Since its beginnings as a laboratory for the training of high school and college teachers, Cold Spring Harbor Laboratory’s educational programs have grown in scale and in depth. The Laboratory’s training and education programs now include courses designed for elementary and high school students, teachers, undergraduate and graduate students, as well as opportunities for post-doctoral fellows.
Watson School of Biological Sciences

In 1998, Cold Spring Harbor Laboratory became a degree-granting institution for the first time in its history with the establishment of the Watson School of Biological Sciences. The Watson School offers an innovative program in which students can take advantage of the Laboratory’s strengths in genetics, molecular biology, neuroscience, cancer, plant biology, genomics and bioinformatics, and quantitative biology.

In designing the Ph.D. program, CSHL aimed to create a unique program tailored to the institution’s strengths, while addressing a widespread problem in graduate education – the increasing number of years required for students in the sciences to complete the PhD degree. The Watson School offers a demanding program, in which students progress rapidly from intensive course instruction to doctoral research – going from matriculation to Ph.D. in four to five years.

During their first year, students combine intensive course work with rotations through several labs at CSHL. These rotations give students an opportunity to work with a range of faculty members, and to engage in research on a variety of topics. At the end of their first year, students prepare and sit for the Ph.D. qualifying exam. When the qualifying exam requirement is satisfied, students begin to focus on their doctoral research.

In addition to their doctoral research, students in years two through four participate in a series of week-long courses on “topics in biology,” and each year participate in one of the postgraduate courses offered at CSHL (described in Part Four). Students also gain teaching experience by working as instructors at the DNA Learning Center (described below).

Since starting with a first class of six students, the PhD program has gradually expanded, with total enrollment of about 50 students each year. In 2013, 8 PhD students graduated from the CSHL program and 10 new students were admitted (out of 274 applicants).

Stony Brook University collaboration

For more than twenty-five years, graduate students from Stony Brook University have come to Cold Spring Harbor Laboratory to conduct doctoral research and to work with CSHL faculty. Students enrolled in the following programs at Stony Brook University are eligible to take advantage of the University’s collaboration with CSHL:

- Genetics
- Molecular and cellular biology
- Molecular genetics and microbiology
- Neuroscience and behavior

Most CSHL faculty members work with Stony Brook students in one or more of these areas.

Brookhaven National Laboratory, located in Suffolk County, plays a similar role in Stony Brook University’s graduate program. The collaboration among Stony Brook University, Cold Spring Harbor Laboratory and Brookhaven National Laboratory allows Stony Brook University students to complete their course work at SUNY Stony Brook and perform laboratory rotations and doctoral research at any of the three institutions.

Each year, about 50 Stony Brook University students take courses or conduct dissertation research at CSHL. The Lab’s collaboration with Stony Brook University and Brookhaven National Laboratory thus makes available to New York graduate students a range of opportunities for learning and high-level research to which they might not otherwise have access.
Undergraduate Research Program

Established in 1959, the Undergraduate Research Program is a 10-week summer program that gives undergraduates an opportunity to learn first-hand the techniques of modern biology while being immersed in a scientific community. Approximately 25 sophomores and juniors from around the world participate in the program each year, working with senior staff members on independent research projects in:

- Cancer Biology
- Neuroscience
- Plant biology
- Cellular and molecular biology
- Genetics
- Macromolecular structure
- Bioinformatics

While conducting original research at a world-class institution, students learn about scientific reasoning, laboratory methods, theoretical principles, and scientific communication. In addition, students attend seminars and special events at CSHL, and are also able to attend the Lab’s postdoctoral courses. At the end of the summer students present a summary of their research to peers and advisors.

During 2013, 27 students were selected from 738 applicants to participate in the Undergraduate Research Program, including 11 who were attending colleges and universities in New York.

The DNA Learning Center

In order to participate fully in the ongoing revolution in the life sciences – and in the economic growth to which that revolution gives rise – Long Island and New York State need a critical mass of workers and citizens who have a basic knowledge of the field. Cold Spring Harbor Laboratory was one of the first research institutions in the world to recognize the importance of introducing school-age children to biotechnology – not only as a resource for education, but also as an investment in human capital. CSHL’s leadership in science education for the public has enhanced Long Island’s strength in education.

