Since 1890, Cold Spring Harbor Laboratory (CSHL) has been a global leader in research and education. The international scientific community at CSHL provides a unique and stimulating atmosphere for doctoral research—an environment where students, postdoctoral fellows, and faculty work side-by-side. The Watson School of Biological Sciences (WSBS) was founded on the belief that with well thought-out mechanisms, enthusiastic involvement of faculty, and highly motivated students, an innovative curriculum could be provided that would allow students to earn a doctoral degree in a shorter time than in traditional programs without compromising the quality of their training. The curriculum is designed to train students to become scholars and independent thinkers.

Our mission is to:

- Prepare the best and the brightest students to face the ever-changing cutting edge of biological and biomedical research with the necessary skills to become leaders in science and society.

- Enable students to complete their Ph.D. in approximately four years from matriculation, while maintaining the highest standards of excellence. Reducing the time to graduation considerably, compared to the national average.

- Impart a broad, multi-disciplinary, representation of the biological sciences.

- Teach students how to think independently and critically focusing on the principles of scientific reasoning and logic.

- Educate ethical biologists who can communicate effectively with all audiences.

- Emphasize that learning is a lifelong process that goes hand-in-hand with outstanding research.

- Facilitate the pursuit of significant, independent thesis research.

To accomplish these goals the following unique features drive the program:

- Separate course work and laboratory rotations into separate phases in the first year of training.

- Extensive student mentoring through a “two-tier” mentoring program.

- Financial support from the program, which serves to uncouple the funding source from graduate education.

- A student body with diverse ethnicities, nationalities, and educational backgrounds.

- A unique environment, which includes a world-class scientific Meetings & Courses program, providing the opportunity to meet and learn from leaders in science.
**Dr. Watson’s Message**

**BIOLOGY IN THE NEW MILLENNIUM**

In 1948, when I first spent a summer at the Cold Spring Harbor Laboratory, the big question to be solved was the nature of the gene and how it functioned. At that time, many scientists believed it would take many decades to come to grips with the essence of the gene at the chemical level. But the double helix with all of its molecular splendor and simplicity suddenly emerged in the spring of 1953. The search for the molecular identity of the gene was over.

Molecular Biology soon went beyond the structure of DNA to the genetic code, recombinant DNA technology, DNA sequencing, RNA splicing, oncogenes, tumor-suppressor genes, signal transduction pathways, and the molecular dissection of the cell cycle. The human genome is now complete as are those of the sea urchin, the honey bee, the mouse, the rat, the chimpanzee, the dog, and the chicken. Even earlier the complete DNA sequences of the worm *Caenorhabditis elegans*, the fly *Drosophila melanogaster*, and the plant *Arabidopsis thaliana* were worked out. By now establishing the DNA sequence for any organism—and the pinpointing of most of its genes and their chromosomal locations—is an achievable, predictable task limited only by the monies at our disposal.

Now we need to understand how these instruction books work. In particular, we need to find out how the just less than 25,000 known human genes are used. Though many scientists at the beginning of the 20th century saw the need for vital forces outside the laws of physics and chemistry, virtually all biologists now believe that not only development but human behavior and personality as well as, say, recognizing a familiar face can all eventually be explained in terms of molecular interactions and cell functioning.

Much, much important science remains to be done. Understanding how variations in our individual genetic instruction books make each human so unique will go on long into this new century and the ones that follow. My own DNA instructions have been worked out and are on the Web for all to see. Soon the cost of sequencing a human genome may be no more than the purchase price of an iPad. Vastly speeding up these efforts are new high-throughput, low cost ways of sequencing DNA.

Already pharmaceutical and biotech companies are using genomic knowledge in ever-expanding practical ways. Here we will continue to search for the gene changes that cause diseases like cancer, autism, schizophrenia, and bipolar disease. Our main goal, however, will long remain understanding how key organisms function when all their genes provide the right instructions.

Nothing is more important than understanding life!
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“Wine and Cheese” on the lawn outside the President’s residence. Each year more than 10,000 scientists from around the world attend meetings and courses at the Laboratory.
A TRADITION OF EXCELLENCE

Since its inception in 1890, Cold Spring Harbor Laboratory has been a leading center worldwide for research and education. Its DNA Learning Center, established in 1988, educates primary and secondary school students and provides innovative programs for science teachers. The Undergraduate Research Program, begun in 1959, hosts exceptional undergraduates from around the world for a 10-week research experience each summer. The Laboratory’s 30-year collaboration with Stony Brook University has attracted many of the University’s graduate students to Cold Spring Harbor for research training. And each year, the Laboratory offers courses at the postgraduate level, hosts international conferences, and organizes small conferences at the nearby Banbury Conference Center. More than 8,000 scientists visit our campus each year to participate in these programs. The most recent addition to fulfill our educational mission is the Watson School of Biological Sciences, an innovative graduate program that was established in 1998 and has already made a great difference in how students are trained.

Cold Spring Harbor Laboratory has long been recognized for its excellence in basic research in the biological and biomedical sciences. The current research era began in 1968 when Nobel laureate James D. Watson became the director of the Laboratory and expanded its research activities to focus on cancer and molecular biology in eukaryotes. During the past 35 years, Laboratory scientists have made many fundamental advances in molecular biology. The Watson School of Biological Sciences, now ten years old, is invigorated by the Laboratory’s current fields of research expertise—genetics; molecular, cellular, and structural biology; neuroscience; cancer; plant biology; genomics; and quantitative biology. Cold Spring Harbor Laboratory is a marvelous place to enjoy and learn science. I came here 32 years ago, attracted by the rich achievements of the past, the exciting science, the lively people, and the enormous beauty of the campus. Here, graduate students can mingle with the world’s top scientists at meetings and courses. They might find themselves working in laboratories where Barbara McClintock revolutionized genetics, where Al Hershey provided important evidence that DNA is the molecule of heredity, where Max Delbrück and Salvador Luria taught phage genetics and ushered in the era of molecular biology, or where split genes and RNA splicing were discovered.

The diversified components of the Laboratory are incorporated into the design of our innovative graduate program. By taking advantage of its extensive resources, the Watson School of Biological Sciences offers a novel curriculum that will challenge its graduate students—biologists of the future—to become leaders in science and in society.
A UNIQUE DOCTORAL PROGRAM

Cold Spring Harbor Laboratory provides a uniquely stimulating environment for a doctoral program in the biological sciences. It is an international community of science where students, postdoctoral fellows and faculty work side-by-side. The hierarchical structure of the Laboratory is flat and the atmosphere intimate and highly interactive. Our program is designed for students with exceptional ability and a deep commitment to their graduate education. Its curriculum is designed to train confident, self-reliant students to become scholars and to acquire the knowledge their research and future careers demand.

Our innovative doctoral program includes the following key features:

• Approximately four years from matriculation to Ph.D.

• A broad representation of the biological sciences

• A first year with course work and laboratory rotations in separate phases

• Emphasis on the principles of scientific reasoning and logic as well as the importance of ethics and effective communication

• Continued advanced course instruction throughout the graduate curriculum

• Extensive mentoring and support in large part through our “two-tier” mentoring program

The Watson School of Biological Sciences opened its doors in 1999. Our first class of six students arrived with a sense of adventure and a trust in a faculty that would follow Cold Spring Harbor Laboratory’s long tradition of non-compromising excellence. In a very short time the WSBS has graduated 60 Ph.D. students and become a leading graduate program in the biological sciences, one whose fresh approach is quickly being emulated by other Ph.D. programs across the country.

The spectacular track record of our students and alumni is a testament to the success of our remarkable program. They are publishing well-cited papers in leading journals, have received highly competitive fellowships and awards. Several have started tenure-track faculty positions within four years of graduating, which is much faster than is typical for Ph.D. programs—an excellent indicator of the School’s success in preparing highly qualified and competitive scientific leaders. Our aim remains to produce the next generation of leaders in science and society, and we invite you to join us.
Phage course graduations (top, middle).
Top (L–r): Rollin Hotchkiss, Charlie Steinberg, Salvador Luria, Frank Stahl, and Al Hershey.
Middle: Vernon Bryson with graduation cap.
Bottom: Max Delbrück, Aaron Novick, Leo Szilard, and Jim Watson relax in 1953.
Although Cold Spring Harbor Laboratory has performed vital educational functions since its beginnings in the 1890s, it was not until a meeting of the Laboratory’s Board of Directors in 1995 that the idea of an advanced degree-granting program was broached in earnest. At the behest of Nobel laureate Dr. James D. Watson, co-discoverer of the double helix and then the Laboratory’s president, a process was set in motion that culminated only three years later in the granting of accreditation to a graduate-level School of Biological Sciences at CSHL by the New York State Department of Education.

