THE DAVID ROCKEFELLER GRADUATE PROGRAM
At a Glance

**THE UNIVERSITY COMMUNITY**
- 75 heads of laboratories
- 200 research and clinical scientists
- 325 postdoctoral researchers
- 1,050 clinicians, technicians and staff
- 185 Ph.D. and M.D.-Ph.D. students
- 1,150 alumni

**AREAS OF RESEARCH**
- Chemical and Structural Biology
- Genetics and Genomics
- Immunology, Virology and Microbiology
- Medical Sciences, Systems Physiology and Human Genetics
- Molecular and Cell Biology
- Neurosciences and Behavior
- Organismal Biology, Evolution, Ethology and Ecology
- Physical, Mathematical and Computational Biology
- Stem Cells, Development, Regeneration and Aging

**FACULTY HONORS**
- 24 Nobel laureates
- 21 Albert Lasker Awardees
- 18 Canada Gairdner Awardees
- 20 National Medal of Science recipients
- 33 current members of the National Academy of Sciences
- 17 current members of the Institute of Medicine

**CLINICAL CONDITIONS UNDER STUDY**
- Infectious diseases, such as hepatitis, HIV/AIDS and hospital-acquired MRSA
- Neurologic disorders, including Alzheimer’s, Parkinson’s, epilepsy and ALS
- Autoimmune diseases, such as multiple sclerosis, asthma, lupus and type 1 diabetes
- Cancers, including breast, colon and brain tumors
- Cardiovascular and metabolic disorders, including heart disease, stroke, diabetes and obesity
- Psychiatric and behavioral disorders, such as schizophrenia, depression and drug addiction
- Genetic disorders, such as cystic fibrosis and inherited immunodeficiencies
- Developmental disabilities, such as autism spectrum disorders, ADHD and fragile X
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PRESIDENT’S MESSAGE
For me, science was love at first sight.

People fall in love with science at different times in their lives and for different reasons, but the common denominator is an excitement and curiosity to understand the world around them. My work in neuroscience — understanding the brain and wanting to know how to deconstruct and resolve its complexity — fueled my career initially and still motivates me today. But whether it be neuroscience, genetics, biochemistry, immunology or another field of biomedicine, it's this fundamental curiosity that Rockefeller's graduate program is designed to nurture. It is also what drives Rockefeller's world-class faculty, who push the boundaries of knowledge with their innovative approaches to scientific discovery.

In an environment that aims to foster independence and freedom, both students and faculty chart their own paths. For faculty, this culture has led to pioneering discoveries with the potential to eradicate disease and reduce suffering for millions. For students, it provides flexibility to work with more than one professor on their chosen thesis topic. For both, it enables collaboration and interdisciplinary research, which are the university's hallmarks.

Rockefeller is truly unique, as it exists solely to support science; thus, every aspect of the administration is dedicated to the success of our scientists. In fact, many members of our scientific administration are active faculty members, with active labs. Vital to faculty and student success are modern and well-equipped buildings, such as the new Collaborative Research Center. We're also well served by scientific resource centers that provide state-of-the-art research support services.

At Rockefeller, we believe students should learn science by doing science, shoulder to shoulder with some of the world's leading researchers, who guide and mentor them every step of the way. As a student at Rockefeller, you'll be part of a diverse and supportive community that is a haven for creative, independent thinkers. Your time will be spent on an extraordinary campus, a green oasis nestled in one of the most exciting cities in the world.

Deciding where to pursue your graduate training is not easy, as there are many outstanding institutions from which to choose. However, Rockefeller stands out among its peers, providing developing scientists an unparalleled educational experience. We hope you'll join us.

Marc Tessier-Lavigne, President
DEAN’S MESSAGE
Rockefeller has a graduate program unlike any in the world.

Since its beginning more than 50 years ago, five principles have guided the program:

- **Recruit the best students, regardless of citizenship.** International diversity is both intellectually and culturally stimulating. Our current student population consists of approximately 185 students from 34 countries, a range made possible by significant private support.

- **Provide a flexible academic program.** Students have diverse interests and needs. We support individual development by giving students the freedom to design their own curricula. They fulfill credit requirements with courses of interest and may conduct rotations or immediately affiliate with a lab.

- **Provide generous professional and personal support.** Relieving worries about practical matters allows our students more time to be creative scientifically. They receive a stipend, health, dental and vision insurance, subsidized housing and an annual research allowance for travel and lab support.

- **Strongly encourage interactions.** Students are often the catalyst for collaborations between labs, and some of the most revolutionary ideas span disciplines. To foster interactions, we have an annual student retreat organized and run by students, as well as numerous lecture series featuring speakers from around the world.

- **Ensure careful mentoring.** The freedom of our graduate program requires supportive advice and mentoring. Counsel is provided by the Dean’s Office and, in later years, by a research adviser and faculty committee.

The program has been an extraordinary success. Of more than 1,100 graduates, two have won the Nobel Prize and 29 are members of the United States National Academy of Sciences, and our alumni occupy influential positions in academia, industry and many other fields.

Graduate school is an important step in becoming a professional scientist. Although it has a well-defined end point, it really is just a beginning. All of the things that go into becoming a scientist — learning new ideas, perfecting new experimental techniques, refining analytical abilities — are lifelong endeavors. Our goal at Rockefeller is to equip you with both the skills and the self-confidence to begin your journey.

Sidney Strickland, Dean
ACADEMIC PROGRAM
Rockefeller’s Ph.D. program is based on the concept of learning science by doing science, and our 75 laboratories are at the center of the Ph.D. training program. The labs, each headed by a tenured or tenure-track faculty member, study a wide range of biomedical and related sciences, including biochemistry, genomics, immunology, microbiology, physiology, molecular and cell biology, neuroscience, evolution and ecology, developmental biology and biophysics.

Rockefeller is a leader in each of these fields, and discoveries made at the university — many by graduate students — often resonate throughout the international scientific community. A study conducted by Leiden University in Belgium recently found that Rockefeller had the greatest scientific impact of 750 institutions it evaluated internationally, as measured by their output of frequently cited publications.

“Rockefeller provides research-based training in an unparalleled intellectual environment. From the day new students join the program, they become integrated into our community, start doing research inspired by their own interest and drive the Rockefeller mission of making game-changing discoveries.”