The DNA Learning Center in the Village of Cold Spring Harbor opened in 1988 to educate primary and secondary school students in genetics, molecular biology and related topics, and provide educational programs for science teachers and the general public.

The first DNALC location is housed in an elementary school purchased from the Cold Spring Harbor School District, about a mile from CSHL’s main campus. CSHL’s DNA Learning Center was the first program of its kind dedicated to genetics education. The Laboratory renovated the building to include 5,000 square feet of usable space – including a 32-seat lab, exhibition space and classrooms.

Over time, the DNALC program outgrew the original building and in the spring of 2001, the Laboratory completed a two-story addition, increasing the size of the building to 15,000 square feet. The DNALC facility in Cold Spring Harbor is now equipped with three laboratory classrooms, a computer laboratory, 104-seat auditorium, nearly 2,000 square feet of exhibition galleries, visitor lunchroom, office space for more than 25 staff members, prep lab, video studio, conference room and staff lounge. This facility is named the Dolan DNA Learning Center.
Based on the success of the first DNA Learning Center facility, Cold Spring Harbor Laboratory in 2002 established the DNA Learning Center West in Lake Success, New York. In collaboration with the North Shore–Long Island Jewish Health System, DNALC West provides the same high-quality genetic and biochemistry laboratory space as the DNALC, but in a more accessible location for middle and high schools in Nassau County and Queens. The proximity of DNALC West to the Clinical Core Laboratory, home of one of the largest robotic machines involved in diagnostics, provides students the opportunity to tour these facilities.

In 2008, Cold Spring Harbor Laboratory opened its first educational laboratory space in New York City, located in the John S. Roberts Educational Complex in East Harlem. Operating in partnership with the New York City Department of Education and with foundation support, the Harlem DNA Lab offers middle and high school students courses and laboratory experiments in topics such as bacterial transformation, DNA restriction analysis, forensic DNA profiling, and human mitochondrial DNA sequencing. The Lab serves students from Harlem and from other New York City neighborhoods as well. About 80 percent of the participating students are African-American or Latino.

CSHL is now planning to develop a second, larger DNALC facility in Manhattan, with sufficient capacity for more than 25,000 student visits per year. The Harlem DNA Lab will continue to operate in tandem with the new center.

Programming at DNALC facilities includes:

- **Class field trips** that offer hands-on laboratory experiments, interactive computer experiences, museum exhibition, and multimedia presentations;
- **Student summer day camps** are week-long genetic workshops for students from middle school through high school;
- **Teacher Training Workshops and Fellowships** for secondary and college faculty covering RNA interference, cancer biology, and neuroscience research, as well as professional development for NYC teachers in genetics and biotechnology; and
- **Saturday DNA!** classes that provide learning experiences available to the general public.

In 2013, DNALC directly reached more than 32,800 students – 20,962 who participated in field trips to Dolan DNA Learning Center, DNALC West, or the Harlem DNA Lab, about 10,200 who benefited from in-school instruction by DNALC staff, and 1,621 who were taught by teachers trained by DNALC. Since the Center began operating in 1988, approximately 500,000 students have participated in its programs.

DNALC has also licensed its programs to several organizations elsewhere in the U.S. – including, for example, the University of Notre Dame, which in 2013 opened a DNA learning center in a new science building on its South Bend campus.
DNA Learning Center – Digital Resources

Since 1993, the DNA Learning Center has been developing and managing websites and other resources with content and tools designed for scientists, students and the general public. The DNALC’s websites fall into two categories:

- **Educational Sites** – educational, content-based Internet sites for the general public, ranging from middle school students to adults, covering topics that include basic heredity, genetic disorders, eugenics, the discovery of the structure of DNA, DNA sequencing, cancer, and plant genetics.

- **Lab and Bioinformatics Sites** – professional sites built around laboratory experiments and bioinformatics to address shortages and inefficiencies in the tools that are generally available to analyze large amounts of scientific data.

In 2013, the 22 websites administered by the DNALC collectively had more than 4.86 million visits, and its YouTube videos were viewed 823,400 times.

The DNALC also develops and distributes educational apps for smart phones and tablets. In 2013, these apps were downloaded 579,165 times. From its launch in 2009 through the end of 2013, the Center’s 3D Brain app was downloaded more than 1.6 million times.