It was fitting that the new doctoral program would be housed in a school named for Dr. Watson, since it was his brilliance and iconoclasm that helped give the program its distinctive character. Dr. Watson is famous for encouraging young scientists to seek “meaningful answers to important questions.” But he has also stressed the importance of a broad education, even at the graduate level. “Looking back,” he recollected in 1999, “I remember my first graduate school years as having taught me the values of science, and how experiments should be planned, executed and interpreted. Most importantly, my days were not narrowly focused, and I spent much time learning how others were trying to approach the gene.”

A DESIRE TO INNOVATE

The intention from the outset was to make the Watson School of Biological Sciences a place of educational innovation. Under the direction of founding Dean Winship Herr, a molecular biologist, an effort was undertaken to reproduce in the values of the school some of those which have made research at CSHL so distinctive. Always known as a place where investigators of the first rank have been given the freedom to pursue their ideas, the Laboratory would build a graduate program that stressed exposing doctoral candidates to the very latest developments across a range of biological fields while instilling in them the fundamental values and ethics pertaining to scientific investigation. The program would stress academic freedom but at the same time provide unique, highly individualized mentorship and guidance that would enable students to intelligently and expeditiously choose and carry out a plan of thesis research.

Dr. Herr had at his disposal members of the Laboratory’s faculty, who had studied in many countries and in a diversity of graduate programs. Together, they shaped a curriculum that marked a sharp departure from a then-prevailing tendency. At the Watson School, students would earn a doctoral degree in four to four and a half years, on average, the founders agreed. Would this suffice? “For the highly motivated students we expect to attract,” said Dr. Bruce Stillman, the distinguished cancer researcher who succeeded Dr. Watson as Director of the Laboratory in 1995, “this time frame should be more than adequate to embark on a life-long journey as a scientist.”

The school’s shorter training period necessitates a way of teaching and learning that is more intense than that found in other graduate programs. One benefit, Dr. Stillman points out, is that the Watson School curriculum tends to quickly instill self-reliance—the ability to think for oneself and to regard learning as an ongoing process and not confined to a period of formal coursework. “We don’t expect our students to become experts in all subjects,” he has explained. Rather, the school’s complementary goals are to demonstrate to students how discoveries in seemingly unrelated fields influence one another, and to teach that learning is a lifelong process that goes hand in hand with research.

Anja Hohmann
UNIVERSITY OF CAMBRIDGE, UK
BOEHRINGER INGELHEIM FONDS FELLOW
DAVID H. KOCH FELLOW
Entering class of 2011

T he Watson School Ph.D. program at CSHL attracted my attention, as it is unique for a U.S. institution. Graduate courses are completed within the first semester. Following three to four rotations, a teaching experience in the Dolan DNA Learning Center, and the qualifying exam, students start to work on their theses at the end of the first year. With exams, teaching and most course requirements out of the way, we can dedicate our full attention to our research. This fast-paced program thereby encourages a timely completion of thesis projects, which makes the Watson School stand out from most other Ph.D. programs in the U.S.”
Much thought was also given, to the nature of graduate student relationships with faculty. An innovative two-tier mentoring system was devised that would provide each doctoral candidate with an academic mentor from the faculty who would guide their intellectual and individual development in addition to the research mentor who would guide the much more focused thesis research. This would provide the student with two different perspectives, and tend to broaden intellectual horizons. So too would the ability of Watson School students to take advantage of Cold Spring Harbor's unique status as a crossroads for the international community of biological scientists. Each year, the campus is visited by some 10,000 researchers from all parts of the world. Many come to discuss their work and ideas in over two dozen annual and semi-annual meetings; a smaller number come to the campus to take advanced courses in new techniques in research, one of the unique features of the Laboratory. These represent a unique opportunity for Watson School students to meet scientists and learn about new developments in virtually every important field and subfield of modern biology.

“When I visited CSHL to interview, apart from the breathtakingly beautiful campus, what struck me most was a deep sense of history. It is here during the summers that the first molecular biologists met to chart the course of modern biology. Since then the Lab has been at the very frontier of biology research. That legacy continues to this day. One of the amazing benefits of being a graduate student here is to be able to walk in to the numerous meetings that happen throughout the year. This allows young graduate students like me to get a glimpse of the best minds in biology and develop a holistic sense of where biology research is headed. It is not uncommon to find yourself in a discussion with a Nobel laureate over a drink at the bar! Moreover, the overall ambience of this place is extremely cordial, which makes me feel at home, away from home.”

Arkarup Bandyopadhyay
TATA INSTITUTE OF FUNDAMENTAL RESEARCH
UNIVERSITY OF DELHI, INDIA
GOLDBERG-LINDSAY FELLOW
Entering class of 2010
Another distinguishing feature of the planning for WSBS was the imperative that every accepted student be supported by a full stipend and pay nothing for courses or research. This was made possible by the remarkable efforts of former Board President David Luke, who, with his colleagues on and off the Board, succeeded in raising $32 million as an initial endowment for the Watson School. A second campaign, led by Board member Robert Lindsay, raised an additional $15 million during the School’s first years of operation. From the very start, therefore, no Watson School student has had to worry about having his or her studies hinge on the receipt of research grants by faculty members in whose labs their thesis work is based.

THE WATSON SCHOOL IS LAUNCHED
An international recruiting effort helped attract more than 130 applications for admission to the first entering class, that of 1999. Six outstanding students were chosen, each supported by a Watson School Endowed Fellowship. As the first academic year got under way, and students and faculty alike became acclimated to the new program, Dr. Watson gave a series of commemorative lectures, whose subjects included the discovery of the double helix and the genetic code, and the beginnings of the Human Genome Project, of which he was the first director. The School’s inaugural Convocation was held November 5, beginning the annual tradition of awarding the Honorary Degree of Doctor of Science to individuals who have made significant and distinguished contributions to education in biological science or to the community in general. First to receive this honor were Nobel laureate David Baltimore, Seymour Benzer and Gerald R. Fink. The latter, then director of the Whitehead Institute, and who for 17 summers had taught the famous Yeast Course at CSHL, said in his acceptance speech, “Cold Spring Harbor has created, I think, the most unique postgraduate program in the world and has built it on the presumption of novelty; the Watson School, newly born, is the child of that remarkable program. Science will not be the same.”

A key milestone was achieved on January 18, 2001. In an issue of Nature appearing on that date was published a paper—the first ever—co-authored by a Watson School student, Amy Caudy. She and others were, with her mentor, Prof. Gregory Hannon, reporting the discovery of an enzyme called Dicer involved in a form of gene silencing called RNA interference. The mechanics of RNAi, which Hannon and WSBS Prof. and future Dean Leemor Joshua-Tor were instrumental in determining, changed the course of bioscience, and Watson School students were in the middle of the action. By the end of that same year, two other WSBS students had first-author publications, in Nature Cell Biology and Proceedings of the National Academy of Sciences. These early student publications in prestigious journals were the beginning of a trend, and indicated in concrete terms the fundamental soundness of the WSBS academic program. Could a young person learn about how to be a scientist and at the same time contribute substantively to research, all in the span of a few years? Absolutely, these and other early student publications suggested.

Colleen Carlston
HARVARD UNIVERSITY
JOHN AND AMY PHELAN STUDENT
Entering class of 2010
Amy Caudy was the first Watson School student to defend her doctoral dissertation. She did so in Bush Auditorium, where Dr. Watson first publicly presented the structure of DNA 50 years earlier. Dr. Philip Sharp, a CSHL alumnus and Nobel laureate, was present to serve as an external examiner. Dr. Caudy, an HHMI Predoctoral Trainee, at this point had seven publications and would be selected as the Harold M. Weintraub 2003 awardee by the Fred Hutchinson Cancer Research Center. Then, on April 25, 2004, 51 years to the day from the publication by Nature of Crick and Watson’s momentous paper on the double helix, Caudy and five other candidates received their Ph.D. diplomas at the first-ever WSBS graduation. The average time to completion of the Ph.D. for these first six graduates was precisely four years. By now, fully one-half of the 14 3rd- and 4th-year students of the school had authored a published study, and many had multiple publications.

Almost a decade had passed since the Board of Trustees set in motion a plan to form an innovative graduate school in biology at Cold Spring Harbor Laboratory. The protean efforts of Winship Herr, drawing upon the talents of a committed CSHL faculty, had produced not just a fully functioning graduate school on the shore of the Long Island Sound, but one with strong claims to distinction and excellence. Dean Herr at this point returned full-time to his research and yielded the deanship to Associate Dean Lilian Clark.

