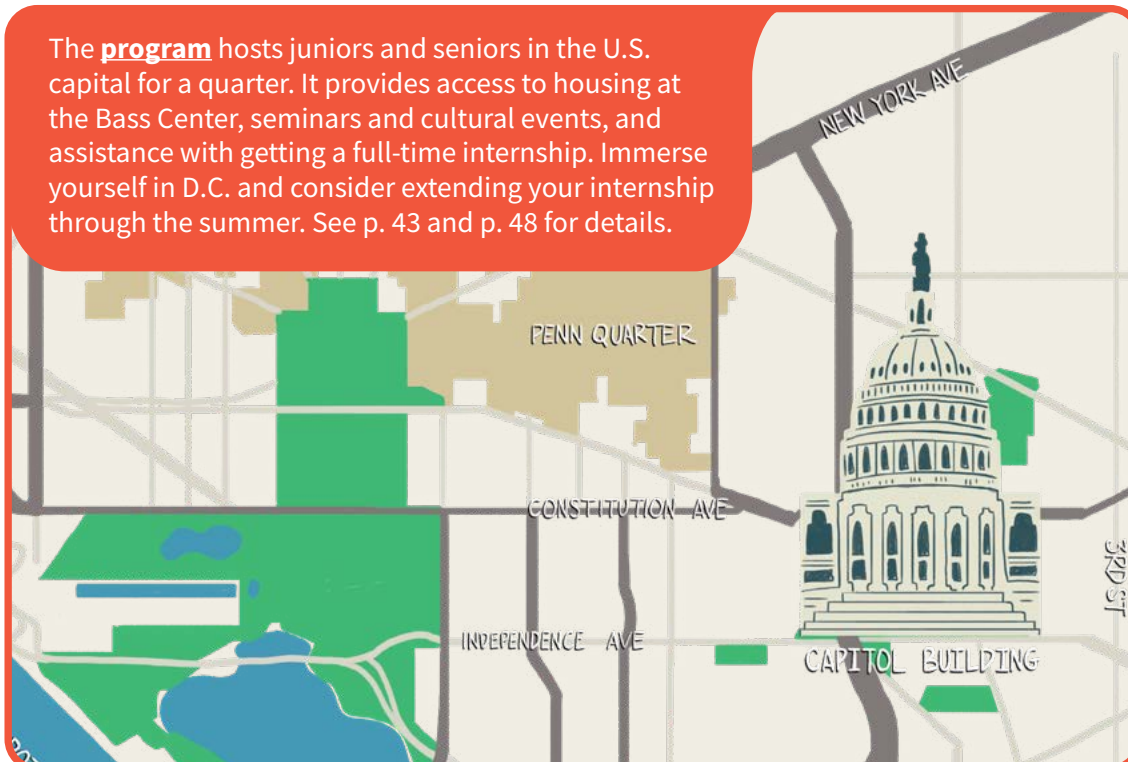
85.6 miles to Stanford's Main Quad



At **Hopkins**, Monterey Bay is your lab. Studying in Pacific Grove allows you to discover concepts in the classroom and then step outside to see them in action. Spend a spring quarter taking marine-related courses or participate in a summer research program. See p. 46 for details.

Bing Stanford in Washington Program—Washington, D.C.

2,843 miles to Stanford's Main Quad



The **program** hosts juniors and seniors in the U.S. capital for a quarter. It provides access to housing at the Bass Center, seminars and cultural events, and assistance with getting a full-time internship. Immerse yourself in D.C. and consider extending your internship through the summer. See p. 43 and p. 48 for details.



DISCOVER

**yourself and
the world**





As you take classes and consider your options for your major, try thinking of the process as an experiment for which you need to gather data. Here are some ideal starting points:

- **Sign up for email lists and newsletters.** Getting information and insight into courses, requirements, events, and opportunities is as easy as checking your email.
- **Apply for an Introductory Seminar.** These discussion-based, hands-on seminars, nicknamed [IntroSems](#), are a way to leap right into an interesting subject, meet and collaborate with faculty, and build friendships with peers. Past science-related IntroSems have included: *A Taste of Quantum Physics*, *Chemistry in the Kitchen*, *Probability and Gambling*, and *The Data Scientist as Detective*.
- **Check out Academic Advising’s frosh-friendly courses.** These are excellent for learning about a new [field](#).
- **Attend a lecture or symposium.** This is a low-commitment way to explore a topic or field. You never know what could grab your attention.
- **Explore subdisciplines.** Most majors have tracks that allow you to narrow your focus; peruse these to figure out what you find most compelling within a discipline.
- **Join a student club.** From Comunidad for Health Equity to the Stanford Sports Analytics Club, there are dozens of [voluntary student organizations](#) (VSOs) related to the natural sciences. Your extracurricular activities might inform your academic ones and vice versa.
- **Do a directed reading/independent study.** Do you want to become familiar with the research literature of a particular field, or are you interested in a topic for which there is no formal course? [You can work with a faculty member to create a personalized experience.](#) [The Department of Mathematics also pairs undergrads with graduate students for directed readings](#) and mentorship outside of coursework.

Make the most of COLLEGE (Civic, Liberal, and Global Education)

Stanford’s first-year curriculum, **COLLEGE** offers a shared intellectual experience and a chance to engage deeply with civic responsibility, self-reflection, and global perspectives. Its seminar-style courses are taught in small sections (<16 students) by faculty and lecturer teams from across disciplines. With lectures oriented away from conclusions and toward questions, COLLEGE nudges you to contemplate what type of scholar you want to be and how you want to exist in the world—at Stanford and beyond.

Frequently asked questions

Q: How do I know if the natural sciences are right for me?

A: Do some self-reflection: Do you want to engage with some of the world's most complex challenges, such as climate change, ethics in technology, and human disease? Are you curious about how things work? Do you like testing ideas and pushing boundaries? Are you excited by invention and the possibility of creating something new? If the answer is yes to any of these, explore the natural sciences and see if you find a major that fits you. Keep in mind that yes answers could also point toward studying the arts, humanities, or social sciences, where you could pursue the same interests from different angles.

Q: What is data science?

A: The field of data science provides an analytical and quantitative framework for tackling data-driven problems in science, industry, and society. In Stanford's interdisciplinary [Program in Data Science](#), you will learn mathematical modeling, inferential thinking, and computational strategies through coursework in multiple disciplines, including mathematics, statistics, computer science, engineering, and the social sciences.

Q: What is the difference between Biology and Human Biology (HumBio)?

A: [Biology](#) is the study of living things, from cell organelles to ecosystems, and Stanford's department offers various tracks within the biology major that focus on the subfields of this broad discipline, including neuroscience, microbial science, and cell, molecular, and organismal biology. [Human Biology](#) is an interdisciplinary program dedicated to the study of biology with a focus on human beings and the behavioral, social, and cultural forces that shape our lives. In HumBio, each student designs a course of study to build expertise in a specific domain of interest; this major is one of the most popular on campus.

Q: What would I study in the Program in Science, Technology, and Society (STS)?

A: [STS](#) students engage with the complex interactions of science, technology, and the social world through interdisciplinary study. You would take a common core of courses drawn from the social sciences, the humanities, the natural sciences, and engineering. This leads to fluency with both technical and social frameworks with which you can define and solve problems. For example, you might study sea life through courses in biology as well as courses on the history and politics of climate change.

Q: Is it possible to pursue a natural science degree as a student-athlete?