Titia de Lange, Professor
Rockefeller’s Ph.D. program promotes strong mentoring relationships. The collegial nature of the laboratory environment links younger students not only to faculty but to past and present members of the lab — alumni, postdocs and collaborators. Rockefeller faculty regard students as colleagues and work to create an open environment where ideas and independence are encouraged. The partnerships that result from these relationships are not only the basis on which our scientific education is built, they are the engine that drives the discovery process. Many collaborations produce exceptional results that lead to publication in prominent journals. And the relationships formed within laboratories often lead to lifelong associations.

The graduate program admitted its first students in 1955, and since then over 1,100 scientists have received degrees from Rockefeller. However, our roots as a biomedical institution reach back to 1901. Founded by John D. Rockefeller as The Rockefeller Institute for Medical Research, we were the first institution in the United States devoted solely to understanding the causes of disease. For over 110 years, biomedical science has been Rockefeller’s singular priority.

WARING “BUCK” TRIBLE
Second-year student

Waring “Buck” Trible has been fascinated by ants since his days as a camp counselor in the Appalachian Mountains of Virginia, where he was tasked with teaching the kids about insects. At the University of Georgia he majored in ecology and entomology and became increasingly intrigued by using genetics to understand evolution. That interest brought Buck to Daniel Kronauer’s lab, where he plans to use a new tool for genome engineering, called CRISPR, to study caste determination, the process that governs whether ant larvae grow up into workers, soldiers or queens, and how that factors into their roles in the colony.

“It’s an exciting time to do genetics, and Rockefeller is at the forefront,” says Buck. “Profound discoveries are going to be made, and I want to be a part of that.”

VICKY MOYA
Third-year student

Vicky Moya can’t imagine being anything but a scientist. “To be able to design an experiment that addresses very specific questions, carry it out, and see the results — I don’t see how any other type of work could possibly be as much fun,” she says. Vicky studied neurobiology at the University of Texas, Austin, and rotated through several neuroscience labs at Rockefeller before settling in Nathaniel Heintz’s, where she uses a variety of tools to target neuron populations in the neurodegenerative disorder ALS.

Vicky, who has a competitive fellowship from the National Science Foundation, takes full advantage of Rockefeller’s scientific resource centers, which provide access to technologies and expertise that individual labs can’t: “For almost any type of biology that you could think of doing, there is a facility here with a dedicated group of professionals ready to help you,” she says.
The Student Experience

Rockefeller graduate students are part of a diverse community of over 2,000, including students, postdocs, faculty and administrative staff. Our location adjacent to Weill Cornell Medical College, NewYork-Presbyterian Hospital and Memorial Sloan Kettering Cancer Center puts us at an epicenter of scientific activity. Our students truly have the best of both worlds: a personal, highly flexible training program and access to a broad range of world-class collaborators and resources.

While formal coursework is minimal, several classes each semester offer foundations in particular specialties, and three required courses taken during the first year serve to develop students’ abilities to critically interpret scientific data, to promote awareness of research ethics and to introduce students to research going on in the university’s labs. Beyond the scheduled curriculum, additional seminars and tutorials are available based on demand.

Students who arrive with a specific mentor or project in mind may immediately join a laboratory; students who prefer to explore may rotate through several laboratories.

Cameron Bess
AAAS Executive Branch Science and Technology Policy Fellow; USAID U.S. Global Development Lab

If Cameron Bess’s life were a scientific journal, he would have a high impact factor. Throughout his career, the goal has been to further his reach. “What really attracted me to Rockefeller was the freedom to chart your own course,” Cameron says. “You get to be a scientific entrepreneur, exploring what excites you.”

As a graduate student in Sanford Simon’s lab, what excited Cameron was the opportunity to study viruses that affect millions. His training led to an NIH postdoc in which Cameron traveled to Mali to research malaria and teach new experimental and microscopy techniques.

And now, as an AAAS science and technology policy fellow at USAID, Cameron has extended his impact even further. He’s connecting researchers in more than 20 developing countries with NSF- and NIH-supported scientists and resources for studies on food security, disaster mitigation, child health and infectious disease.

Kang Liu
Assistant Professor, Department of Microbiology and Immunology, Columbia University

Kang Liu’s experience at Rockefeller was, to use her word, transformative. Kang joined Ralph Steinman’s lab as a graduate student in 1998, studying dendritic cells with the scientist who discovered them, and then spent six years in Michel C. Nussenzweig’s lab as a postdoc and research associate, sharpening her skills in molecular immunology.

Both labs, she says, were nurturing and encouraging in such a way that she was able to blossom as a scientist. “Both Ralph and Michel encouraged me to trust my instincts and pursue my intuition,” Kang says. The university also supported her when she became a mother, with affordable family housing and day care.

Kang’s confidence as a mentor is evident in her new position in the department of microbiology and immunology at Columbia University. “At Rockefeller, there is a tremendous effort to nurture students’ curiosity,” she says. “I hope to inspire that same confidence in my students.”
During the first year in order to gain exposure to different areas of research. Students choose a laboratory by the end of their first year and present a thesis proposal before the end of their second year.

Students are closely mentored by their advisor and the Dean's Office as their research progresses. As students near the end of their studies, they defend their thesis before a panel of faculty members and present their work to the full Rockefeller community.

**Student Achievements**

Like the faculty they train with, Rockefeller's students are some of the brightest and most accomplished in the world, and they have been recognized with numerous national awards and honors. An impressive 10 students have received the Harold M. Weintraub Graduate Student Award for quality, originality and significance of thesis research in the biological sciences. The Weintraub Award, begun in 2000, is considered one of the most prestigious graduate student prizes in the U.S., and approximately 15 are given each year. Rockefeller students also have a long-standing record of obtaining competitive fellowships from the National Institutes of Health and the National Science Foundation, among others, to fund their graduate training.

**Career Opportunities**

A scientific education at Rockefeller can be the first step in a stellar career in academic research, or it can serve as the basis for work in other areas. While the majority of Rockefeller's graduates go on to careers in research or teaching, others are drawn to the pharmaceutical and technology industries, businesses or nonprofit organizations.

The university works to expose its students to the career opportunities available to them after graduation and to help them transition to postdoctoral fellowships or other positions. Seminars bring experts in various fields to campus to discuss their work and their career paths. Regular science career symposia also connect students with leaders in fields including academia, industry, public policy and media and provide workshops on résumé writing and job interviews.
Tri-Institutional Graduate Programs

In addition to its own Ph.D. program, Rockefeller participates in two specialized graduate training programs with its neighboring institutions, Weill Cornell Medical College and Memorial Sloan Kettering Cancer Center.