In July 2007, Leemor Joshua-Tor, who had played an important role in the school’s development, assumed the Dean’s position. She continued in this position for the next 5 years while still running her laboratory research in structural biology as a Howard Hughes Medical Institute Investigator. In January 2013, Alexander Gann took over as Dean, having previously been involved in teaching and mentoring students at the school while working as Editorial Director of CSHL Press and writing textbooks. The Watson School has enrolled, at this writing, 132 exceptional students, whose 250-plus publications attest to their and the school’s success. Another measure is the number of current students and alumni who have been successful in winning prestigious awards and fellowships. Most important, graduates have been successful in securing faculty positions at world-class research institutions, and have done so much more rapidly, on average, than their peers in other graduate programs.

The Watson School continues to evolve. Just as Biology continues to change rapidly in this 21st century, so must our curriculum. Great scientists are nimble in their work and great graduate programs must do the same.

Since arriving here I have had the opportunity to learn about the latest, exciting new research being done in many areas of biology in the labs on campus. The research environment is wonderful. I appreciate the really strong work ethic here, where people put in long hours because they really enjoy—and take pride in—their research. This, however, being what I expected came as no real surprise.

I think my most important insight, that people here almost take for granted, is that to thoroughly understand a scientific discipline, a scientist must know where the field came from and anticipate the direction in which it is headed. CSHL will help you to do both. There is a very rich history here and the atmosphere will allow you to learn the names and faces behind world-renowned research. There are few places where you can trace research in the biological sciences back to Darwin. You will hear stories about scientists who met simply by chance and on a whim, decided to work together or exchange ideas and, eventually, made a landmark discovery.

Anticipating where a field is going is also crucial, and here there are meetings and courses in many cutting-edge areas of science that will guide you. Constantly learning about the latest research and newest techniques will at most drive your creativity and innovation, and at least prevent your perspective from growing too stale. You have opportunities to meet people from all over the world face-to-face, discuss research firsthand, facilitating your own chance encounter that could change history.”

Jack Walleshauser
UNIVERSITY OF NORTH CAROLINA, GREENSBORO
JACK AND BARBARA MCCLINTOCK FELLOWSHIP
Entering class of 2010
The Lay of the Lab

WATSON SCHOOL OF BIOLOGICAL SCIENCES OFFICES
1 Urey

LECTURE HALLS
2 Bush
3 Grace

RESIDENCES
4 President: Airslie
5 Ballybung
6 Dolan Hall

STUDENT RESIDENCES
7 Cutting House
8 Knight House

DINING FACILITY & BAR
9 Blackford

ADMINISTRATION & FACILITIES BUILDINGS
10 Luke
11 Nichols
12 Richards
13 Wawepex

ON-SITE CHILD CARE
14 Lindsay Child Care Center

RESEARCH BUILDINGS
15 Axinn
16 Beckman
17 Cairns
18 Delbrück-Page
19 DeMatteis
20 Demerec
21 Freeman
22 Harris
23 Hershey
24 James-Sambrook
25 Jones
26 Koch
27 Marks
28 Main Library
29 Matheson
30 McClintock
31 Quick
32 Wendt
An important goal of Cold Spring Harbor Laboratory is to stimulate the education of children and teachers in the biological sciences. Through its DNA Learning Center, the Laboratory offers a year-round selection of programs for primary and secondary students, as well as special programs for science teachers. Watson School students participate in teaching at the DNA Learning Center as part of the curriculum’s instruction in scientific exposition.

UNDERGRADUATE RESEARCH PROGRAM
Begun in 1959, the Laboratory’s Undergraduate Research Program is a highly selective, ten-week residential summer research program for undergraduate students from the United States and abroad. Students work with senior scientists in their labs to learn through experimentation about theoretical principles and practical methodologies in biology. Additionally, the program instructs students in the delivery of scientific presentations and provides the opportunity to put what is learned into practice.
POSTDOCTORAL PROGRAM This residential program recruits scientists from around the world who have distinguished themselves in their doctoral thesis research. Each postdoctoral fellow works closely with a Laboratory scientist, usually for several years. The experience allows young scientists to sharpen their analytical skills, establish a reputation in an area of scientific inquiry, and develop an independent research program. The Laboratory’s postdoctoral program office, which is housed in the Watson School, works closely with postdoctoral fellows and faculty to enrich the postdoctoral experience at Cold Spring Harbor Laboratory.

POSTGRADUATE COURSES & CONFERENCES Each year the Laboratory offers courses at the postgraduate level, hosts international conferences, and organizes small conferences at the nearby Banbury Center. More than 10,000 scientists visit our campus each year to participate in these programs. The postgraduate research courses teach biology at the highest level to advanced graduate students, postdoctoral fellows, and senior scientists looking to change research direction. Instructors and guest lecturers are recruited from leading universities and research institutes from around the world. The Cold Spring Harbor Laboratory conferences and symposia significantly advance the progress of collective research as colleagues from around the globe gather to share their ideas and latest results with each other. Each year, the Laboratory’s Banbury Center hosts smaller conferences that focus on topics in the biological sciences, including significant health, societal, and ethical issues.
Advances in biology depend on multidisciplinary approaches, in which knowledge and technology from diverse areas intersect to inspire new discoveries. Today, the breadth of accumulated knowledge about biology is immense—far more extensive than any individual can assimilate. Thus, our curriculum is designed to train self-reliant students to become scholars who, under their own guidance, can acquire and assimilate the knowledge their research or career demands require.

The curriculum takes advantage of the unique and flexible environment of Cold Spring Harbor Laboratory and includes the following features:

- approximately four years from matriculation to Ph.D. degree award
- broad representation of the biological sciences
- a first year with course work and laboratory rotations in separate phases
- emphasis on the principles of scientific reasoning and logic as well as the importance of ethics and effective communication
- continued advanced course instruction throughout the graduate curriculum
- supportive two-tier mentoring and guidance

WSBS students Claudio Scuoppo and Amy Leung analyzing data.
Curriculum at a Glance

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Two-tier Mentoring

The Watson School of Biological Sciences graduate program is committed to the success of its students. To promote a high level of student achievement, the faculty and administration take an active role in mentoring and supervising the students. A special feature of the curriculum is an intensive and supportive “two-tier” mentoring program, which involves an academic and research mentor for each student. Soon after matriculation, each student is matched with a faculty member as an academic mentor. The academic mentor follows the student’s academic and research progress, and provides advice for the duration of the student’s tenure in the graduate program. After the laboratory rotations, each student chooses a research mentor. The research mentor is the doctoral thesis research advisor, who supervises the student’s independent laboratory research. Should the student choose his or her academic mentor as the research mentor, a new academic mentor is selected. By providing both academic and research mentors, the Watson School of Biological Sciences provides each student with advice from faculty who hold different views. They can then offer a multiplicity of in-depth evaluations of the student to aid in promoting each student’s future career.

The First Year

The first year of the curriculum assumes an innovative format in which students progress rapidly from intensive course instruction to doctoral research. The year begins with a 15-week fall course term that extends from the end of August to mid-December. During the fall term, students are free of research responsibilities, which allows them to devote their full attention to intensive course instruction and seminars.

During the subsequent winter and spring, students participate in three six-week-long laboratory rotations, a Topics in Biology course, and teaching at the DNA Learning Center. In May, students select a research mentor and prepare for the Ph.D. qualifying exam at the end of June. After the requirements of the qualifying exam have been satisfied, students focus on their doctoral research.

ARRIVAL AND ORIENTATION The curriculum is tailored for a highly qualified and diverse student body. Soon after arrival, students are matched with an academic mentor. Any students needing aid with background knowledge in the biological sciences are provided additional tutoring.

FALL COURSE TERM The curriculum used in the fall course term provides intense instruction in a series of integrated courses. Students participate in three core courses—Scientific Reasoning and Logic, Scientific Exposition and Ethics, and Research Topics—which span the length of the fall term. In parallel, students participate in three, tandem four-week lecture courses in specialized disciplines. Students are also introduced to research activities at the Laboratory through an annual Laboratory-wide symposium, or “retreat,” and graduate student and Laboratory-wide seminars.
LABORATORY ROTATIONS After the fall course term, students participate in laboratory rotations. These rotations provide students and faculty with opportunities to get to know each other and to explore possibilities for doctoral thesis research. At the end of each rotation, students make short presentations of their studies to the other students, the rotation advisors and academic mentors. These talks give students an opportunity to share their laboratory experiences and to receive instruction on how to give a scientific presentation.