A: Absolutely! Balancing the rigorous demands of a science curriculum with the commitments of being an athlete can be challenging. But Stanford and the athletics community provide a supportive environment and resources to succeed in both. [For example, you can get academic and holistic advising from professionals with expertise in mentoring student-athletes and access drop-in and group tutoring, among many other supports.](#)

Q: What does the Symbolic Systems (SymSys) major cover?

A: [SymSys](#) is an interdisciplinary program that integrates computer science, linguistics, philosophy, and psychology. The name stands for exactly what you will study: systems that are built with symbols (such as natural language and formal logic) and systems that work with symbols (such as brains and computers).

Q: Do I need to have advanced math skills already?

A: No. For many majors in the natural sciences, you can learn the math you need during your undergraduate studies. Stanford's Department of Mathematics has [a variety of entry points and sequences](#) within its curriculum to help you find the best fit for your current skills as well as your future plans.

Q: I heard that some natural science classes are hard. What if I get a poor grade, which negatively affects my GPA and thus my future?

A: A disappointing grade doesn't define you or your future. It is important to focus on your trajectory rather than your performance at a given moment. The natural sciences are incredibly broad in scope, and coursework is just one way to engage. After reflecting about your performance, you can then be proactive in your next course: Try to balance your course load with 1-2 challenging courses and/or reduce your unit load that quarter to 12-15 units, instead of maxing out with 18-21 units. Go to office hours and check in with your professors and teaching assistants (TAs) early and often.

Q: I don't want to be a doctor or work in a lab. What else is there?

A: So much! You could become a science educator or science writer, someone who helps others understand science. You could inform public health policy for social change or lead the clean energy future. A natural science background can prove useful in countless careers, not just medicine and research.

Still have questions? Talk to these people:

- Your **undergraduate advising director**
- Your **Stanford Newcomer Guide mentor**
- Your **prehealth adviser** if you are interested in medicine or another health career
- **Student service officers**. These staff know the ins and outs of each major.
- **Directors of undergraduate studies**. These faculty members serve as department and program curriculum experts.
- **Teaching assistants (TAs) and undergraduate peer advisers/mentors**. These advanced students have recently been where you are.
- Your **professors**. Take advantage of office hours and ask faculty and teaching staff about courses and majors as well as their experiences in their discipline.



Science is for everyone

The natural sciences are not only for the people who did Math Olympiad or took the AP or IB exams for chemistry in high school. Science welcomes anyone with the curiosity to learn and the willingness to try, and Stanford has supports to help you pursue any major on campus. Check out these resources:

Placement diagnostics are required if you are interested in taking chemistry, mathematics, or physics in your first year. These assessments are simply to help you find the class that's the best fit based on your experience with a subject. Plan to take a diagnostic before arriving at Stanford. See the Approaching Stanford website for [more details](#).

[The STEMentors Program](#), offered by the Department of Chemistry in partnership with the Leland Scholars Program, provides personalized mentorship and tutoring through 1-hour courses that accompany the chemistry courses that are gateways to STEM majors, *Chemical Principles I* and *II* (Chemistry 31A and 31B).

[bioBUDS \(Building up Developing Scientists\)](#) is a Department of Biology program run by graduate students with the goal of connecting undergrads, especially those from historically underrepresented backgrounds, to resources, skills, and mentorship in fields that deal with living organisms and life processes, including biology and medicine.

Tutoring options abound. Stanford's [Center for Teaching and Learning \(CTL\)](#) provides free, peer-based academic coaching and subject tutoring in all natural science disciplines. Similarly, the [Physics Tutoring Center](#) has TAs available to tutor in the introductory physics courses, and the [Stanford University Mathematical Organization \(SUMO\)](#) also offers drop-in peer tutoring for a number of introductory math courses.

[Stanford Online Academic Resources \(SOAR\) Math](#) is a free, five-week online summer course designed to prepare incoming first-year students for math courses that are prerequisites for numerous courses across majors. Learn more on p. 49.

[The Leland Scholars Program \(LSP\)](#) is a summer bridge experience for incoming frosh who may be the first in their families to attend college or who come from under-resourced high schools or low-income backgrounds. Learn more on p. 49.

Many [math on-ramps](#) are available as a result of the Department of Mathematics' efforts to restructure its curriculum to support student success. For example, *Foundations for Calculus* (Math 18) is a fall quarter course extending the SOAR program. The multivariable math courses that prepare students for quantitative coursework have curricula based on advice from other natural science departments to provide a contemporary approach. These courses all feature free e-books, some of which were written at Stanford and are updated in response to feedback.

Active learning is a hallmark of a Stanford education, and this includes the natural sciences—no falling asleep in lectures! The Department of Physics has been at the forefront for several years; in its introductory courses, you'll do hands-on work with methods proven to be engaging and effective. Following this lead, Stanford's world-class Department of Statistics—which is not even a stand-alone department at many other universities—is reworking courses to feature active learning and real-world content. For example, Data Science students can learn cutting-edge statistical techniques and then immediately apply them at an internship or discuss them during a job interview.



Find and join your

COMMUNITIES





Photos by Andrew Brodhead / Stanford University



More than 7,000 undergraduate students attend Stanford University, and they come from all over the United States and the world. In dining halls, at cultural events, and in dorm lounges, you will meet peers from a diversity of backgrounds, perspectives, and interests and bond with future friends. These multiple dimensions enrich the Stanford experience and create a more vibrant place to live and learn.

Grouped into eight geographically cohesive neighborhoods, Stanford’s campus housing offers a variety of living experiences. These include frosh and multi-year residences, university ethnic and academic theme houses, Greek houses, cooperatives (co-ops), self-operated houses, and apartment-style residences.

Science-related academic theme houses include:

- [Explore Energy House](#): connecting the fields of energy, sustainability, and climate change
- [Outdoor House](#): playing in the natural world, exploring, and promoting conservation
- [Public Service and Civic Engagement House](#): committing to social change

Ethnic theme houses include:

- [Casa Zapata](#): Latine
- [Ujamaa](#): Black Diaspora
- [Muwekma-Tah-Ruk](#): Indigenous
- [Okada](#): Asian American

Did you know?

All undergrads have an advising director from the Office of Academic Advising who supports them throughout their time at Stanford. An advising director is a Stanford employee with a doctoral degree whose full-time job is helping students like you. And their office is in your residential neighborhood!

Stanford offers many opportunities for you to explore identities, including your own, and to learn about the experiences of others. From **community centers and cultural organizations** to sacred spaces and special events, you will have access to resources and support from faculty, staff, and peers as you navigate your time as an undergraduate.

Stanford also has student support offices such as the [First-Generation and/or Low-Income Office \(FLI\)](#), which provides FLI students with critical resources, networks, and services to set them up for success, and the [Office for Religious and Spiritual Life](#), which works to guide, nurture, and enhance spiritual and religious life within the university community.



Students discuss how to solve a math problem during a study session organized by the Stanford University Mathematical Organization (SUMO).