The Tri-Institutional M.D.-Ph.D. Program trains physician-scientists to bridge the gap between laboratory research and clinical medicine. Approximately 15 students enroll in this highly competitive program each year. They spend their first two years in medical school, then complete graduate studies and thesis research at one of the three institutions, and finally reenter medical school and perform clinical rotations. Graduates typically go on to pursue clinical and advanced research training, and many alumni of the program occupy research, clinical and administrative positions at the nation’s top medical schools and academic research centers. For more information visit weill.cornell.edu/mdphd.

The Tri-Institutional Training Program in Chemical Biology trains graduate students to use chemical approaches and technologies to answer fundamental biological questions. Students receive graduate-level training in both chemistry and biology and conduct thesis research in any of nearly 50 participating labs at the three institutions. For more information visit chembio.triiprograms.org.

The Tri-Institutional programs have separate admissions processes.

HELEN BATEUP
Assistant Professor, Department of Molecular and Cell Biology and Helen Wills Neuroscience Institute, University of California, Berkeley

DIRK HOCKEMEYER
Assistant Professor, Department of Molecular and Cell Biology, University of California, Berkeley

It was the science that brought Helen Bateup and Dirk Hockemeyer to Rockefeller in the early 2000s. Helen, from Pennsylvania, and Dirk, from Germany, were drawn by the opportunity to conduct innovative research and work with the scientists conducting it. “I liked that the faculty, these very distinguished scientists, treated their students as scientific equals,” says Helen. “We were valued and respected.”

But it was an elevator ride — Dirk, in Titia de Lange’s lab, worked one floor above Helen, who was in Paul Greengard’s — that brought the two together. Now the couple is just as close geographically and even closer scientifically. Both joined UC Berkeley in 2013 to begin labs of their own. Dirk studies telomeres — repetitive sequences of DNA that protect the ends of linear chromosomes from molecular attack — and their role in tumors, aging and tissue homeostasis. Helen is researching how genetic mutations associated with neurodevelopmental disorders such as epilepsy and autism cause changes in the synapses between neurons and the circuits that connect them.

In addition, they are working on a joint project to establish a neuronal model of neurodevelopmental disorders in human cells. The work takes advantage of Helen’s background in mouse models of neurobiology and Dirk’s expertise with induced pluripotent stem cells.

Both Dirk and Helen credit their time at Rockefeller for teaching them how to be mentors and how to run a lab. “I think we both learned that to be a good role model, you have to work as hard as you expect the people in your lab to work,” says Dirk. “Rockefeller opened our eyes to how science could and should be done.”
FACULTY AND RESEARCH
Whether studying individual cells, model organisms, human beings or entire populations, Rockefeller’s scientists are working to explore the inner workings of life and are attempting to unravel the causes of disease. The questions they ask and the experiments they perform, although they vary, are all in service of expanding knowledge, and the results they generate have opened up new fields and overturned long-held dogma. It’s this emphasis on inquiry and discovery above all else that sets Rockefeller apart from its peers and that has sustained its excellence over more than 100 years. At Rockefeller, the formula for success is to hire only the best scientists and to give them the resources and freedom they need to do their best work. The result is a faculty that’s passionate, curious, energetic and brilliant — Rockefeller faculty have won an impressive 24 scientific Nobel Prizes in 113 years, more than all but three countries.

“For more than a century, The Rockefeller University has fulfilled the mission my grandfather had envisioned, to produce discoveries that would benefit humankind. It has become one of the world’s great medical research institutions.”

David Rockefeller, Life Trustee

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Faculty Mentors

At Rockefeller, students have 75 labs to choose from and are free to explore their interests before settling on one. Regardless of which lab they choose, students will be sharing the bench with the world’s preeminent scientists, participating in the innovative research that has earned Rockefeller’s faculty its international reputation.

Rockefeller faculty members have relatively little to distract them from their work. The university’s small size and lack of departmental structure mean that faculty have fewer administrative duties. As a result, they are able to spend most of their time running their labs and serving as collaborators and mentors. They also benefit from a culture that supports high-risk projects and rewards intellectual curiosity.

Taken as a whole, the faculty has a record of achievement that is virtually unmatched in academia. In addition to its Nobel Prize winners, five of which are on the current faculty, Rockefeller scientists have been recognized with 20 National Medal of Science awards, 18 Canada Gairdner International Awards and 21 Albert Lasker Medical Research Awards. More than one-third of the current faculty are members of the prestigious National Academy of Sciences, and 17 have been elected to the Institute of Medicine. Rockefeller’s junior faculty members also have a remarkable record of obtaining competitive grants and receiving coveted fellowships that recognize promise and leadership in research.

Award-winning discoveries include the discovery of the hormone leptin, which is critical to the body’s ability to regulate its weight; uncovering how stem cells in the skin undergo a cycle of self-renewal; elucidating how ion channel proteins help generate nerve impulses; and the discovery of peptide signals that govern the transport of proteins inside cells.

New Rockefeller faculty members are principally recruited via an open search mechanism that seeks to identify the most talented scientists regardless of their field. Faculty from all disciplines participate in the search process, and faculty candidate seminars are open to the entire campus. Two searches are run each year, in the spring and fall.
Basic Science

Basic biomedical science — the study of living systems in order to generate knowledge about their fundamental processes — is Rockefeller’s specialty. Because it underlies many of the medical advances being made in other fields, basic science plays a critical role in the advancement of human health and in the fight against disease. Studies of fundamental biological processes are adding to our understanding of cancer, acute and chronic infections, neuropsychiatric and neurodegenerative diseases, and autoimmune disorders, as well as the constellation of related metabolic conditions that include obesity, diabetes and cardiovascular disease.

Rockefeller views basic research as the surest route to transformative advances in medicine, and its vision is to be a world leader in the life sciences and biomedical research through the generation of transformative discoveries. It especially encourages fundamental research that is novel and intrinsically risky but has the potential to be revolutionary. Such science can make creative leaps, achieving unprecedented new levels of understanding, and can seed completely new fields of inquiry.

