RIGHT SKILLS RIGHT NOW

FOR TODAY’S JOB MARKET

Professional Science Master’s (PSM) offer advanced curricula and hands-on training
The Human Genome Project ushered in a new era of academic and industry research for better understanding mutations linked to different forms of cancer, finding the genetic roots of disease and using that knowledge to develop more effective and less toxic therapies for patients.

Since the Human Genome Project was completed in 2003, advances in computer technology have greatly aided the discovery process, and researchers around the globe have discovered more than 1,800 disease genes. But as the volume of data gleaned from these studies grows exponentially, so too has the demand for a new generation of research professionals who can capably wield powerful computers to sort through billions of DNA sequences (or reads) and the training for analyzing that data and making sense of it.

They’re called bioinformaticians. This fall, nine students eager to enter the field will embark on CST’s new bioinformatics program, a two-year Professional Science Master’s (PSM) degree. The bioinformatics program is CST’s fourth PSM to launch in the past several years, part of a growing trend at universities globally to offer new career pathways for those who have a bachelor’s degree in a STEM field and are interested in advanced scientific training.

As of fall 2015, there are 48 students enrolled in the college’s four PSM programs and nine graduates to date. Graduates have gone on to find new jobs, or better paying positions with a current employer, at GlaxoSmithKline (GSK), Children’s Hospital of Philadelphia, Merck, Johnson & Johnson, U.S. Army, U.S. Navy and other leading companies and government agencies.

“There’s a lot of enthusiasm for a technical level of expertise that’s above the bachelor’s degree and below the PhD,” says Ron Levy, co-director of the bioinformatics program, Laura H. Carnell Professor of Biophysics and Computational Biology and director of the Center for Biophysics & Computational Biology. “There’s a sweet spot there that’s not currently being filled, and we aim to fill it.”

The PSM, developed by the Sloan Foundation and Council of Graduate Schools, offers advanced training in science, while simultaneously developing valued business skills. A survey report from the council found more than 5,800 students enrolled in PSM programs in fall 2013, a 23 percent increase since 2010.

More than 91 percent of recent PSM graduates were employed in a job related to their field of study, the survey showed.

In addition to bioinformatics, CST offers PSM degrees in biotechnology, bioinnovation and forensic chemistry, which launched in fall 2015 (see sidebar). PSM programs take students between 18 months and two years to complete and include a capstone project and internship. Internship placements are facilitated by PSM directors and coordinators working in concert with members of each program’s external advisory board, which is made up of private industry executives and researchers from leading pharmaceutical and other scientific companies in the Philadelphia region.

Associate Professor Seema Freer, coordinator for PSM programs in biology, says advisory boards are an indispensable element of PSMs. Board members are actively involved in developing curricula with Temple faculty so students gain the skills most needed for in-demand jobs. Employers also benefit through the saved expense of not having to train new employees when they hire PSM grads.

“Our external board members love meeting with students,” says Freer. “They offer insights from their own career trajectory and advise on current trends in the field.”

The partnerships were of great value to Shirley Shpungin (BS ’13, Bio; PSM ’15, Biotech), who completed her PSM biotechnology degree while working full time as an intern at GSK. While there, she worked closely with a team of scientists to understand the science of oxidative stress in hopes of finding a new drug that targets patients with various respiratory diseases. The experience gave her new insights about ethical concerns related to environmental sustainability.

“The PSM expanded my views and enabled me to think beyond the day-to-day bench work,” says Shpungin, who is now with Johnson & Johnson.

To design the bioinformatics PSM, co-directors Levy and Professor Jody Hey teamed up with Justin Shi, faculty member from the Department of Computer & Information Sciences. Bioinformatics students will gain extensive skills in computer programming as well as a deeper knowledge of genomics and structural biology.

“There’s a tremendous need for people with the know-how to write computer code,” Hey says. “But they also need the knowledge of what the data actually means, the biology and chemistry of it, and to make the connections between the two.”

One of the new bioinformatics students is Akshay Chitturi. While earning a BS in biomedical engineering from Johns Hopkins University this past spring, he spent most of his summer and winter breaks working on computation and structural biology
projects in a laboratory at Temple’s Fox Chase Cancer Center. “The great thing about the bioinformatics program is that they have connections with many companies and organizations in a variety of fields,” says Chitturi. “It gives you a lot of options in terms of finding a company where you can fit in.”

Taking scientific discoveries made in health care, biotech, public health and other emerging fields and translating them “from the bench to the bedside” presents a host of challenges for researchers and startup companies. Bioinnovation PSM graduates receive cross-disciplinary knowledge and training needed to land jobs in corporations and with lead scientists looking to build strategies for developing, testing and marketing new technologies.

CST developed the bioinnovation curriculum in collaboration with the Fox School of Business. When Robert McNamee, Fox assistant professor and managing director of the Innovation and Entrepreneurship Institute, first learned that CST had plans to add a bioinnovation PSM, he saw a great marriage in the making. The Fox School already had a master’s program for innovation and entrepreneurship, and several of the courses are required or electives for PSM bioinnovation students. A Fox School faculty member with extensive relationships with local biotech companies helps pair students with internships.

“It’s been a very open, collaborative relationship,” says McNamee. “It’s the perfect opportunity to bring a diversity of perspectives together around the table because that’s where the really good ideas come from.”

The bioinnovation program, which started in January 2015, has been developed as the first interdisciplinary science/business program in the region, and is one of only a handful of similar master’s programs nationally, says Eva Surmacz, the program’s academic director and professor of biology (adjunct). The program, she says, is particularly attractive to Millennial-generation students who tend to be more business-oriented and seek employment in new bioscience-related sectors.

Although she earned a BS in criminal justice from Temple University in May 2014, Shahd Azab is now part of bioinnovation’s first cohort. She has already interned with Gentox, a genetic testing company, and Dream It, a partner of the program that Forbes has ranked as one of the world’s top-10 business accelerators for early-stage entrepreneurs.

“Science people don’t talk business and business people don’t talk science,” says Azab, who notes that several family members have been affected by cancer. “So the opportunity to bridge that gap and bring great ideas to help patients control and overcome their illnesses is very appealing.”

With scarce research funding leading to fewer academic career opportunities, Surmacz predicts student interest in PSMs will continue to grow. She sees several similarities with prospective students she meets. “Most are highly motivated and willing to take risks enrolling in a nontraditional program in order to have a chance for a rewarding career at the forefront of scientific discovery,” she says. “From interviews with candidates, these are people who appreciate biomedical innovation and really want to excel in this field.”

—Bruce E. Beans, with additional reporting by Brian Schleter