Photo by LiPo Ching / Stanford University

Communities for the science minded

In the natural sciences, you will connect with fellow students through shared experiences in class, creating lasting friendships within your major. If you work on a faculty research project, you will be part of a “family” of scientists working toward a shared goal. There are also a number of groups and organizations that foster community within the sciences through events and mentoring. Examples include:

- [Black in Physics at Stanford](#)
- [Building Up Developing Scientists in the Biosciences \(BioBUDS\)](#)
- [Physics Undergraduate Women and Gender Minorities at Stanford \(PUWMAS\)](#)
- [Society for Advancement of Chicanos/Hispanics and Native Americans in Science \(SACNAS\)](#), Stanford chapter
- [Society of Black Scientists and Engineers](#), Stanford chapter of the National Society of Black Engineers
- [Stanford Biomedical/Biosciences Association for the Interest of Minority Students \(BioAIMS\)](#)
- [Stanford Black Premedical Organization](#)
- [Stanford Chapter of Alpha Chi Sigma](#), a preprofessional co-ed fraternity with members interested in chemistry and various other STEM fields
- [Stanford Chapter of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers](#)
- [Stanford Premedical Association \(SPA\)](#)
- [Stanford Symbolic Systems Society](#)
- [Stanford University Mathematical Organization \(SUMO\)](#)
- [Stanford University Physics Society \(SUPS\)](#)
- [Stanford Women in Math Mentoring \(SWIMM\)](#)



An undergraduate presents research findings during a poster session culminating the *Introduction to Laboratory Research in Neuronal Cell Biology* course.

Photo by LiPo Ching / Stanford University



“The people I met while majoring in Mathematical and Computational Science (MCS) became some of my best friends (and colleagues!). Right now, I’m a consultant for *The Washington Post*, and I work with another MCS major building election models; our work helps people across the country figure out what’s happening on election night.”

John Cherian, '17 Mathematical and Computational Science (now Data Science), Statistics cotermin '17

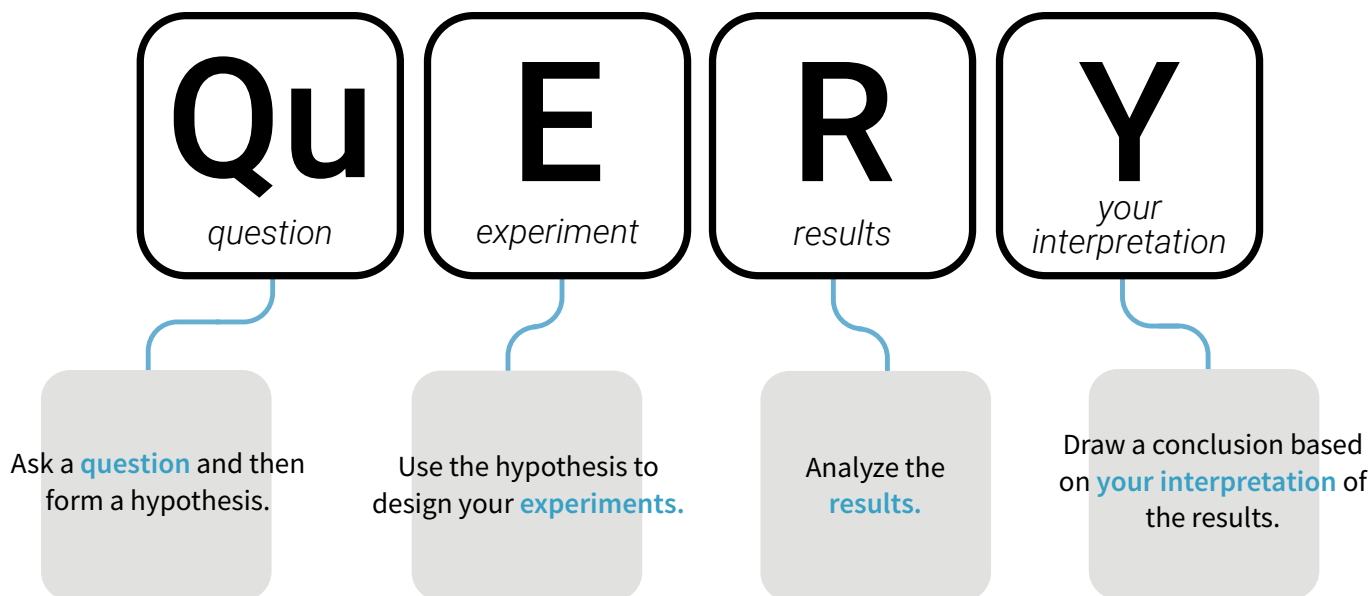
Doctoral student, Department of Statistics, Stanford





Get involved in

RESEARCH



You can participate in cutting-edge research as early as your first year here. Stanford is a major research university where outstanding scholars with deep knowledge work on diverse projects. Collaborating closely with these scientists and getting hands-on experience is one of the best ways to discover your passions.

Natural science research experiences tend to fall into two categories:

Research assistant or volunteer: One of the best ways to get started in research is to join a predefined faculty-led project. This might take the form of volunteering your time or participating in a formal assistantship. Often, the experience involves learning technical skills in the sciences, with graduate students as your mentors. You will also benefit from expert instruction in how to frame research questions; identify, analyze, and interpret sources; and communicate results by contributing to a faculty project. In the process, you will come up with your own ideas and questions, as well as form valuable relationships with faculty and other lab members, which can help you launch a future independent project.

Independent projects: There are many opportunities to develop—and receive funding for—an independent project of your own, under the guidance of a faculty mentor. Senior capstone projects and honors theses are common entry points to conducting independent research. Learn more about independent research and funding for these kinds of projects on p. 37.

The rewards of research

What can you gain from research? In addition to knowledge, skills, and experience, you can earn:

- **course credit.** One way to begin research is to dive into the scientific literature of a topic through a directed reading course with a faculty member. You can also earn course credit for working in a lab. Options vary by department and program.
- **a stipend.** There are a variety of ways to get paid to do research, whether you are supporting a faculty project or leading your own. If work study is part of your financial aid, be sure to mention this option to labs you would like to join.
- **your name on a scientific paper.** If your contribution to a study is significant, you could be listed as a co-author.



How do I get started doing research on campus?

Check out department and program options. Most natural science departments and programs sponsor paid summer undergraduate research programs that are open to first- and second-year students as well as students with more experience, depending on the sponsoring organization. These opportunities are designed to introduce students to research. See p. 45 for more information.

Take a research overview course

These low-intensity courses offer a way to learn about research happening at Stanford in a given discipline:

- *bioBUDS: Building Up Developing Scientists* (quarterly workshops; 2 units each)
- *Exploring Chemical Research at Stanford* (1 unit)
- *Frontiers of Physics Research* (1 unit)

Sign up for email lists and newsletters. Any student can sign up to receive emails from any natural science department or program—even if you're undeclared or have a different major. Student research opportunities are often part of these communications.

Ask your IntroSem professor if they need a research assistant. Introductory Seminars provide great ways for first- and second-year students to form close relationships with faculty.

Check out the [Stanford Undergraduate Research Association \(SURA\)](#), a student group dedicated to helping undergraduates get started in research. It organizes a variety of workshops, mentorship opportunities, faculty dinners, and annual symposia for students to share their work.



Go SOLO. Visit the Stanford On and Off Campus Learning Opportunities (SOLO) [website](#) for a database of hundreds of opportunities from campus research centers, institutes, programs, departments, and other units. You can sort by your interests and set email alerts.

Ask around, and be friendly. As a new Stanford student, it may take time to learn which labs work with undergraduates. Start asking, and follow up on word-of-mouth tips with polite inquiries to faculty about research opportunities in their labs.