Clinical and Translational Research

The connection between basic research and clinical investigation is an essential feature of Rockefeller’s culture. While it is well recognized that discoveries at the bench can lead to effective new therapies, it is equally true that research that probes the cause of disease in patients can lead to important discoveries about the basic processes of life. At Rockefeller, moving research between lab and clinic is facilitated by one of the country’s only stand-alone research hospitals.

An independent, central unit of the university since its opening in 1910, The Rockefeller University Hospital provides a vital facility to study the scientific basis of disease diagnosis, treatment and prevention. It provides infrastructure, services and support to allow scientists to explore the medical significance of their work without the barriers and bureaucracy typical of large teaching hospitals. Close to half of the university’s labs are now conducting protocols that involve human subjects, and of these labs, more than a third are headed by Ph.D. scientists, not medical doctors.

The hospital’s unique environment is well suited for long inpatient stays, facilitating the study of pathologic

RESOURCE CENTERS

The university’s in-house resource centers provide centralized, high-quality laboratory services for the university community at cost-effective rates. In addition, some common lab services, including DNA sequencing, are provided by outside companies under contract to the university.

BIO-IMAGING RESOURCE CENTER
COMPARATIVE BIOSCIENCE CENTER
CBC IMAGING RESOURCES
GENE TARGETING RESOURCE CENTER
LABORATORY OF COMPARATIVE PATHOLOGY AND GEM PHENOTYPING CORE
TRANSGENIC SERVICES LABORATORY
ELECTRON MICROSCOPY RESOURCE CENTER
FLOW CYTOMETRY RESOURCE CENTER
GENOMICS RESOURCE CENTER
GLASSWASHING SERVICES
HIGH ENERGY PHYSICS INSTRUMENT SHOP
HIGH THROUGHPUT AND SPECTROSCOPY RESOURCE CENTER
MONOCLINAL ANTIBODY CORE FACILITY
PRECISION FABRICATION FACILITY
PROTEOMICS RESOURCE CENTER
STEM CELL DERIVATION CORE
STRUCTURAL BIOLOGY RESOURCE CENTER
TRANSLATIONAL TECHNOLOGY CORE LABORATORY

TRI-INSTITUTIONAL & EXTERNAL COLLABORATIONS

NEW YORK GENOME CENTER
NEW YORK STRUCTURAL BIOLOGY CENTER
TRI-INSTITUTIONAL THERAPEUTICS DISCOVERY INSTITUTE
processes in patients and normal physiological processes in healthy volunteers. Funded by both The Rockefeller University and a Clinical and Translational Science Award from the National Center for Advancing Translational Sciences of the National Institutes of Health, the hospital's facilities include a 20-bed inpatient unit, a procedure suite suitable for endoscopy and biopsy procedures, a sleep study unit, a broadband/narrowband ultraviolet lightbox and a digital radiology suite. The Robert and Harriet Heilbrunn Outpatient Research Center, opened in 2003, includes nine examination rooms, two consultation rooms and two phlebotomy rooms.

Research at the hospital, which celebrated its centennial in 2010, has resulted in some major contributions to public health, including development of the oxygen chamber, methods for blood transfusion and storage, methadone therapy and multiple-drug treatment of HIV infection.

Research Areas

To help reduce artificial barriers and provide its investigators with the greatest degree of freedom, Rockefeller does not have academic departments. Organizationally, the university's laboratories are loosely clustered into nine distinct research areas; these research areas, some of which were pioneered at Rockefeller, represent the broad fields of study that are being pursued most actively by the university's scientists.

**Chemical and Structural Biology:** the identification and characterization of molecules and molecular assemblies involved in biological processes

**Genetics and Genomics:** work on the genetic basis of human disease and genetic studies of fundamental biological processes

**Immunology, Virology and Microbiology:** the study of the molecular and cellular biology of the immune system as well as microbial physiology and pathogenesis, parasitology, tumor immunology and vaccine development

**Medical Sciences, Systems Physiology and Human Genetics:** the translation of novel scientific insights into approaches for preventing, diagnosing and treating disease

**Molecular and Cell Biology:** research on how cellular and extracellular macromolecules interact and communicate with each other to give rise to specific functions and responses

**Neurosciences and Behavior:** the study of the nervous system, including molecules that mediate neural function, cellular ensembles engaged in high-level sensory processing, and mechanistic links between the brain and behavior

**Organismal Biology, Evolution, Ethology and Ecology:** studies of the biology of organisms as well as on the evolution of species over time

**Physical, Mathematical and Computational Biology:** the study of the physical properties of biological systems and the application of physical techniques to the modeling of biological networks

**Stem Cells, Development, Regeneration and Aging:** research on cell cycle control pathways, embryo growth, pluripotent stem cells and organ development
STUDENT LIFE
“To be a student here is to experience a golden age of biomedical science with unparalleled resources, brilliant colleagues and a responsive administration — all in a global city rife with energy and excitement.”

Joe Luna, Student

Although the laboratory is the heart of the graduate student’s day-to-day life, learning at Rockefeller is an immersive experience and takes place in both formal and informal settings. The academic calendar buzzes with a busy schedule of lectures and seminars, and the university’s thoughtful architecture and peaceful landscaping include many indoor and outdoor spaces for quiet study or informal conversation with peers and mentors. Subsidized student housing, free comprehensive health insurance and a highly regarded child care facility help to reduce the burdens of daily life and allow students to focus on their work. And a welcoming, approachable community of students, postdocs, faculty and staff is always ready to offer support and lend a hand — it’s not uncommon for friends and neighbors at Rockefeller to become lifelong confidantes and collaborators. Meanwhile, Rockefeller’s location on Manhattan’s Upper East Side provides easy access to everything New York — a world epicenter of art and culture — has to offer.
Campus Overview

Rockefeller’s 14 acres and 22 buildings, set along the East River, serve as its students’ home base for their scientific explorations. Nearly all students, along with most postdocs and many faculty, live on or adjacent to campus, and their proximity keeps the grounds — and many of the labs — alive with activity late into the night. Many labs have dramatic views of the river, the historic Queensboro Bridge or the New York skyline.

The university’s laboratories are state of the art. Its newest lab complex, the $400 million Collaborative Research Center, was completed in 2012 and features over 125,000 square feet of open-plan lab space connected by a dramatic glass atrium. And a new 160,000-square-foot lab building, to be built over the FDR Drive, is currently in the design phase; when complete it will feature lab spaces extending more than three city blocks and a landscaped green roof.