TEACHING EXPERIENCE As science plays an increasing role in society, there is an increasing need for biologists to educate nonscientists of all ages about biology. The graduate program at Cold Spring Harbor Laboratory offers its graduate students unique teaching experiences through the Laboratory’s DNA Learning Center. Graduate students gain experience teaching high school and middle school students laboratory courses at the DNA Learning Center. From these experiences, graduate students learn how to communicate with nonbiologists and to inspire and educate creative young minds.

DOCTORAL RESEARCH The most important element of the Ph.D. program is learning to perform independent research that leads to a unique contribution to human knowledge. Cold Spring Harbor Laboratory is recognized internationally for the excellence of its research faculty, and it thus provides an outstanding environment for doctoral thesis research. Following the laboratory rotation schedule, and generally prior to the qualifying exam, each student selects a research mentor to serve as the doctoral thesis research advisor.

PH.D. QUALIFYING EXAM In June of the first year students take an oral qualifying exam. Students are expected to possess a broad basic knowledge of biology and to display the ability to acquire and articulate in-depth scientific information by defending their knowledge of assigned topics.

THE SUMMER MONTHS Following the qualifying exam, each student begins doctoral research.

The Subsequent Years

After the first year, students focus on laboratory research. Nevertheless, course instruction, in the form of the annual Topics in Biology course and an annual postgraduate course of the student’s choosing, continues as shown on page 13. In the second year, students defend their doctoral thesis research proposal, and, in their last year, they present a proposal for postdoctoral studies. Students are awarded the Ph.D. degree after successful defense of a thesis that describes their original research.

DOCTORAL THESIS RESEARCH PROPOSAL AND THESIS ADVISORY COMMITTEE

In January of the second year, students defend a written doctoral thesis research proposal. The proposal includes a clear outline of goals and specific aims and describes the broader scientific context and debate surrounding the proposed research. After successful oral defense of the research proposal, a thesis advisory committee consisting of the research mentor, academic mentor, and the thesis research proposal examining committee is constituted to guide the student with his or her doctoral research.

THESIS PREPARATION AND DEFENSE

With the approval of the thesis advisory committee, each student prepares a written thesis on his or her original research. To defend the thesis, students present a public seminar and are subsequently examined by the thesis committee and an additional examiner external to Cold Spring Harbor Laboratory. A satisfactory defense and...
fulfillment of all curricular requirements results in the granting of the Ph.D. degree.

The Watson School of Biological Sciences graduate program is designed so that students can complete their doctoral studies in four to four and one-half years. If, at four years, a student and thesis committee agree that more than four and one-half years are required to complete the doctoral program, the student and thesis committee may petition for an extension.

Courses

The flexible structure of the Watson School of Biological Sciences permits the design of courses with flexible mandates and formats. Three core courses—Scientific Reasoning and Logic, Scientific Exposition and Ethics, and Research Topics—span the fall course term and are designed to help students develop the analytical skills required of today’s biologists. The courses designated as Specialized Disciplines in Biology are four weeks long and allow students to explore well-defined research fields in depth. Each course is taught by a small team of faculty who work closely together to develop and present a well-organized and cohesive course. The intensive one-week Topics in Biology courses broaden the educational program by offering instruction in areas of biology outside the expertise of Cold Spring Harbor Laboratory’s faculty. Lastly, the two- or three-week postgraduate courses offered by the Laboratory allow students to participate in the lectures offered in a long-standing and highly regarded series of advanced-level courses. Thus, a Ph.D. student participates in a total of 13 lecture courses: the three core courses, three Specialized Disciplines in Biology courses, four Topics in Biology courses, and three Cold Spring Harbor Laboratory postgraduate-course lecture series.

The Core Courses

Scientific Reasoning and Logic
A fundamental aspect of earning the Ph.D. is training in the pursuit of knowledge. In this core course, which forms the heart of the curriculum, students (1) acquire a broad base of knowledge about the biological sciences, (2) learn about the logic of biological thought, and (3) learn how to think critically. This course is taught by a team of six instructors and consists of six bi-weekly segments, each of which has a different theme. Each week, students read an assigned set of research articles and at the end of the module provide written answers to a problem set that guides them through several of the articles. Twice weekly, students attend lectures related to the week’s topic that include concepts and fundamental information as well as experimental methods. During each week, the students meet among themselves to discuss assigned papers not covered by the problem set. Each week students spend an evening discussing the assigned articles with faculty.

Scientific Exposition and Ethics
This core course offers instruction in the fundamental elements of scientific exposition—writing skills and public speaking—and ethics. The ability to communicate effectively and to appreciate the intricacies of ethical issues are essential skills for biologists; both subjects are taught in a series of example-based lectures and discussion groups.

Writing skills include the fundamentals of modern scientific English and the organization and preparation of papers, research abstracts, and grant applications. Oral presentation skills are taught by scientists with excellent, albeit different, modes of presentation. Together with instructors, students critique formal seminar presentations at the Laboratory.

Instruction and discussions about ethics include the ethical implications of biological discovery on society as well as the nature and boundaries of ethical behavior of scientists and their rights and responsibilities. A primary objective of the course is that students consider exposition and ethics an integral part of scientific research.

Research Topics
As an in-depth introduction to the fields of research that Laboratory scientists investigate, students attend a weekly evening Research Topics seminar, at which faculty members present seminars on their current research topics and methods of investigation. Here, the students learn how to approach important problems in biology. These seminars, together with the annual fall in-house symposium, provide students with a basis for selecting laboratories in which to do rotations.

Specialized Disciplines in Biology

The Specialized Disciplines in Biology courses provide in-depth instruction by Cold Spring Harbor Laboratory faculty on defined topics. These four-week courses are divided into a three-week lecture and discussion period and a one-week reading period. The courses enable students to identify key issues in the field, to propose experimental or theoretical solutions to those issues, and to evaluate the published literature. The courses demonstrate biological principles that resonate beyond the limits of the course topics themselves. The topics of these courses can change.
each year. The courses offered to date were: Fundamentals of Bioinformatics, Mechanisms of Transcriptional Regulation, Mechanisms of Synaptic Plasticity and Learning, The Genome, Cellular Structure and Function, Systems Neuroscience, Genetics, From Molecules to Networks, Neuroscience: Systems and Behavior, and Quantitative Biology.

**TOPICS IN BIOLOGY**

Each year, one or a team of invited instructors offer seven-day courses at the Banbury Center to explore specialized topics outside the expertise of the Cold Spring Harbor Laboratory faculty. These courses include morning or evening lectures as well as afternoon sessions during which students read assigned papers. The focus of these courses has been Immunology, Evolution, Microbial Pathogenesis, Animal Behavior, Human Behavior, Fundamental Concepts in Statistics, and Physical Biology of the Cell.

**COLD SPRING HARBOR LABORATORY POSTGRADUATE COURSES**

Cold Spring Harbor Laboratory offers 26 postgraduate courses annually. In their second through fourth years, graduate students in the Watson School of Biological Sciences select and attend the lecture sessions of one postgraduate course each year. This required element of the graduate school curriculum allows students to mold their individual academic programs to their research interests.

**Seminars and Symposia**

Seminars and symposia are an integral part of the continuing education of all scientists at Cold Spring Harbor Laboratory. Each year, graduate students participate in weekly seminar programs that include graduate student seminars, in-house seminars, and seminars given by invited speakers. Graduate students also participate in an annual, two-day in-house symposium, or retreat, in the fall and seminar programs designed especially for them including the Gavin Borden, Career Pathways for the Biology Ph.D., and Journeys in Science lectures.

**Cold Spring Harbor Laboratory Conferences**

Cold Spring Harbor Laboratory Conferences Students are also encouraged to participate in the 20 to 25 annual Cold Spring Harbor Laboratory conferences on a wide range of topics that include: the annual Cold Spring Harbor Symposium, Computational Cell Biology, Yeast Cell Biology, Plant Genomes, Eukaryotic mRNA Processing, Imaging Neurons & Neural Activity, Mechanisms of Eukaryotic Transcription, Systems Biology: Global Regulation of Gene Expression, Eukaryotic DNA Replication, Synapses: From Molecules to Circuits & Behavior, Microbial Pathogenesis and Host Response, The Ubiquitin Family, Cell Death, Telomeres & Telomerase, Neurobiology of Drosophila, Workshop on Honey Bee Genomics & Biology, Clinical Cardiovascular Genomics, The Biology of Genomes, Genome Informatics, Phosphorylation, Signaling & Disease, In Vivo Barriers to Gene Delivery, Retroviruses, Molecular & Immunological Approaches to Vaccine Design, Rat Genomics & Models. Students can meet with scientists who come from all parts of the world to attend each conference and may apply to present their work at the conferences that are relevant to their own research.