**Amelia Woodward, Mathematics '22,
Computer Science coterm '22**
Associate Consultant, Bain and Company

“ I worked in a Department of Chemistry lab on artificial intelligence for molecule discovery. The type of work I do now is very different, but I think the communication skills I developed—articulating hyper-specific topics to the rest of the lab—makes distilling complex information into key insights much easier. I also try to adopt a hypothesis-driven approach in my work now wherever possible even though the topics are different. ”

Other research options

Many Stanford research centers and institutes welcome undergrads. Check out the offerings of these H&S programs and affiliates:

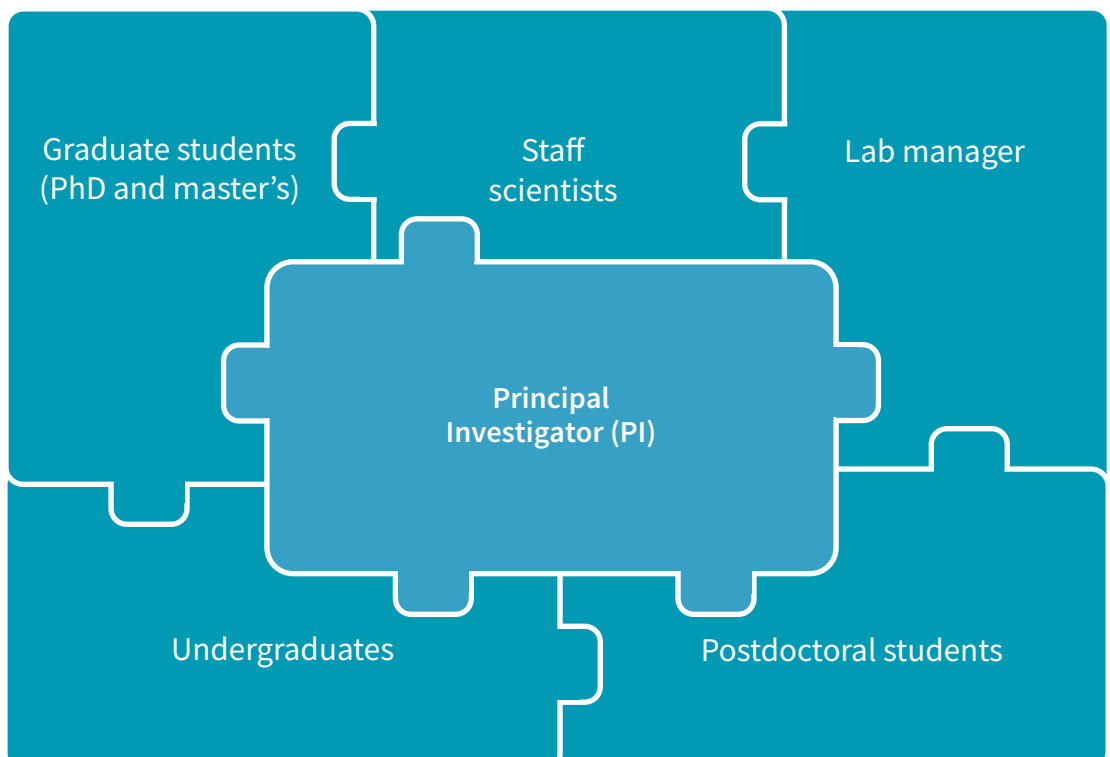
- [Bill Lane Center for the American West](#)
- [Center for Spatial and Textual Analysis \(CESTA\)](#)
- [Hopkins Marine Station](#)
- [Jasper Ridge Biological Preserve 'Ootchamin 'Ooyakma](#)
- [Kavli Institute for Particle Astrophysics and Cosmology \(KIPAC\)](#)
- [Quantum Fundamentals, Architectures, and Machines Q-Farm Initiative](#)
- [Woods Institute for the Environment](#)

Outside of H&S, these entities offer research opportunities for undergrads interested in science:

- [Bio-X](#)
- [Doerr School of Sustainability](#)
- [King Center on Global Development](#)
- [Precourt Institute for Energy](#)
- [Sarafan ChEM-H](#)
- [School of Engineering](#)
- [School of Medicine](#)
- [SLAC National Accelerator Laboratory](#)
- [Stanford Institute for Human-Centered Artificial Intelligence \(HAI\)](#)
- [Wu Tsai Neurosciences Institute](#)

Who works in a lab?

There are more than 300 lab spaces in H&S for natural science research.



How to approach faculty

You can communicate with Stanford professors directly to inquire about research opportunities—or even to invite them out for coffee and a chat. Just keep in mind that faculty members are busy people, so it's wise to approach them in a way that respects their time and shows you're prepared.

- **Do your homework.** Read up on a professor's research, expertise, and career before reaching out to them, and be able to articulate what interests you about their work.
- **Get their name right.** "Dear Professor" in front of their last name is best. Do not write "Dear sir" or "Dear madam."
- **Keep it short.** Emails should be genuine and concise. Be yourself but be brief.
- **Attach your résumé.** Include your Stanford courses and other college-level courses you have taken as well as any other relevant credentials.

Independent research funding and support

Stanford provides support for advanced undergraduates to devise their own independent research projects with mentorship from faculty, who get to share both their passion for teaching and their research expertise.

Independent research can be undertaken at any time, but most projects connect to capstone experiences. Every Stanford senior completes a capstone, a project designed to help them bring together all they have learned in their major and place a personal stamp on their education. Capstones take many forms, including independent research papers, honors theses, and synthesis projects.

Supports for independent research include:

Vice Provost for Undergraduate Education (VPUE)

Explore VPUE's Undergraduate Research and Independent Projects [website](#) for inspiration and guidance on how to get started. The site also details VPUE funding for independent projects:

- Major Grants—funding for full-time summer research
- Small Grants—funding for part-time academic-year research
- VPUE STEM Fellows—a program for sophomores and first-year transfer students interested in pursuing careers in fundamental science research. The program provides a stipend for summer research (after sophomore year) and quarterly stipends to support junior- and senior-year research.

Departments and programs

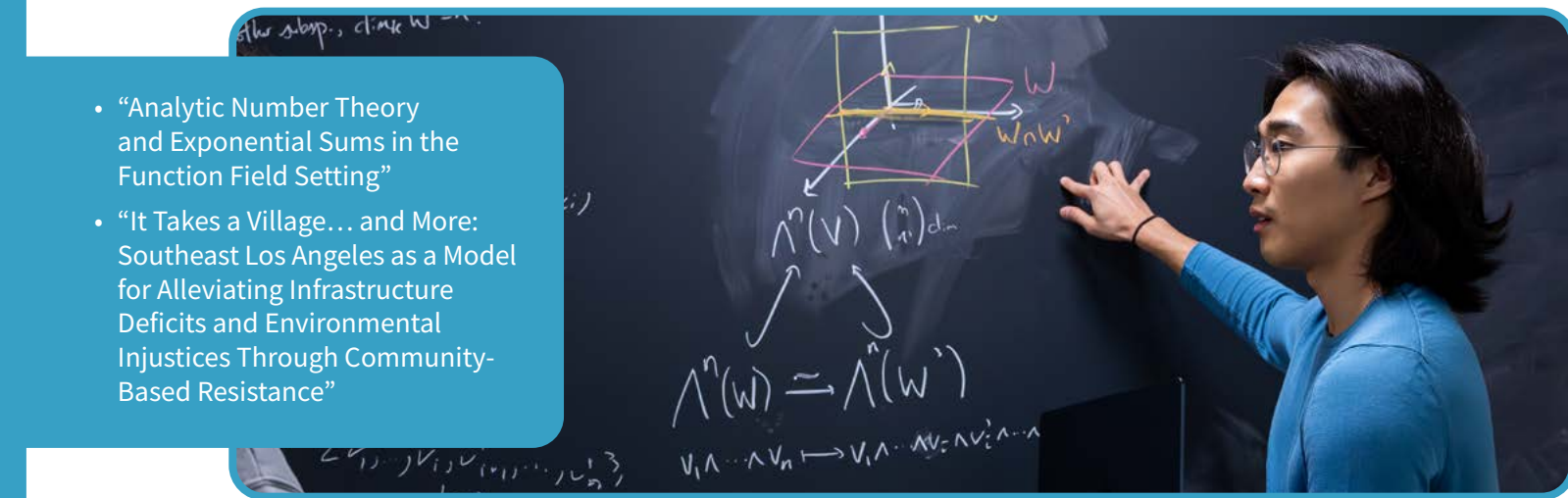
Student services officers/advisers can help you understand capstone requirements and local funding options for independent research. For example, the Symbolic Systems Program awards GEAR funds (Grants for Education and Research) each year to help with expenses including research costs, and the Program in Human Biology supports student projects through its Bingham Innovation Fund. You can also earn academic credit—generally applied to elective units—for independent research outside of capstone requirements.