Because science isn’t only about lab work, the university offers numerous spaces for impromptu conversations that spur creative thought. For more than 50 years, the university’s Faculty and Students Club has been a relaxed setting for interactions among scientists of all ages and disciplines. Three dining facilities offer spaces for the Rockefeller community to meet over lunch or grab snacks. And the Rita and Frits Markus Library, located in newly renovated Welch Hall, features a cavernous reading room overlooking Roosevelt Island as well as an extensive archive of books and journals and access to electronic databases.

The campus also offers athletic facilities — including a fitness center and tennis and squash courts — to stimulate the body and, to stimulate the mind, an impressive collection of artwork and a weekly concert series. The campus is smoke free indoors and out, and its commitment to sustainability includes LEED-certified construction, organic horticultural practices, the purchase of wind-generated electricity, a comprehensive recycling program, and high-efficiency lighting and HVAC equipment. Through a combination of energy conservation initiatives and the use of cleaner fuels, the university has reduced its carbon emissions by 31 percent since 2007.

Lectures

Two of the university’s lectures halls, Caspary Auditorium and Carson Family Auditorium, host several lecture series that bring in the world’s foremost scientists and thinkers for lectures and informal conversations. In addition to twice-weekly scientific lectures (Rockefeller faculty speak on Mondays; acclaimed researchers from outside institutions speak on Fridays), the university’s Insight Lecture Series brings speakers in public health, policy, arts and humanities. There are also a variety of specialized student- and postdoc-sponsored seminar talks, as well as concerts and a film series.

Recent speakers have included Alan Alda, Michael Bloomberg, Harry Frankfurt, Frank Gehry, Murray Gell-Mann, Eric Kandel, David Nathan, Martin Rees, Jeffrey D. Sachs, Robert Sapolsky, Anne-Marie Slaughter, Nicholas Wade, Jonathan Weiner, E.O. Wilson, Tadataka Yamada and Elias A. Zerhouni.

Housing

The university provides subsidized housing for all Ph.D. students. Accommodations include studios with kitchenettes, double and triple suites with shared kitchens and one-bedroom apartments. Like the laboratories, all on-campus student rooms have high-speed internet access. Current rents range from $600 to $880 a month.

For those in need of an escape, the university owns two cottages located about an hour north of the city near the Bear Mountain Recreational Area. Student use of the cottages is by lottery, and they are available between May and October.
Child Care

The university’s Child and Family Center provides a limited number of spots for children of faculty, staff, postdocs and students. Committed to providing high-quality early childhood education, the center offers full-day programs for 125 infants, toddlers and preschoolers in 10 classrooms located on the university’s campus. The school fosters learning and growth by emphasizing relationships with peers and teachers, and its innovative curriculum includes programs in art, music and movement. Tuition is based on household income.

Financial Support

As part of its mission to educate the next generation of scientific leaders, the university guarantees full financial support for its students in the Ph.D. program, including tuition, stipend and a research budget. This arrangement relieves students of financial concerns and also allows them to select a laboratory without the complication of considering the lab’s budget.

For the 2014–2015 academic year, the stipend is $36,000; the research budget is $2,500 in the first year and $1,500 in subsequent years and may be used toward the purchase of a computer, reading material or research-related supplies or for travel to attend scientific meetings. Students are strongly encouraged to apply for appropriate fellowships; these will be supplemented by the university to the current stipend level, plus $5,000 in the case of competitively awarded fellowships. Fellowships for participation in collaborations abroad are also available. Students are expected to engage full time in advanced study and research (university policy does not permit students to accept activities for compensation).

Rockefeller students and their families have the option to be covered by comprehensive health, dental and vision plans at the university’s expense (coverage for domestic partnership may incur imputed income costs).

New York City

Rockefeller students have chosen to focus their studies on science, but living in New York City is one of the best liberal arts educations in the world. The Rockefeller campus, located on Manhattan’s Upper East Side, is a short walk — or quick subway ride — to many of New York’s outstanding museums, theaters, concert halls, cultural centers, sports arenas and art galleries. Students can obtain complimentary passes to The Museum of Modern Art and The Metropolitan Museum of Art as well as discounted tickets to selected concerts and Broadway shows.

Those who like being outdoors can bike, stroll or run along the East River esplanade that adjoins the campus or enjoy Central Park with its zoo, summer Shakespeare festival and free concerts, ice skating rink, boating pond, walkways and running and bicycle paths. The city’s more than 18,000 restaurants offer authentic food from every imaginable cuisine. New York is also situated within a few hours’ drive of numerous state parks, beaches and other recreational areas, perfect for swimming, hiking, skiing, boating, rock climbing, mountain biking, camping and other adventure sports.

What’s more, opportunities for scientific stimulation don’t end at Rockefeller’s gates. Home to several of the country’s most well-respected universities and hospitals, New York has a vibrant academic and scientific culture. The New York Academy of Sciences offers conferences, symposia and other opportunities to meet and share knowledge with scientists of all disciplines. Other organizations offer Rockefeller students the opportunity to volunteer in local science classrooms or participate in public science events. Numerous biotech companies are also choosing to locate in New York, many of them in a new bioscience campus on the East River two miles from Rockefeller.
ADMISSIONS AND SCHEDULE OF COURSES
To be accepted into The Rockefeller University graduate program, applicants must demonstrate a record of achievement in science and have superb undergraduate academics. Applications are evaluated by faculty working in a wide range of fields, and they look for students who have demonstrated a commitment to scientific excellence and who they believe will thrive in a flexible, interdisciplinary program. The application process is highly selective. Applicants to the university’s other two programs, the M.D.-Ph.D. program and the Tri-Institutional Training Program in Chemical Biology, are handled separately (see page 33 for contact information). There is no prescribed curriculum in the life sciences; each student develops a program of advanced study that is constructed in relation to individual need. After consulting with the graduate deans, students choose their own courses toward qualification. They must complete seven course units by the end of the second Ph.D. year. Supplemental seminars and tutorials, dependent on demand, and support courses are also available.

“We pride ourselves on not going by the numbers. We look for a good fit in terms of the flexibility and independence that we offer, and we’re most influenced by what we view as potential for research achievements.”