**Requirements for the Award of the Ph.D. Degree**

**CORE COURSES**

Scientific Reasoning and Logic
Scientific Exposition and Ethics
Research Topics

**OTHER COURSES**

Specialized Disciplines in Biology (4)
Topics in Biology (4)
CSHL postgraduate course lecture series (3)

**OTHER REQUIREMENTS**

Laboratory rotations
Teaching
Ph.D. qualifying exam
Seminar series
Thesis research proposal
Defense of a written thesis describing original research
Graduate student symposium
The Watson School of Biological Sciences is designed for highly qualified and motivated students who desire a Ph.D. in the biological sciences. The program is open to all legitimate registrants, irrespective of gender, race, ethnic origin, or creed. To give students personal attention and financial support, the number of matriculating students is limited to ten to twelve students per year. Students from around the world are encouraged to apply. Suitable applicants will be assessed on the basis of their academic record, recommendations from their mentors, and an in-person interview.

APPLICATION PROCEDURE All applicants must have received a Bachelor of Arts or Science, or equivalent, degree from an accredited university or college prior to matriculation. A completed application form must be submitted online together with official transcripts of all undergraduate studies, three letters of recommendation, general and advanced subject GRE results where applicable, and a $60 application fee. Applicants whose first language is not English must submit recent TOEFL or IELTS scores. In addition to the above requirements, applicants must include in their application materials a 250- to 500-word personal statement that details their reasons for pursuing a Ph.D. degree in the biological sciences and that explains why the Watson School of Biological Sciences is particularly well suited to them. The application deadline is December 1, each year. Students will be selected for admission on the basis of the perceived ability of the student to excel in this doctoral program. Interested students may apply online from our web site at www.cshl.edu/gradschool.

RECRUITMENT OF INDIVIDUALS FROM UNDERREPRESENTED MINORITIES Cold Spring Harbor Laboratory strives to locate, attract, and place individuals from underrepresented minorities in its research and educational programs. The Watson School of Biological Sciences encourages members of underrepresented minorities to apply to its doctoral program. The faculty and graduate program administrators provide mentoring and guidance to ensure the successful progress of all students.

MASTER OF SCIENCE DEGREE The Watson School of Biological Sciences does not offer matriculation to students seeking the Master of Science (M.S.) degree. Under special circumstances, however, students may petition the graduate school to award an M.S. degree. The M.S. degree will be awarded only if the student has successfully completed the first year of studies, including the course work, laboratory rotations and summer research, and the Ph.D. qualifying exam.

Financial Support

The Cold Spring Harbor Laboratory Watson School of Biological Sciences is largely funded by an endowment generously provided by private donors. For the first four years, each student will receive an annual stipend from the graduate school. The current annual stipend for doctoral students studying at Cold Spring Harbor Laboratory is $31,500 per year (and is reviewed annually). In addition, the Watson School of Biological Sciences, rather than the research mentor, covers the research costs of each student for the first four years. To enhance their careers as well as to provide support for the graduate school, students are encouraged to seek independent funding through predoctoral fellowships from, for example, the National Science Foundation (www.nsf.gov/funding).
Stony Brook University (SBU) and Cold Spring Harbor Laboratory (CSHL) are just 25 miles apart and are two of just three Institutions on Long Island that currently award doctoral degrees in the Biological Sciences. The close proximity has allowed numerous scientific and training collaborations between our institutions for more than 30 years. The success of these collaborations is evidenced by multiple co-authorships on research papers and the success of SBU graduate students who have completed their thesis research at CSHL. Currently, there are over 50 SBU Ph.D. and M.D.-Ph.D. students at CSHL accounting for half of the graduate students on campus. After performing their course work at SBU, students who choose to perform their doctoral thesis research at CSHL participate in the tri-annual graduate student symposium and the other seminar programs (see “Seminars and Symposia” on page 23), irrespective of their degree program. CSHL is enthusiastic about its involvement in the shared graduate programs with SBU. Prospective students are encouraged to apply to these programs, which can be done automatically by checking the appropriate box on the Watson School of Biological Sciences application form.

The SBU graduate programs that collaborate with CSHL are described below. For more information, we encourage students to visit the web sites listed.

**BIOMEDICAL ENGINEERING**

With more than 25 Laboratories from SBU, Brookhaven National Laboratory (BNL) and CSHL it offers graduate students the opportunity to work at the intersection of engineering and biology, in areas including biomechanics, biomaterials, bionanotechnology, medical instrumentation, molecular biomedical engineering, tissue engineering, molecular imaging and biomedicale modeling. For more information visit [http://www.bme.sunysb.edu](http://www.bme.sunysb.edu).

**GENETICS**

This is a tri-institutional graduate program with approximately 90 faculty members from SBU, BNL, and CSHL. It includes the largest number of faculty from BNL and CSHL of all the shared graduate programs. It is exceptional in its breadth of topics and experimental systems for graduate study as faculty interests vary widely and include classical, developmental, and molecular genetics, as well as genomics and evolution. For more information visit [http://life.bio.sunysb.edu/gen](http://life.bio.sunysb.edu/gen).

**MOLECULAR AND CELLULAR BIOLOGY**

As largest biomedical graduate program at SBU, this interdepartmental program of study crosses departmental boundaries and institutions including CSHL to offer the student research training in nearly 100 different laboratories. The research interests of faculty include biochemistry, biophysics, microbiology, pharmacology, and structural biology. For more information visit [http://www.stonybrook.edu/biochem/mcb](http://www.stonybrook.edu/biochem/mcb).

**MOLECULAR GENETICS AND MICROBIOLOGY**

Graduate students carry out their dissertation research with faculty, seven from CSHL, whose labs use basic research methods in molecular genetics, cell biology, and biochemistry to answer questions in areas including cancer, infectious diseases, signal transduction, and cell cycle regulation. For more information visit [http://www.mgm.stonybrook.edu](http://www.mgm.stonybrook.edu).

**NEUROSCIENCE**

The graduate program provides a broad educational background in neurobiology, and the opportunity to pursue doctoral research in one of over 40 laboratories. Collectively, the SBU, BNL and CSHL neurobiologists included in this program represent a wide range of neuroscience research interests. For more information visit [http://neurobiology.informatics.sunysb.edu/graduate/index.html](http://neurobiology.informatics.sunysb.edu/graduate/index.html).

**MOLECULAR AND CELLULAR PHARMACOLOGY**

Graduate training in this interdisciplinary program is intended to provide students with a broad background in molecular and cellular biology. The research interests of the training faculty, three from CSHL, include the therapeutics of cancer and infectious diseases, cardiovascular and endocrine pharmacology, neuroparmacology and drug design. For more information visit [http://www.pharm.stonybrook.edu/grad](http://www.pharm.stonybrook.edu/grad).
Cold Spring Harbor Laboratory is located on the wooded north shore of Long Island, 35 miles east of Manhattan in New York City. Long Island is a glacial moraine left by the Ice Age, with islets and natural harbors facing Long Island Sound to the north and expansive beaches facing the Atlantic Ocean to the south. The nearby village of Cold Spring Harbor, a whaling town in the 19th century, attracts weekenders from New York City. Thirty miles east of the Laboratory is Stony Brook University, and ten miles further is the Brookhaven National Laboratory. Cold Spring Harbor Laboratory employs more than 1,000 people, including more than 50 heads of laboratories, 150 postdoctoral fellows, and more than 100 graduate students.

The main campus of the Laboratory is located on 110 acres on the west shore of Cold Spring Harbor. Within five miles of the main campus are the 50-acre Banbury Center, the 12-acre Uplands Farm Agricultural Field Station, the Cancer Genome Research Center and, in the village of Cold Spring Harbor, the DNA Learning Center. On the main campus, more than 40 buildings are devoted to research, education, and residences, as shown on the map on page 9. The Laboratory is recognized for the beauty and splendor of its grounds; within minutes, one can leave the intensity of the laboratory environment and relax in beautiful surroundings. The area is a resting spot for migratory birds in the spring and fall, making the Laboratory an excellent place for bird-watching.

Cold Spring Harbor Laboratory’s Cancer Genome Research Center is one of the largest centers of its kind in New York State. The 65,000-sq. ft. facility is located on 12 acres in Woodbury, New York, south of the main Laboratory campus. The Center significantly advances the Laboratory’s research missions through its additional laboratory space, core facilities,
and the Genome Sequencing Center. The Center also houses a 125-seat auditorium, a library for print, electronic and online information, and administrative offices, including administrative space for the Cold Spring Harbor Laboratory Press.