Independent research projects

Undergrads typically pursue independent research starting in their junior or senior year, as part of their capstone experience. The titles listed below highlight a few of the research projects recently completed by natural science students.



- “Bit by Bit: A Comic Exploring the CS106A/B Curriculum through Storytelling, Visual Thinking, Fractal Gridding, and Concept Personification”
- “Responses and Resilience to Climate Change and Habitat Modification in Urban Lizards”



- “Analytic Number Theory and Exponential Sums in the Function Field Setting”
- “It Takes a Village... and More: Southeast Los Angeles as a Model for Alleviating Infrastructure Deficits and Environmental Injustices Through Community-Based Resistance”



- “From Catastrophe to Opportunity: Transforming Mindsets to Improve Mental Health & Immunity”
- “Mathematical and Computational Studies in Human Evolution and Population Genetics”
- “Novel Techniques to Measure Micron-Scale Gravity”

Photos by LiPo Ching / Stanford University

Discover more

Working across disciplines is fundamental to research at Stanford; life and physical scientists collaborate with each other as well as with humanities and arts faculty and social scientists. This has led to novel theoretical and experimental advances as well as new ways to develop materials, fight disease, and tackle ecological challenges.

This cross-pollination extends to undergraduate experiences: Math students work with faculty in many quantitative fields, Human Biology students collaborate with Stanford School of Medicine researchers, and Data Science students join English faculty projects. Students interested in the intersection of physics, biology, and engineering can pursue research with faculty from the H&S Department of Applied Physics, whose research takes place at Stanford facilities such as the Geballe Laboratory for Advanced Materials (GLAM) and SLAC National Accelerator Laboratory. The combinations are as endless as your curiosity.



The art of life

In the Department of Biology's **Senior Reflection** capstone option, students produce in-depth creative projects that combine their scientific interests with the arts, bringing the natural sciences to a wider audience in intriguing ways. For example, one student filmed a documentary on whitewater backcountry medicine. Other projects have explored biological questions related to Alzheimer's disease, environmental degradation, and the neurochemistry of emotion, and students have worked with media such as dance, fiction, music, photography, sculpture, and more.



“Some of the most exciting future discoveries are going to happen at the interface of disciplines. It is probable that it will take a village to solve some of the most challenging problems that our society is facing today and will face in the future. And it's going to take scientific leaders who are comfortable working at the intersection of fields to address those big challenges.”

Christine Jacobs-Wagner

The Dennis Cunningham Professor and Professor of Biology, Stanford School of Humanities and Sciences
Professor of Microbiology and Immunology, Stanford School of Medicine
Institute Scholar, Sarafan ChEM-H

Beyond the lab

Doing research in the natural sciences isn't all specimens and safety glasses. It can also take the form of interviewing stakeholders, analyzing data, writing code, building models, constructing instruments, and observing the natural world through fieldwork, among many other activities.

Take a look at the various research activities one student was able to take part in on campus as an undergrad.



Xochilt Lorenzo,
'24 Human Biology

The PI for this project does guest lectures in Human Biology, and I was in one. Later, an email went out to the HumBio list about a research opportunity, and I recognized the PI's name. I emailed to express my interest and referenced her lecture.

Research assistant for academic credit:
**Department of Epidemiology & Population Health,
Stanford School of Medicine and Latinas Contra Cancer**

Skills learned:
recruiting study participants, qualitative data analysis, interviewing

I interviewed a Latin American population within the Bay Area about experiences receiving treatment before and during COVID.

★ *Through a Maternal and Child Health Research Institute DRIVE summer program stipend*

★ **Paid research assistant:
Division of Gastroenterology, Hepatology, and Nutrition, Stanford School of Medicine**

Skills learned:
immunofluorescence, CRISPR, Western blotting, qRT-PCR

I worked with pediatric tissue samples. I want to go to med school, so I tried traditional lab research. And I figured out it isn't really the right thing for me, personally.

**Paid research assistant:
Stanford Prevention Policy Modeling Lab, Stanford Health Policy—Freeman Spogli Institute and Stanford School of Medicine**

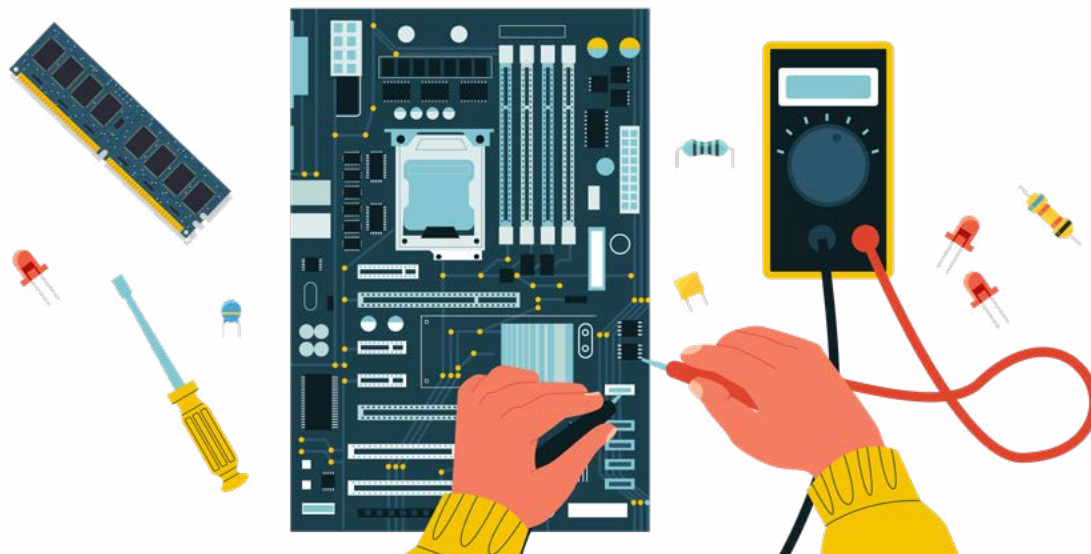
Skills learned:
literature review, setting up studies

Data modeling to produce results that can be operationalized in health care and other sectors

A professor from my previous research knew I was interested in health policy and recommended me to this lab's PI.

Venture off campus

Stanford students get involved in research off campus via internships. With easy access to the industries of Silicon Valley—tech, biotech, and startups doing science in myriad ways—you can experience research in a non-academic setting. See p. 48 for more.



Shoptalk

Do you get a thrill out of hands-on building? Stanford's dynamic research environment often requires the creation of one-of-a-kind equipment intended to perform unique, specific functions, so fabrication could be part of your research experience.

Within the Varian Physics Building, you'll find the **physics student shop**, maintained and supervised by the Department of Physics. The shop is equipped with mills, lathes, drill presses, and saws—all available to students working on funded research projects who have completed the necessary training.