Sidney Strickland, Dean
Applying to the Ph.D. Program

The university seeks students who have a natural curiosity about science and who have demonstrated aptitude, enthusiasm and commitment to research. Students who enter the Ph.D. program must have received a degree of bachelor or master of arts or sciences, or doctor of medicine or equivalent international qualification. Applicants should be able to document a high level of achievement in the biological, chemical, mathematical or physical sciences. Each year, up to 30 students enter the Ph.D. program.

Applications must be submitted online. Applicants must submit a personal letter describing their scientific interests, academic background and research experience and goals, as well as a biographical data form and at least three letters of recommendation from faculty who can assess their research potential. Official college or university transcripts and GRE general test scores are required for admission. A GRE advanced subject test is strongly recommended. Applicants whose native language is not English must submit evidence of their proficiency in the English language. The application deadline for the Ph.D. program is December 1, 2014, for entrance during the first week of September 2015. An application fee is required.

A faculty committee representing a wide range of research interests screens the applications. Selected candidates are invited to interview for a position in the graduate program in March. During these visits, candidates have formal and informal opportunities to meet faculty and students, to visit laboratories and housing facilities, to explore the Rockefeller neighborhood and to experience the cultural opportunities of New York.

Applying to the Tri-Institutional Training Program in Chemical Biology

Complete application instructions for the Tri-Institutional Training Program in Chemical Biology are available online at chembio.triiprograms.org.

Contact information for all three programs can be found on page 33.

Ph.D. Requirements and Fields of Study

To earn the Ph.D. degree, a Rockefeller student must complete a thesis comprising a coherent body of novel scientific work. In consultation with the dean and research advisers, students must plan coursework and tutorials to support and complement their thesis research. Students must balance their need for a broad basis of scientific knowledge with the requirement for greater depth of understanding in the particular area of science in which their thesis research will be focused. Students in the life sciences are required to participate actively in courses, discussions and tutorials and to fulfill designated qualifying requirements. Students are evaluated on their required coursework based on participation in class discussions and written or oral exercises. Most courses are scheduled on a two-year cycle during the fall, winter and spring quarters, but some are offered annually. Additional information about course offerings and participation and qualification requirements appears on the following pages.

If a specialized course that is essential for a student's research is unavailable at the university, the Dean's Office will help the student register for a course at another institution. Students are encouraged to arrange tutorials with appropriate faculty members, if they feel the need.

Curriculum

There is no required core curriculum for the Ph.D. In consultation with the dean of graduate studies, students choose a flexible combination of courses totaling seven academic units. Courses toward qualification should be relevant to the intended area of thesis research and completed by the end of the second year.
Dean’s Office Staff

From left: Cristian Rosario, Sidney Strickland, Emily Harms, Kristen Cullen, Stephanie Fernandez, Marta Delgado

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Stephanie Fernandez
Dean’s Office Assistant and
SURF Coordinator
Schedule of Courses

Biochemical and Biophysical Methods
Seth A. Darst and Michael P. Rout
Fundamental biochemical and biophysical principles are presented, with an emphasis on methodologies. This course addresses issues of protein and nucleic acid structure and the forces that underlie stability and govern the formation of specific three-dimensional structures. Specific case studies are presented that examine particular processes, such as transcription and replication, and how the application of different methodologies has been used to address specific biological questions. For background reading, use Biochemistry by Lubert Stryer and Molecular Biology of the Cell by Alberts et al. There are no prerequisites for this course. The final exam consists of a written research proposal and an oral presentation of the proposal to the class.

The Biology of Brain Disorders
Gerald Fischbach
This course emphasizes the biological and behavioral underpinnings of common neurological and psychiatric disorders. Subjects include disorders of excitation and conduction (epilepsy and multiple sclerosis); perception, cognition and memory (autism, schizophrenia and Alzheimer’s disease); consciousness (coma and persistent vegetative state); mood (depression and anxiety); motivation (addiction); sensation (pain); motor control (Parkinson’s disease and ataxia); and trauma (brain/spinal cord injury and stroke). The course meets once a week for two hours and consists of introductory remarks followed by brief student presentations and open discussion based on assigned readings. Each student will be asked to write a speculative paper relating a disordered trait to a specific brain circuit.

Cell Biology
Sanford M. Simon and Shai Shaham
This is an advanced course covering major topics in modern cell biology, taught by faculty and visitors who are specialists in various disciplines of cell biology. A good knowledge of textbook cell biology is a prerequisite for effective participation. The course is completed with an oral exam. Recommended text for cell biology: Molecular Biology of the Cell by Alberts et al. Recommended text for histology: Basic Histology by Junqueira et al., 2009 edition.

Cell Cycle Control
Frederick R. Cross and Hironori Funabiki
This seminar will cover contemporary understanding of eukaryotic cell cycle control. It is designed to complement the Molecular Basis of Cancer seminar, so there will be little overlap between the two. A primary resource in the seminar will be The Cell Cycle: Principles of Control by David Morgan. This book presents a highly integrated view of cell cycle control drawing on over 20 years of research in many experimental systems. Weekly reading in this book will be accompanied by reading primary research papers (some relatively classical, some current). Weekly homework exercises will be assigned.

Evaluation will be based on homework and class participation. Due to the integration of the discussions, the readings and the homework exercises, auditing is not a possibility. Topics in the seminar will include construction of a biochemical oscillator and overall structure of cell cycle control; positive and negative control of DNA replication; spindle morphogenesis and function; chromosome cohesion control; surveillance mechanisms (checkpoints) monitoring spindle and DNA integrity; and control of proliferation (start/restriction point control). We will rely heavily on studies in model organisms, but the emphasis throughout will be on aspects of cell cycle control conserved throughout the eukaryotes.

Chemical Biology
Tarun Kapoor, Howard C. Hang and Sean F. Brady
The spirit of the course will be to explore the complexities of modern biology using the tools of chemistry. The lectures will cover amino acid chemistry, nucleic acid chemistry, posttranslational modifications of proteins, discovery and use of chemical probes to examine cellular mechanisms, membrane chemistry, chemical tools for imaging and natural product biosynthesis. Knowledge of introductory chemistry and organic chemistry will be helpful, but is not essential. This course is offered every two years.