**LIBRARY**
The Library and Archives, located in the Carnegie building, houses the main collection of materials, while eight satellite libraries hold specialized collections in cancer cell biology and virology, neuroscience, crystallography and structural biology, plant genetics, and bioethics. The library offers online access to 90% of its journal collection and access to scientific databases, e-books and reference materials. Our Archives consists of the institutional collection and the newly established Genentech Center for the History of Molecular Biology and Biotechnology. The archival collections include original papers, manuscripts, lab notebooks and correspondence. Interviews with prominent scientists are available in our Oral History DVD collection.

**INFORMATION TECHNOLOGY**
The IT Department provides campus-wide support for all computer-related needs of the Laboratory. Computing services are maintained in three distributed datacenters. The main datacenter on the central campus also serves as a nexus for a high speed fiber optic network connecting all buildings. This network has over 1800 devices consisting of PC and Mac desktops, and ~340 Unix and Windows servers—the majority of these, including a 500 node world class supercomputer, are used for computer intensive scientific applications. File, backups, e-mail, wireless connections in all classrooms, and other services, are provided to all graduate students.

**GRADUATE SCHOOL CLASSROOMS, STUDY HALL, AND ADMINISTRATION**
Conference and lecture rooms are located throughout Cold Spring Harbor Laboratory. These instructional facilities are in Beckman Laboratory, Bush Lecture Hall, and Delbrück, Demerec, James, Marks, McClintock Laboratories, and upper campus: “hillside”. Fall-term courses are offered in different lecture rooms, which ensures that first-year students experience different research environments. It also promotes student–faculty interactions. Urey Cottage provides office and conference space for first-year students in the Lindsay Student Center and houses the administrative offices of the Watson School of Biological Sciences.

**GRADUATE STUDENT HOUSING**
The Laboratory provides housing to all Cold Spring Harbor Laboratory graduate students through a network of subsidized on-site and off-site housing. Single graduate students are offered single rooms in shared houses; married students are housed in apartments. First-year students in the Watson

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**The Carnegie building.**

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**The Townsend Knight House, a residence for first-year graduate students.**
School of Biological Sciences are offered housing in one of two renovated 19th century houses located on the road to the Village of Cold Spring Harbor.

HEALTH CARE
Graduate students are provided with health care through the Laboratory’s student health-care plan, which includes coverage for dental and major medical expenses for the students, and their spouses and children.

LOCAL AMENITIES
Cold Spring Harbor Laboratory offers many amenities. It has extensive resources for recreational activities, including a fitness room; pool, table-tennis, and fútbol tables; tennis and volleyball courts; a beach for swimming and fishing; sailboats, racing skulls and windsurfers; and many quiet back roads for running or walking. Laboratory staff participate in a summer volleyball league, winter basketball, and weekly soccer games. In March each year, Laboratory employees are invited for a ski trip to the Catskill Mountains. Blackford Hall provides dining facilities and an on-campus bar for the employees. The Laboratory also hosts picnics in the summer and indoor parties in the winter. As a part of its meetings program, students may participate in afternoon wine-and-cheese gatherings and Saturday evening cocktail receptions with meeting participants. Students are also welcome to attend distinguished lectures and classical music performances sponsored by the Laboratory for scientists and the neighboring community. Within an hour of the Laboratory are Manhattan and the magnificent beaches of the south shore of Long Island. New York City offers an extraordinary range of cultural events, shopping opportunities, fine restaurants, and world-famous museums. Theatre-goers can enjoy musicals, comedies, and dramas in venues on and off Broadway. Music aficionados will find instrumental and vocal performances to suit all tastes, and sports enthusiasts can revel in a wide variety of athletic events. Occasionally friends of the Laboratory donate tickets for concerts and other events to employees and students of Cold Spring Harbor Laboratory.
Students in the Watson School of Biological Sciences

On September 7, 1999, Cold Spring Harbor Laboratory opened its doors to the first entering class of the Watson School of Biological Sciences. Since then, more than 130 students have embarked on their Ph.D. studies at the Watson School. Diversity and academic excellence have become a tradition in the classes, and, by maintaining small classes of approximately ten students, the students receive individual attention and are able to participate actively in class activities.

Each student is supported by a Watson School fellowship so that they may focus their efforts fully on their studies. Please read some of their perspectives in the following pages:

Ian Peikon
DUKE UNIVERSITY
BECKMAN GRADUATE STUDENT
DR. JOHN AND CONSUELO PHELAN STUDENT
Entering class of 2009

collaborations—most of which are sparked by a chance meeting between two scientists at one of the many lab-wide events (seminars, volleyball games, wine and cheese, etc.). Where else do you see a plant biologist looking at slides with a neuroscientist?

Throughout the year, thousands of scientists come through CSHL to present their work at meetings, teach/learn at one of CSHL’s courses, or give a talk at a lab-wide seminar. Scientists at CSHL are thus exposed to the newest ideas in all fields of biological research. Because of this, it has become commonplace at CSHL for a researcher to step out of the boundaries of his/her field of expertise and adopt an idea from a completely different field

As a student at the Watson School of Biological Sciences—and an integrated member of the CSHL community—you are exposed to all of this and are invited to join any and all conversations between some of the brightest scientists in the world...it is hard not to get sucked in to the fun.”

Onyekachi Odoemene
GEORGE WASHINGTON UNIVERSITY
NIH PREDOCTORAL TRAINEE
WILLIAM RANDOLPH HEARST SCHOLAR
Entering class of 2011

“CSHL has provided me with a fantastic research environment and access to dedicated faculty who are among the leaders in their fields. This stimulating atmosphere has enabled me to learn and grow tremendously. I continually draw inspiration from the work of other graduate students, postdocs, and professors with whom I interact, including members of other academic institutions attending CSHL meetings and courses.

As someone with an engineering background, I am particularly grateful for the core coursework and qualifying exam in the first year that strengthened my ability to think critically and taught me how to formulate and approach scientific problems. This, together with the individual attention and encouragement from faculty and administrators within the school, has been instrumental in my successful transition from engineer to biologist.”
A big part of my decision to come to the Watson School for my doctorate was the opportunity to be immersed in Cold Spring Harbor’s historic research community. A large part of this unique group of scientists are the postdoctoral fellows who have been a constant source of advice and guidance, both scientific and otherwise. The Lab’s rich community of postdocs have already done so much to enrich my scientific education from a practical standpoint and a theoretical one, helping me to further develop both techniques and ideas. The highly collaborative nature of the institute allows a young scientist to gain knowledge from these highly trained individuals very easily. I can’t begin to think of how many times I have received advice on experiments from postdocs in other labs over a drink at the bar, lunch by the water or even an incubation period between assays. The amazing thing about it is that they approach you and ask how your work is going and it is not uncommon to get advice from postdocs trained in a completely different field of research, which allows for very unique perspectives and insights. In my experience so far they have been tremendously helpful in all respects and will continue to enrich my education here at the Watson school throughout my entire Ph.D. It is them and the rest of the scientific community here that makes getting a degree at CSHL so unique.”

Felix Schlesinger
Jacobs University, Bremen
Crick-Clay Fellow
Graduating class of 2013

“For me one of the highlights of the Watson School is the opportunity to take part in the Meetings and Courses program at CSHL. The program has a great tradition and there is a meeting almost every week for most of the year. The topics span from basic molecular biology over genomics, systems biology to neuroscience and medical applications. Several of these meetings are on newly emerging fields, such as the one on ‘Personal Genomes’. Most meetings are attended by the leaders in the respective fields. This gives Watson students a great and easy way to learn about different research frontiers, get new ideas, find collaborators or just enjoy the discussion with other scientists from around the world. The first semester courses already gave me a good enough background in many areas to follow these meetings, but the advanced courses of CSHL are available in addition to learn about a new technique or a totally different area of biology. Since I came here, I learned about so many new and exciting things that I feel I can make a much better decision what I want to work on for the next years then I could have made just a few month ago.”
Fellowships

All students in the Watson School are supported by fellowships generously endowed or awarded by the following individuals, foundations, institutions and the Federal Government.

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Amy A. Caudy, Ph.D., was a member of the first entering class of the Watson School of Biological Sciences and was the School’s first graduate. Dr. Caudy received a B.A. from Washington University in St. Louis. She was awarded the prestigious Fred Hutchinson Cancer Research Center’s Harold M. Weintraub Award and was also the recipient of a Howard Hughes Medical Predoctoral Institute Fellowship during her time at CSHL. She completed her postdoctoral research with Dr. John Atkinson at Washington University in St. Louis and completed her time as a Lewis-Sigler Fellow at the Lewis-Sigler Institute for Genomics at Princeton University. She is currently an Assistant Professor at University of Toronto.