Not interested in research? No problem

Stanford offers a variety of ways to help you build your knowledge and pursue your interest in science outside of research.

Education: Apply for a job as a course assistant for a class you enjoyed or tutor peers via the Stanford Center for Teaching and Learning (CTL) and try out science education. You might discover a love for teaching that leads you to a career inspiring the next generation at the university or K-12 level.

Policy: Pursue science policy experience through projects at the Stanford Woods Institute for the Environment and the Haas Center for Public Service, as well as other campus groups. You can also join the [Cardinal Policy Group](#), a team of undergrads focused on helping California legislators and organizations conduct research and develop evidence-based solutions, including in the health sector.

Communication: Are you adept at translating scientific ideas into writing? Work as an editor for the [Stanford Undergraduate Research Journal](#) or [Intersect: The Stanford Journal of Science, Technology, and Society](#), both run by undergrads. You can also pursue a [Notation in Science](#) to fulfill your capstone requirement for some majors. This program helps you hone your science writing and communication skills and build a portfolio.



PURSUE

new passions

At Stanford, we know that your major and what you choose to study are only part of who you are. Here are a few ways to complement your coursework, try new things, and get involved in campus life:

Participate in public service. The Haas Center for Public Service is the hub for [Cardinal Service](#), a university-wide effort to make service an essential feature of a Stanford education. Choose from more than 150 community-engaged [Cardinal Courses](#) that integrate coursework with hands-on experience. Example courses include *Introduction to Health Science Statistics* and *Environmental Governance and Climate Resilience*.

Or **enroll in Cardinal Quarter** to pursue a full-time summer or quarter-long public service experience with Stanford support. More than 500 funded fellowships, internships, and community work-study opportunities are available.

Study abroad. The [Bing Overseas Studies Program \(BOSP\)](#) enables immersion in different cultures, environments, and languages. With careful planning to ensure your natural science major requirements will be met, you can embark on a quarter-long program in Berlin, Cape Town, Florence, Hong Kong, Istanbul, Kyoto, Madrid, New York, Oxford, Paris, or Santiago. Or **join a three-week faculty-led summer program** in various locations such as Oaxaca or Accra. Several BOSP opportunities even have a natural science component, such as biology in Australia, public health in South Africa, and climate change in Chile.

Live and learn. The [Wrigley Field Program in Hawaii](#) is a biennial interdisciplinary program that brings together biology, cultural anthropology, and Earth systems studies to investigate the natural environment of the Hawaiian Islands as well as the interactions between humans and nature. Spend a full quarter living on the islands of Hawaii, Oahu, and Kauai, taking field-based courses, and working on an independent research project.

Join a [Voluntary Student Organization \(VSO\)](#).

Stanford has hundreds of groups ranging from the Stanford Birdwatching Club and the Stanford Student Space Initiative to Data and Mapping for Society and the Biological Interdisciplinary Open Maker Environment (BIOME).

Discover D.C. Spend a quarter in the U.S. capital as a junior or senior in the [Bing Stanford in Washington \(BSIW\) Program](#). The program helps you find a full-time internship geared toward your interests, and it supports learning with seminars taught by Stanford faculty and policy-makers and with outings showcasing the area. There are opportunities at many D.C.-based science organizations and government entities, including the National Institutes of Health, the National Science Foundation, and the U.S. Department of Energy.

Study at sea. [Stanford@SEA](#) is a biologic and oceanographic program that includes five weeks of classes and labs at Stanford's Hopkins Marine Station in Pacific Grove, California, followed by five weeks aboard the research vessel Robert C. Seamans in the Pacific Ocean. Offered in winter and spring quarters, this academically and physically rigorous experiential learning environment develops knowledge of the ocean as well as leadership and teamwork skills.

Shadow a medical professional. Apply to the [Stanford Immersion in Medicine Series \(SIMS\)](#) program to be paired with a physician mentor for a quarter. You will shadow in clinic and on rounds, observe in the operating room, and attend Grand Rounds lectures, among other activities.

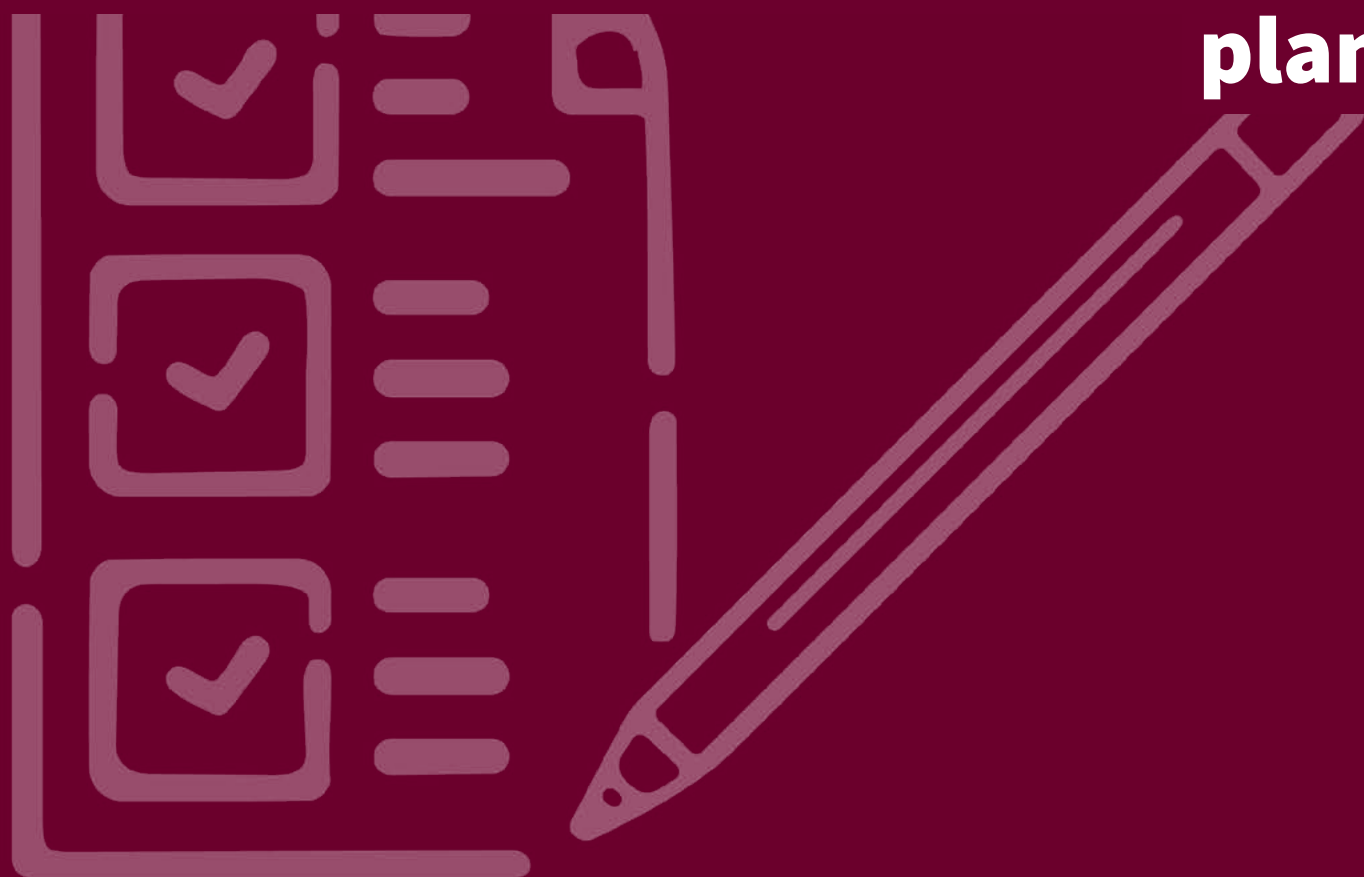




Make

SUMMER

plans





Twice a year, undergraduates get the opportunity to present their research and public service projects to the broader university community at the Symposia of Undergraduate Research and Public Service (SURPS) events.