Chromatin Biology and Epigenetics
C. David Allis
This course will explore the fast-growing field of chromatin biology and epigenetics. It will have two primary objectives: (1) to gain some appreciation of chromatin, the physiological form of our genome, and (2) to introduce students to a wide array of mechanisms that may underlie epigenetic phenomena — heritable changes in gene function that are not due to changes in the DNA sequence. The study of these
seemingly bizarre phenomena, often in off-beat organisms, has now emerged as a scientific field with far-reaching implications in human biology and human health. The course will examine the scientific approaches and research methods employed to define key advances in chromatin biology leading to the current interest in epigenetics.

Clinical Immunology
This tutorial covers selected topics in clinical immunology such as autoimmunity, tumor immunity, transplantation, allergies and infectious diseases. Participants meet for two to three hours each week to hear a brief overview from a faculty member and then discuss a few papers. The course is Tri-Institutional and required for students in the Tri-Institutional Cancer Immunology Program.

Developmental Neurobiology
Mary E. Hatten
This course focuses on the molecular and cellular mechanisms underlying the development of the mammalian nervous system. Topics to be discussed include induction of the nervous system, specification of neural cell fate, cell migration, axon guidance and establishment of neuronal connectivity. Major emphasis is placed on the molecular mechanisms of neuronal differentiation and cellular mechanisms of cell patterning in the brain.

Experiment and Theory in Modern Biology
Shai Shaham, Sanford M. Simon and Daniel Mucida
This course introduces first-year graduate students to the methods and principles behind current biological research. Students meet once a week to discuss preselected papers that illustrate methods of biological deduction. With guidance from the faculty mentors, students present papers, discuss them and formulate conclusions regarding the experimental results. Students also present a project based on one of the papers discussed in class. By the end of the course, students should be able to critically read a scientific manuscript and understand principles used in interpreting scientific data. There are no prerequisites for the course.

Fundamentals of Neuroscience
A. James Hudspeth
An introduction to neuroscience for those without previous experience with the subject, as well as a refresher for those with a modest background, this course covers the biophysical principles of electrical and synaptic signaling; neural plasticity; neuronal cell biology; the structure and development of invertebrate and vertebrate nervous systems; human neuroanatomy; and the operation of simple neural circuits. Each week’s single session comprises two lectures separated by a break and followed by a student-led discussion of a classic paper related to the subject at hand. Auditing is not permitted.

Genetics and Evolution
Frederick R. Cross
This seminar covers basic genetic mechanisms: generation of mutations and genetic segregation, linkage and recombination (emphasis on linkage/segregation in eukaryotes). The seminar also considers changes in population genotypes when these basic genetic mechanisms are operating in the presence or absence of selective pressure. Changes in population genotypes can have effects ranging from polymorphism at neutral loci to evolution of distinct species. Such changes are also used in historical analysis to trace migrations, evolution and coevolution in diverse biological contexts. Students are required to read two to three papers in the primary literature each week and participate in a weekly discussion of those papers. In addition, there are weekly homework exercises, requiring a variable level of effort. Group effort on the homework exercises is encouraged. Evaluation is based on participation in the discussion groups and performance on the homework exercises. There are no specific prerequisites for this course. Due to the integration of the discussions, the readings and the homework exercises, auditing is not a possibility.

Immunobiology Tutorial
Howard C. Hang and Daniel Mucida
Major topics in cellular, molecular and clinical immunology are covered. Each session consists of a discussion of the topic and a review of two or more papers.

Introduction to Programming for the Life Sciences
This course is designed to instruct students on how to build tools to perform certain programming tasks from scratch, as well as how to modify existing open source tools. We will focus primarily on learning to write general purpose programs in the Python programming language. Near the end of the course, we will also discuss shell scripting and the R programming language. No previous experience with programming is necessary. Those with some programming background can attend the later class meetings. All materials will be posted online.
Mammalian Genetics
Agata Smogorzewska
The course entails 12 weekly lectures. Topics to be covered include modern genetic tools, including RNAi screening and genetic engineering using TALENS; human gene mapping; mouse genetics and human disease modeling; genetics of bone marrow failure syndromes; genetics of cancer susceptibility; ethical issues in modern genetics; and genetics of infectious diseases, obesity and diabetes, coronary heart disease and neurodegenerative diseases. The lectures will be supplemented by specific readings and questions/problems. Performance in the course will be evaluated by class participation and a take-home final exam.

Math Review for Biologists
Marcelo O. Magnasco
This is an intensive skill development course, starting with calculus and linear algebra and leading up to differential equations, Fourier transforms and related computational methods for model simulation. The concurrent journal club explores the major historical papers as well as contemporary biological modeling papers proposed by the students, in full line-by-line detail. There are no prerequisites.

Membrane Biophysics
Gaby Maimon and Vanessa Ruta
This intensive six-week course consists of 15 to 20 two-hour lectures and six to eight all-day labs. The topics are biophysical aspects of the structure and mechanisms of function and regulation of ion channels, pumps/transporters and neurotransmitter receptors. The labs are limited to 12 students.

Microbial Pathogenesis
Luciano Marraffini
Infectious diseases continue to be a leading cause of human morbidity and mortality worldwide as well as an important cause of economic loss and the “poverty trap” in developing countries. Microbial Pathogenesis focuses on the molecular mechanisms of host-pathogen interactions and pathogenesis of representative bacterial, fungal and protozoan diseases. Topics may include malaria, schistosomiasis, trypanosomiasis, leishmaniasis, toxoplasmosis, selected Gram-negative and Gram-positive bacterial infections, pathogenic mycobacteria, opportunistic mycoses, antimicrobials and vaccines, evolution of pathogenicity and molecular mimicry. The course is taught by Rockefeller and Cornell faculty and selected guest speakers. Each class includes a lecture followed by lunch and in-depth discussion of assigned papers with the lecturer.

Molecular Basis of Cancer
Sohail Tavazoie
This course is designed to teach modern concepts in the regulation of growth control and its significance to cancer. The format consists of a weekly two-hour lecture followed by informal discussion over lunch. Each lecture is accompanied by a review and a research article to be discussed at lunch. (A reference list is distributed at the first lecture.) Before the start of the course, students should read The Biology of Cancer by Robert A. Weinberg (Taylor and Francis, Inc.). The method of evaluation is discussed at the beginning of the course. There is a take-home exam at the end of the course.