“CSHL is one of the most perfect places to do science that I could imagine. First, there are terrific interactions between people in diverse disciplines. The institution is just the right size to make it possible for a person working on RNAi in Drosophila and mammals to continually rub shoulders with neurobiologists, plant biologists, and cancer biologists. Second, CSHL makes it easy to do ambitious experiments by providing many excellent shared resource facilities. The Watson School fosters an environment of high expectations. The intellectual rigor of the Scientific Reasoning and Logic core course sets the stage for a research environment where graduate students can eagerly debate the latest results and plot the course for exciting new experiments with research advisors, postdocs, and other graduate students.”

Keisha A. John, Ph.D., received a B.S. from the University of Maryland, Baltimore County. During her time at the Watson School, Dr. John was the recipient of a Ford Foundation Predoctoral Fellowship and a William Randolph Hearst Foundation Fellowship. After conducting postdoctoral research with Dr. Marybeth Hatten at the Rockefeller University, Dr. John returned to the Watson School and is currently a Assistant Dean at Florida State University.

As a participant in the Summer Undergraduate Research Program at CSHL I was exposed to a scientific culture unlike any other and thus decided that the Watson School was the perfect place for me to pursue my graduate education. The School’s innovative program, unparalleled student support, and focus on critical thinking were then and remain to this day its selling points for highly motivated students. Dr. Linda Van Aelst, my thesis advisor, was a wonderful and honest mentor. In our quest to understand the molecular mechanisms responsible for neuronal development, I discovered a role for the novel signaling protein, DOCK7. During my tenure as a graduate student I learned that a scientist not only needs to have an analytical mind, but also a collaborative spirit, great hands, luck, and a steely backbone. These life lessons and a myriad of opportunities made available to me through the Meyerhoff Scholarship Program and the Watson School has led me to pursue my current career in education.”

Yaniv Erlich, Ph.D., received a B.S. from Tel Aviv University. During his time at the Watson School, Dr. Erlich was the recipient of the Harold M. Weintraub Award. Dr. Erlich is currently a Fellow at The Whitehead Institute for Biomedical Research.

“The name “Cold Spring Harbor Laboratory” was first mentioned to me by my undergraduate mentor as a potential place for carrying out a summer research program. When asked to share more information about the Lab, he simply replied, “It’s the mecca of molecular biology!” Thrilled by the environment I experienced as an URP, I applied to the Ph.D. Program in the Watson School of Biological Sciences, which turned out to be one of the best decisions I have made in my life. Greg Hannon, my thesis advisor, taught me countless lessons about sciences and life, and pushed me far beyond what I thought were my limits. I see myself as extremely fortunate to have been part of his lab where I was given the freedom to work on a variety of projects combining quantitative thinking, biological reasoning, and direct relation to human health and disease.”

Graduate Outcomes

The Watson School’s graduation rate is over 95%, and all students have graduated within six years of starting their studies. Directly after graduating from the School, over 80% of Ph.D. awardees pursued postdoctoral training in academic research labs, 10% took up independent positions in academia or industry, and 6% followed non-research science-related careers. Currently, of our Ph.D.s who graduated six or more years ago, more than a third are in tenure-track faculty or independent research positions in major US or international research institutes; another third are continuing with postdoctoral training. The remaining graduates are employed in non-research, science-related careers or non-science careers.
Cold Spring Harbor Laboratory is world-renowned for the excellence of its faculty, an international group of scientists with many different perspectives on education and research in the biological sciences. This diversity has helped create our unique graduate program. By integrating two groups—research faculty, who direct independent research programs, with nonresearch faculty, who direct other programs at the Laboratory—the Watson School of Biological Sciences provides exceptional educational breadth for today’s graduate students.

Research Faculty

Cold Spring Harbor Laboratory recruits exceptional young scientists and provides them with the resources and freedom to perform outstanding research. In the past 35 years at CSHL, Richard Roberts and his colleagues co-discovered split genes in eukaryotes; Michael Wigler co-discovered the first human oncogene; Edward Harlow discovered the association of oncoproteins and tumor-suppressor proteins; Bruce Stillman discovered the DNA-replication origin recognition complex; Robert Martienssen and Venkatesan Sundaresan developed Arabidopsis gene-trap technology; and Tim Tully and Jerry Yin discovered how learning and memory can be altered through gene action. These discoveries, one of which has already led to a Nobel Prize in Physiology or Medicine, were performed by young scientists early in their careers.

Faculty who are so actively engaged in their own research programs are excellent doctoral research advisors.

The research interests of the faculty are broad and diverse and can be organized into five overarching disciplines: plant biology, cancer biology, neuroscience, and genomics and quantitative biology. The discipline with the longest tradition at the Laboratory is plant biology, which originated with the development of hybrid corn by George Shull in the early 1900s and has been continued throughout the past century, most notably by Barbara McClintock, who demonstrated the dynamic nature of genomes through the discovery of transposable elements in maize. Today, scientists at the Laboratory have used the transposable elements discovered by McClintock to develop technologies to study plant development and physiology in Arabidopsis, a small flowering plant.

The study of cancer biology links scientists who have a broad range of interests. James Watson initiated the Laboratory’s cancer research program when he became its director in 1968. Today, two-thirds of the faculty at the Laboratory is associated with the cancer program in a broad-based research effort that involves many model organisms and includes investigations of oncogene function, apoptosis, signal transduction, cell cycle control, cell biology, RNA interference, regulation of gene expression and DNA replication, chromosome dynamics, epigenetics, structural biology, virology, bioinformatics, and genome sequencing.

Scientists engaged in cancer-related research focus on many aspects of molecular and cellular biology and often collaborate with members of the other research programs.

In 1991, the Laboratory initiated a new research effort in neurobiology with a special focus on neural plasticity, and learning and memory. This new discipline has already met with exceptional success in studies of neurobiology in both vertebrates and invertebrates. Neuroscience adds considerable breadth to the graduate education provided by the Watson School of Biological Sciences.

By being grouped into four thematic areas of research—plant biology, cancer biology, neuroscience, and genomics and bioinformatics—the faculty and students synergize with one another through common interests. The synergy is enhanced by grouping faculty with similar interests in the same buildings. Nevertheless, there is also extensive interaction among faculty and students in different disciplines through research collaborations shared seminar programs, dining facilities, and social and cultural events.
Areas of Expertise

Dinu Florin Albeanu, Assistant Professor  
PH.D. HARVARD UNIVERSITY  
Neuronal circuits; sensory coding and synaptic plasticity; neuronal correlates of behavior; olfactory processing

Gurinder Mickey Atwal, Assistant Professor  
PH.D. CORNELL UNIVERSITY  
Population genetics; bioinformatics; cancer; stochastic processes; statistical mechanics and information theory

Anne Churchland, Assistant Professor  
PH.D. UNIVERSITY OF CALIFORNIA, SAN FRANCISCO  
Decision-making; electrophysiology; sensory processing; vision; audition; neural computation; modeling; behavior

Josh Dubnau, Associate Professor  
PH.D. COLUMBIA UNIVERSITY  
Learning; memory; genetics; behavior

Mikala Egeblad, Assistant Professor  
PH.D. UNIVERSITY OF COPENHAGEN  
Tumor microenvironment; intravital imaging; tumor-associated myeloid cells; breast cancer

Grigori Enikolopov, Associate Professor  
PH.D. RUSSIAN ACADEMY OF SCIENCES, MOSCOW  
Stem cells; neurogenesis; development; signal transduction

Hiro Furukawa, Associate Professor  
PH.D. UNIVERSITY OF TOKYO  
Membrane proteins; X-ray crystallography; electrophysiology; neurodegenerative disease

Jesse Gillis, Assistant Professor  
PH.D. UNIVERSITY OF TORONTO  
Gene networks; gene function prediction; guilt by association; neuropsychiatric; hub genes; multifunctionality; computational genomics

Thomas Gingeras, Professor  
PH.D. NEW YORK UNIVERSITY  
Genome-wide organization of transcription and the functional roles of non-protein coding RNAs

Christopher Hammell, Assistant Professor  
PH.D. DARTMOUTH MEDICAL SCHOOL  
Post-transcriptional gene regulation; control of animal developmental timing; RNA biology

Molly Hammell, Assistant Professor  
PH.D. DARTMOUTH COLLEGE  
Gene regulatory networks; integrated genomic analysis; bioinformatics; RNA biology; small RNAs

Gregory Hannon, Professor  
PH.D. CASE WESTERN RESERVE UNIVERSITY  
Growth control in mammalian cells; post-transcriptional gene silencing