Photo by LiPo Ching / Stanford University

Summer allows you the freedom to try new things and delve deeper into learning. There are countless opportunities for natural science students on and off campus. The following pages list just some of them.

Summer opportunities via H&S departments and interdisciplinary programs

Most H&S units offer summer research programs that match undergrads with faculty projects for 10-week internships on campus. These are paid research experiences, with financial support from departments and programs, the vice provost for undergraduate education (VPUE), and faculty research funding. Requirements vary by program: Some programs prefer rising juniors who have declared a major, while others encourage frosh and sophomores to apply. H&S summer research programs include:

- [Biology Summer Undergraduate Research Program \(B-SURP\)](#)
- [Human Biology Program Research Exploration \(HB-REX\)](#)
- [Physics/Applied Physics/SLAC National Accelerator Laboratory Summer Research Program](#)
- [Stanford Undergraduate Research Institute in Mathematics \(SURIM\)](#)
- [Summer Undergraduate Research Program in Chemistry](#)
- [Summer Undergraduate Research Program through the Statistics Department \(SURP-Stats\)](#)
- [Symbolic Systems Summer Internship Program](#)



Other summer opportunities on campus

- **Bill Lane Center for the American West** is dedicated to advancing the scholarly and public understanding of the past, present, and future of Western North America. The center coordinates [summer research assistantships and internships for undergraduates](#), from national park conservation to environmental journalism.
- **Bio-X** is Stanford's pioneering interdisciplinary biosciences institute, and it offers paid research for undergraduates via the [Stanford Bio-X Undergraduate Summer Research Program \(Bio-X USRP\)](#). Many H&S natural science faculty are members of Bio-X.
- **Center for Spatial and Textual Analysis (CESTA)** invites [undergraduate interns](#) to apply their developing expertise in data science, geographic information systems, and web development to the humanities and social sciences.
- **Hopkins Internships—Summer Undergraduate Research Funds (HI-SURF)** support full-time [summer undergraduate research](#) as part of faculty projects at Stanford's Hopkins Marine Station, on the Pacific Coast near Monterey.
- **Jasper Ridge Biological Preserve 'Ootchamin 'Ooyakma** hires [undergraduate interns](#) each summer to help collect data to support vegetation management, wildfire resiliency, watershed restoration, and other stewardship research.
- **Sarafan ChEM-H** brings together Stanford chemists, engineers, biologists, and clinicians to understand life at a molecular level and apply that knowledge to improve human health. It offers two programs that include academic-year and summer research: the [Undergraduate Entrepreneurship Program](#) and the [Undergraduate Scholars Program](#).
- **Science Undergraduate Laboratory Internship program**, which is sponsored by the U.S. Department of Energy, welcomes undergraduates to its community and hosts students at Stanford's [Kavli Institute for Particle Astrophysics and Cosmology \(KIPAC\)](#) and [SLAC National Accelerator Laboratory](#).



- **Stanford Data Science for Social Good Fellowships** invite [undergrads](#) to focus full time on a data science project with technical mentorship from Stanford researchers and graduate students. Examples of past projects include detecting human trafficking in Brazil and improving operations at the Stanford Blood Center.
- **Stanford Precourt Institute for Energy’s Summer Undergraduate Program on Energy Research (SUPER)** allows undergraduates to tackle global energy challenges without leaving campus. This is a [paid program](#) focused on real-world solutions.
- **Stanford Summer Fellows Program (SSFP)** brings together a cohort of first-generation and low-income (FLI) students to spend the summer after their first year on campus participating in four weeks of a half-time research experience, four weeks of an intro-ship program, and a summer course for credit. The eight-week program provides full financial support for all participants.
- **Stanford Woods Institute for the Environment's Mentoring Undergraduates in Interdisciplinary Research (MUIR)** invites faculty to nominate students to support their research through this [paid summer program](#).
- **Wu Tsai Human Performance Alliance** offers a research program that introduces undergrads to the field of human performance. Students take a spring course that yields a research proposal. Research is then carried out with alliance mentors during a full-time, [paid summer fellowship](#).
- **Wu Tsai Neurosciences Institute** supports undergrads who want to help advance our understanding of how the brain works (and why sometimes it doesn't) with [Neuroscience Undergraduate Research Opportunity \(NeURO\)](#) fellowships. Students apply with a faculty member who is an institute affiliate and will host the applicant in their lab for the summer.

General internships

- **Handshake** is an [online](#) system that connects students and employers; it lists thousands of internships in a wide range of fields.
- [Rising Bird Fellowships](#) provide funding to allow undergraduates to participate in part- or full-time experiential learning opportunities that would otherwise be unpaid.

Extending academic-year experiences

- **Bing Overseas Studies Program (BOSP) internships** are available through many of its global centers to help students deepen their cultural understanding and gain practical, professional experience while working in another country. Students can pursue an internship in a location where they have done a BOSP program.
- **Bing Stanford in Washington Program (BSIW)** students can extend their academic-year internships in the nation's capital through the summer with support from the program's Bing Summer Fellowship stipend.
- **The Institute for Human-Centered Artificial Intelligence (HAI)** and **the McCoy Family Center for Ethics in Society** offer a [Tech Ethics and Policy Fellowship](#) for Stanford undergraduates to engage in the technology, ethics, and policy field as it intersects with public policy and social impact. The program includes a spring-quarter course followed by a paid summer opportunity at a technology company, civil society organization, federal agency, or congressional office.

Internships abroad

- **Stanford Global Studies (SGS)** offers students an opportunity to extend classroom learning to immersive, cultural, and professional experiences through the [Global Studies Internship Program](#), which has taken students everywhere from a Taiwanese hospital to a French plasma research group.



Christopher Cross,
'22 Symbolic Systems
Computer Science coterm '23
Quantitative Research Analyst—Commodities
Citadel

“ Working in the self-driving car industry at PlusAI in Beijing as part of the Stanford Global Studies program was amazing! I got real-world experience programming software using real data taken by sensors from the engineering team as well as theoretical experience discussing machine learning models with experienced researchers. I'm glad that Stanford gave me the opportunity to witness what my skills as a computer scientist could bring outside the context of the tech world of Silicon Valley. Despite having traveled a lot during my childhood, working in a different culture was a unique experience that opened my eyes as a college student. ”

Summer programs for incoming first-year students

[The Leland Scholars Program \(LSP\)](#) is a fully funded summer bridge experience for incoming frosh who may be the first in their families to attend college or who come from under-resourced high schools or low-income backgrounds. A cohort of 80 students comes to campus in August to participate in courses, workshops, and community-building activities to support the academic and social transition to Stanford. As part of this program, you take two courses—a research project course and a writing, math problem-solving, or chemistry problem-solving course—and participate in field trips, study halls, and talent shows to develop a sense of belonging within your cohort. There is also a virtual option. LSP continues throughout the first two academic quarters as 1-unit weekly seminars.