Neural Systems
Charles D. Gilbert
This course covers mechanisms of information processing in the adult nervous system at the level of neuronal ensembles and interactions, concentrating primarily on the visual cortex, with selected examples from other systems. Themes include connectivity, functional architecture, receptive field properties, psychophysics, dynamic properties of cortical circuits, the relationship between synaptic mechanisms and functional specificity, learning and memory, attentional mechanisms and higher order cognitive functions. Theoretical approaches to modeling neural function are discussed. The seminar meets for two to three hours once a week and includes lectures and discussion groups. Readings for the course consist of original papers and reviews.

Responsible Conduct of Research
In collaboration with the Sloan Kettering Institute, this course promotes awareness of ethical considerations relevant to the responsible conduct of research. Attendance is mandatory for all Rockefeller graduate students.

Seminars on Modern Biology
Members of the Rockefeller University faculty
This series is designed to give incoming graduate students a chance to interact with faculty in an intensive series of twice-weekly two-hour seminars. Participation is mandatory for and limited to first-year graduate students. (This course is not required for M.D.-Ph.D. students, who complete similar Tri-Institutional seminars during their first two
years.) Seminar sessions run from 1 to 3 p.m. on Monday and Tuesday afternoons. In each session, two to three faculty members give brief introductions to their research and participate in a student-led discussion.

Social Evolution and Behavior
Daniel Kronauer
This one-week intensive course will include morning and afternoon sessions. Sessions include a lecture, as well as a combination of paper discussions and hands-on workshops. For each paper discussion, one student will be chosen to present, and one will be chosen to prepare questions and help keep the discussion going. Hands-on workshops in most cases involve computers, e.g., modelling/simulations/introduction to programs, etc., but there is also lab space available for wet lab-based workshops.

Stem Cells in Tissue Morphogenesis and Cancer
Elaine Fuchs and Ali H. Brivanlou
This course aims to present and discuss key concepts in stem cell biology, drawing on research from organisms including planaria, Drosophila, zebrafish, mouse and human. It covers basic principles of stem cells from self-renewal to tissue development, homeostasis, wound repair and cancer. In addition to the basic lectures, there are guest speakers who are world-renowned leaders in the field. Although these lectures are open to the public, they are geared toward students enrolled in the course. Following each of these lectures, speakers lead a discussion with the class. Course credit is awarded based on participation in lectures and class discussions, as well as a written paper. Students are required to attend lectures and class.

Virology
Charles M. Rice, Paul Bieniasz and David D. Ho
This course of lectures and discussions is presented by Rockefeller faculty and selected visitors. Major emphasis is placed on the cellular and molecular biology of animal viruses. The topics include virus structure, replication, molecular genetics and gene expression, interactions with host cells, immunology, pathogenesis, viral vaccines, antiviral therapy and resistance and viral vectors. Model systems discussed will include cytocidal, steady-state and tumorigenic virus-cell interactions. Recommended texts for the course are Fields Virology by Knipe et al. and Principles of Virology by Flint et al.

Supplementary Seminars and Tutorials
Additional seminars and tutorials are offered in response to demand. Students are encouraged to speak with the dean to arrange seminars or tutorials in any area of science not covered by the listed courses.

Support Courses
Several courses of a more practical nature are offered by various faculty and service departments. These include courses on various aspects of computing, which range from instruction in the efficient use of everyday software to the effective use of more complex computational tools.
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**Ph.D. Program**

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1230 York Avenue, Box 177  
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rockefeller.edu/graduate  
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phd@rockefeller.edu  
Fax: 212-327-8505

**M.D.-Ph.D. Program**

Weill Cornell/Rockefeller/Sloan Kettering  
Tri-Institutional M.D.-Ph.D. Program  
1300 York Avenue, Room C-103  
New York, NY 10065

weill.cornell.edu/mdphd  
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**Tri-Institutional Training Program in Chemical Biology**

Tri-Institutional Training Program in Chemical Biology  
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The Rockefeller University is accredited by the New York State Board of Regents and the Commissioner of Education, located at 89 Washington Avenue, Albany, New York 12234, 518-474-3852.

The Advisory Committee on Campus Safety will provide upon request all campus crime statistics as reported to the United States Department of Education. Please contact James Rogers in The Rockefeller University Office of Security at 212-327-7339 to request a copy of the report. The U.S. Department of Education's Web site for campus crime statistics is ope.ed.gov/security.

It is the policy of The Rockefeller University to support equality of educational and employment opportunity. No individual shall be denied admission to the graduate program of the university or otherwise be discriminated against with respect to any program or in the administration of any policy of the university because of race, color, religion, sex, age, national or ethnic origin, citizenship, sexual orientation, veteran status or disability. The Rockefeller University is committed to the maintenance of affirmative action programs that will assure the continuation of such equality of opportunity.

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At a Glance

**THE UNIVERSITY COMMUNITY**
- 75 heads of laboratories
- 200 research and clinical scientists
- 325 postdoctoral researchers
- 1,050 clinicians, technicians and staff
- 185 Ph.D. and M.D.-Ph.D. students
- 1,150 alumni

**AREAS OF RESEARCH**
- Chemical and Structural Biology
- Genetics and Genomics
- Immunology, Virology and Microbiology
- Medical Sciences, Systems Physiology and Human Genetics
- Molecular and Cell Biology
- Neurosciences and Behavior
- Organismal Biology, Evolution, Ethology and Ecology
- Physical, Mathematical and Computational Biology
- Stem Cells, Development, Regeneration and Aging

**FACULTY HONORS**
- 24 Nobel laureates
- 21 Albert Lasker Awardees
- 18 Canada Gairdner Awardees
- 20 National Medal of Science recipients
- 33 current members of the National Academy of Sciences
- 17 current members of the Institute of Medicine

**CLINICAL CONDITIONS UNDER STUDY**
- Infectious diseases, such as hepatitis, HIV/AIDS and hospital-acquired MRSA
- Neurologic disorders, including Alzheimer’s, Parkinson’s, epilepsy and ALS
- Autoimmune diseases, such as multiple sclerosis, asthma, lupus and type 1 diabetes
- Cancers, including breast, colon and brain tumors
- Cardiovascular and metabolic disorders, including heart disease, stroke, diabetes and obesity
- Psychiatric and behavioral disorders, such as schizophrenia, depression and drug addiction
- Genetic disorders, such as cystic fibrosis and inherited immunodeficiencies
- Developmental disabilities, such as autism spectrum disorders, ADHD and fragile X