Z. Josh Huang, Professor  
PH.D. BRANDEIS UNIVERSITY  
Neuroscience; experience-dependent development of the neocortex; mouse genetics; neurotrophins

Ivan Iossifov, Assistant Professor  
PH.D. COLUMBIA UNIVERSITY  
Computational biology; molecular networks; human genetics; human disease; applied statistical and machine learning; biomedical text-mining; molecular evolution

David Jackson, Professor  
PH.D. UNIVERSITY OF EAST ANGLIA  
Plant development; stem cell signaling; genomics and imaging

Leemor Joshua-Tor, Professor  
PH.D. WEIZMANN INSTITUTE OF SCIENCE  
Structural biology; nucleic acid regulation; RNAs; molecular recognition; X-ray crystallography

Adam Kepecs, Associate Professor  
PH.D. BRANDEIS UNIVERSITY  
Decision-making; neural circuits; behavioral electrophysiology; theoretical neuroscience; neuroeconomics

Alexei Koulakov, Professor  
PH.D. UNIVERSITY OF MINNESOTA  
Theoretical neurobiology; quantitative principles of cortical design; computer science; applied mathematics

Adrian R. Krainer, Professor  
PH.D. HARVARD UNIVERSITY  
Post-transcriptional control of gene expression; pre-mRNA splicing mechanisms, fidelity and genetic diseases; RNA-protein interactions; cancer

Alexander Krasnitz, Assistant Professor  
PH.D. TEL AVIV UNIVERSITY  
Genomics of cancer; machine learning for biology; inference from noisy biological data; large-scale numerical computing

Dan Levy, Assistant Professor  
PH.D. UNIVERSITY OF CALIFORNIA, BERKELEY  
Human genetics; mathematical modeling; algorithm development

Bo Li, Associate Professor  
PH.D. UNIVERSITY OF BRITISH COLUMBIA  
Neuroscience; glutamatergic synapse; synaptic plasticity; schizophrenia; depression; rodent models of psychiatric disorders

Zachary Lippman, Associate Professor  
PH.D. COLD SPRING HARBOR LABORATORY WATSON SCHOOL OF BIOLOGICAL SCIENCES  
Plant development; genetics; flowering; inflorescence architecture; sympodial growth, phase transition, heterosis; quantitative genetics.

Gholson Lyon, Assistant Professor  
M.D. WEILL CORNELL MEDICAL COLLEGE  
PH.D. ROCKEFELLER UNIVERSITY  
Human genetics; neuropsychiatric diseases; whole genome sequencing; ethics

Robert Martienssen, Professor  
PH.D. CAMBRIDGE UNIVERSITY  
Epigenetics; DNA methylation; chromatin and chromosome biology; transposable elements; RNA interference; stem cells; germline specification; plant genomics; plant evolution; aquatic plants

W. Richard McCombie, Professor  
PH.D. UNIVERSITY OF MICHIGAN  
Genomics of psychiatric disorders; genomics of cancer; computational genomics; plant genomics
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>University/Institution</th>
<th>Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alea A. Mills</td>
<td>Professor</td>
<td>PH.D. UNIVERSITY OF CALIFORNIA, IRVINE</td>
<td>Cancer; development; aging; senescence; epigenetics</td>
</tr>
<tr>
<td>Partha Mitra</td>
<td>Professor</td>
<td>PH.D. HARVARD UNIVERSITY</td>
<td>Neuroinformatics; theoretical engineering; animal communications; neural prostheses; brain imaging; developmental linguistics</td>
</tr>
<tr>
<td>Pavel Osten</td>
<td>Associate Professor</td>
<td>M.D. CHARLES UNIVERSITY, PRAGUE</td>
<td>Neurobiology of autism and schizophrenia; gene expression based mapping of brain activity; anatomical mapping of brain connectivity; high throughput microscopy</td>
</tr>
<tr>
<td>Darryl Pappin</td>
<td>Associate Professor</td>
<td>PH.D. UNIVERSITY OF LEEDS</td>
<td>Proteomics; mass spectrometry; protein chemistry</td>
</tr>
<tr>
<td>Scott Powers</td>
<td>Associate Professor</td>
<td>PH.D. COLUMBIA UNIVERSITY</td>
<td>Cancer genome; molecular targets and therapeutics; functional genomics; cancer biology</td>
</tr>
<tr>
<td>Michael Schatz</td>
<td>Assistant Professor</td>
<td>PH.D. UNIVERSITY OF MARYLAND</td>
<td>Genomics; genome assembly and validation; sequence alignment; high performance and multicore computing; parallel algorithms; cloud computing</td>
</tr>
<tr>
<td>Stephen Shea</td>
<td>Assistant Professor</td>
<td>PH.D. UNIVERSITY OF CHICAGO</td>
<td>Olfaction; audition; in vivo electrophysiology; individual recognition</td>
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<tr>
<td>Raffaella Sordella</td>
<td>Associate Professor</td>
<td>PH.D. UNIVERSITY OF TURIN</td>
<td>Molecular therapeutics; signal transduction</td>
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<tr>
<td>David L. Spector</td>
<td>Professor</td>
<td>PH.D. RUTGERS UNIVERSITY</td>
<td>Cell biology; gene expression; nuclear structure; microscopy; non-coding RNAs</td>
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<tr>
<td>Arne Stenlund</td>
<td>Associate Professor</td>
<td>PH.D. UPPSALA UNIVERSITY</td>
<td>Cancer; Papillomavirus; DNA replication</td>
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<td>Bruce Stillman</td>
<td>Professor</td>
<td>PH.D. AUSTRALIAN NATIONAL UNIVERSITY</td>
<td>Cancer; cell cycle; DNA replication; chromatin assembly; biochemistry; yeast genetics</td>
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<tr>
<td>Marja Timmermans</td>
<td>Professor</td>
<td>PH.D. RUTGERS UNIVERSITY</td>
<td>Plant development; epigenetic regulation of stem cell fate; pattern formation via small RNAs</td>
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<tr>
<td>Nicholas Tonks</td>
<td>Professor</td>
<td>PH.D. UNIVERSITY OF DUNDEE</td>
<td>Posttranslational modification; phosphorylation; phosphatases; signal transduction; protein structure and function</td>
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<td>Lloyd Trotman</td>
<td>Associate Professor</td>
<td>PH.D. UNIVERSITY OF ZURICH</td>
<td>Cancer modeling and treatment; senescence and tumor progression; cancer visualization; PTEN regulation</td>
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<tr>
<td>Glenn Turner</td>
<td>Associate Professor</td>
<td>PH.D. CALIFORNIA INSTITUTE OF TECHNOLOGY</td>
<td>Neural coding; learning and memory; sensory processing; Drosophila; electrophysiology</td>
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<tr>
<td>David Tuveson</td>
<td>Professor</td>
<td>M.D./PH.D. JOHNS HOPKINS UNIVERSITY</td>
<td>Pancreatic cancer; experimental therapeutics; diagnostics; mouse models; cancer genetics</td>
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<td>Yi Zhong</td>
<td>Professor</td>
<td>PH.D. UNIVERSITY OF IOWA</td>
<td>Neuroscience; cortical mechanisms of auditory attention; autism</td>
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<td>Christopher Vakoc</td>
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<td>M.D./PH.D. UNIVERSITY OF PENNSYLVANIA</td>
<td>Chromatin; transcriptional regulation; acute myeloid leukemia; BET bromodomains; lysine methyltransferases</td>
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<tr>
<td>Linda Van Aelst</td>
<td>Professor</td>
<td>PH.D. CATHOLIC UNIVERSITY OF LEUVEN</td>
<td>Signal transduction; Ras and Rho proteins; tumorigenesis; neural development</td>
</tr>
<tr>
<td>Doreen Ware</td>
<td>Adjunct Associate Professor</td>
<td>PH.D. OHIO STATE UNIVERSITY</td>
<td>Computational biology; comparative genomics; genome evolution; diversity; gene regulation; plant biology</td>
</tr>
<tr>
<td>Michael Wigler</td>
<td>Professor</td>
<td>PH.D. COLUMBIA UNIVERSITY</td>
<td>Human genetic disorders; population genetics; cancer genomics</td>
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<tr>
<td>Anthony Zador</td>
<td>Professor</td>
<td>M.D./PH.D. YALE UNIVERSITY</td>
<td>Malignant gliomagenesis; animal modeling; stem cell renewal/differentiation; genetic and epigenetic regulation</td>
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</table>

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E-mail: gradschool@cshl.edu

**FOR MORE INFORMATION, PLEASE CONTACT**

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