[Stanford Online Academic Resources \(SOAR\) Math](#) is a free five-week online summer course designed for incoming first-year students. The goal is to prepare you for math courses, particularly single-variable calculus, that are prerequisites for numerous STEM courses across majors. For English language learners, SOAR is a chance to practice math in English. There is also a SOAR Writing course designed to boost confidence in academic writing.

Note: You can apply to both LSP and SOAR with the same application. If you are selected, you will receive an offer to participate in one program.

September programs

- [Sophomore College \(SoCo\)](#) is an immersive, three-week academic opportunity for incoming sophomores. Students arrive on campus before the start of fall quarter in early September and join a cohort of 12-16 students embarking on intensive study of one subject. Recent SoCo courses included *Artificial Intelligence and Deliberative Democracy*; *Natural History, Marine Biology, and Research*; and *Needs Finding in Healthcare*.
- [Bing Honors College](#) is a two-week program that runs the first two weeks of September for students, typically rising seniors, actively engaged in researching and drafting their honors theses. This is an uninterrupted time to delve into thesis writing before the academic year begins, with close supervision from a faculty leader and a chance to strengthen your intellectual community with students in your discipline and across fields.

Explore graduate education

Q: What is graduate school, exactly?

A: Any education completed after your bachelor's degree is considered graduate education. This could look like: completing a master's degree to increase your earning potential and competitiveness; enrolling in professional school to become a doctor, dentist, physical therapist, or lawyer; or writing a doctoral thesis and earning a doctorate (PhD), a process that typically takes at least four or five years, en route to an academic career.

Q: And how do I know if it's the right fit for me?

A: Some undergraduates know they want to work in academia, so graduate school is a natural fit. Others might want to work in an industry where an advanced degree is a prerequisite for employment. Ask your faculty mentors for guidance about what level of education is necessary for your dream career.

Sometimes students enroll in graduate school to immerse themselves deeply in research they find especially compelling. Graduate school hones a layer of critical thinking that emphasizes writing and communicating about a discipline. It forces you not only to learn about a favorite subject, but also how to explain it to others.

Q: What is a coterm?

A: A coterminal student, or [coterm](#), is a Stanford undergraduate who has applied to complete a bachelor's and master's education simultaneously, overlapping the degrees by at least one quarter. Many students complete coterm degrees in fields related to their undergraduate majors, and others extend their skills into new fields.

See the complete list of coterminal degrees on the [Stanford Student Services website](#).

Some natural science coterm programs include:

- Applied and Engineering Physics
- Biomedical Data Science
- Statistics
- Symbolic Systems

Whether you have your mind made up about graduate education or are unsure what comes next, consider these suggestions:

- **Start with the online [H&S Guide on Getting Into Grad School](#).** If you're a physics student, connect with the Stanford [Physics, Identity, and Equity \(PIE\) program](#), which encourages candidates from underrepresented groups in physics who are interested in pursuing a doctoral degree.
- **Talk to your TAs and graduate students in your circle.** Your current life stage is still fresh for them, and they will likely have sound advice.
- **Reach out to your professors and lecturers for references, the sooner the better.** Graduate school requires—you guessed it—letters of recommendation. To be courteous, ask for letters at least a month in advance of when you need them; two months in advance is better (your professors are likely writing letters for multiple students). Even if you don't plan to go to graduate school immediately, ask for letters of recommendation during or shortly after your time at Stanford, while professors' knowledge of you is fresh.
- **Explore the [Stanford Alumni Mentoring \(SAM\) network](#).** Who has your dream job? Consider asking for 15 minutes of their time to find out how they got there.
- **Take a serious look at your finances.** Some professional schools will offer financial aid, though many students depend on loans. Most doctoral programs will offer funding while you pursue your doctoral degree in exchange for doing research or teaching. Education is a valuable investment, but you should understand what you are committing to for the years or decades ahead.



So Young Lee, '20 Chemistry
Doctoral student in chemistry,
Massachusetts Institute of Technology

Beyond the bachelor's

Natural science alumni are well prepared for success in graduate and professional school and are regularly accepted into top programs, including those at Stanford. For example, recent graduates have gone on to attend:

- Harvard University, math doctoral program
- Imperial College of London, aerospace engineering master's program
- Massachusetts Institute of Technology, math and chemistry doctoral programs
- Princeton University, biology, chemistry, and physics doctoral programs
- Stanford engineering, law, and medical schools as well as H&S graduate programs

“ I worked in a lab for most of my time at Stanford. I was able to publish a second-author paper (I was the second author named, indicating that I made a significant contribution to the study), make close connections with my graduate student mentors, and present a poster at a conference. Looking up to graduate students made me pursue a PhD. Now at MIT, I am applying the skills and lab techniques I learned at Stanford to my graduate research on chemical probes and strategies to study mycobacterial cell wall assembly. ”

Career resources

How do I know which career is right for me? How do I start preparing to find a job?

Knowing yourself better will help you discern next steps no matter what profession you hope to pursue. The Stanford community is here to help you succeed. Your first step is learning where to ask for advice. To connect the dots, you can take time as an undergraduate to do the following:

1. **Learn more about yourself**, including your skills, values, and workplace preferences. Coaching appointments and career self-assessments, such as the [Meaningful Work Kit](#) (MWK), can help.
2. **Learn about a wide range of possible industries and careers**, especially by connecting with professionals through informational interviews, career workshops, alumni mentoring, and internships. Look for strong matches with your own skills and goals.
3. **Create the connection**. Develop a narrative for prospective employers about how your coursework and experience ideally prepare you for their role. Acquire any training you might be missing through classes, internships, and extracurricular activities. Learn the mechanics of the job search (résumés, cover letters, interviews, timing, etc.) and how to leverage online networks such as LinkedIn, the [Alumni Directory](#), and [Stanford Alumni Mentoring](#) (SAM).
4. **Practice, practice, practice**. Interviewing is a skill, and like anything, you improve with repetition. CareerEd provides access to an interview training curriculum and video practice via [Big Interview](#).

Did you know?

Stanford Career Education (CareerEd) and the [Stanford Alumni Association](#) now offer career development support for alumni for five years after graduation, including connections and career education.

Check these out for guidance during all four steps:

- [Stanford Career Education \(CareerEd\)](#)
- [Haas Center for Public Service](#)—specialized resources for nonprofit and government careers
- [Academic Advising](#)—specialist advisers for medical, law, and business school applicants
- [Stanford Life Design Lab](#)—popular courses that help you think through your skills and goals



More resources

- School of Humanities and Sciences: humsci.stanford.edu
- Vice Provost for Undergraduate Education: vpue.stanford.edu
- Academic Advising: advising.stanford.edu
- STEM Roadmap to Your First Year: ughb.stanford.edu/stem-roadmap
- School of Engineering: engineering.stanford.edu
- Doerr School of Sustainability: sustainability.stanford.edu
- School of Medicine: med.stanford.edu/school
- Residential Education (ResEd): resed.stanford.edu
- Student Affairs: studentaffairs.stanford.edu
- Student Services: studentservices.stanford.edu
- Stanford Career Education (CareerEd): careered.stanford.edu



Deborah Stevenson,
Stanford Associate Vice Provost
and Dean of Academic Advising

“Stanford is a place where you can pursue your chosen major while exploring your passion and interests. We encourage students to learn about things they love even if what they’re learning doesn’t obviously relate to their major.”

Students, spend time with your academic adviser, take courses that spark your curiosity, talk to your professors and instructors, visit Career Education, and connect with Stanford alumni. You don’t need to have it all figured out in your first quarter or even your first year.”

Notes

Stanford Classes in the Natural Sciences