New BS in genomic medicine offered

Beginning this fall, CST and the Biology Department will be offering a new major: a bachelor of science in genomic medicine. The 123-credit program is designed to attract and serve the next generation of researchers and professionals interested in careers at the interface of biology and human health.

"Graduates of the program will have gained a foundation in the life sciences that emphasizes the medical relevance of genomics, evolutionary biology and informatics, making them well prepared for entry into medical school and STEM research careers in medicine," says Sudhir Kumar, Laura H. Carnell Professor and director of Temple’s Institute for Genomics & Evolutionary Medicine who led the development of the new degree program.

The program will develop a strong foundation for next-generation medical professionals, who will arrive in medical schools and laboratories fully conversant in modern biological sciences. Temple’s curriculum delivers the genomic basis of diseases and their physiology, which are taught in partnership with Temple’s School of Dentistry.

Faculty

Using the Galaxy Project’s powerful software tools, Pond says he and his research collaborators will watch for any changes in the virus during the next six to 12 months that could indicate it is evolving in a clinically significant way. “We will continue to look for any evidence that, in the wake of defensive responses by the human body, the virus is adapting or changing,” says Pond.

That will involve looking for evidence of natural selection occurring; how frequently mutations are occurring over time; variations of the virus within individual humans; and instances of mutations occurring at the same genomic positions as previous coronaviruses. Any such significant findings, says Pond, could help fine-tune the development of COVID-19 drugs and vaccines.

Creating predictive epidemiological models

Associate Professor Rob Kulathinal, currently on sabatical at the Collège de France in Paris, has unexpectedly found himself during COVID-19 confinement helping to develop new epidemiological models that can predict the spread and control of the disease.

As part of a team of mathematical biologists, Kulathinal is helping to generate a new random variable model that includes direct population-based clinical features taken from the recent literature, including SARS-CoV-2 incubation period and generation time, as well as the fraction of asymptomatics in a population and duration times between infection, symptom establishment, hospitalization, recovery and death,” explains Kulathinal. “From our simulations we have also been able to infer the effective days of confining a population and the effects of such lockdowns on deaths.”

The model, which will soon be submitted for peer-reviewed publication, suggests several strategies to guide both local and global policies—including monitoring, surveillance and population controls—in reducing the spread of this deadly virus.

Producing medical face shields

Associate Professor Tonia Hisheh, is part of the Temple University COVID-19 Assistance Team—a universitywide task force of faculty, students and staff. Hisheh is leading a face shield design and production team that is utilizing 3D printing with a goal of producing 3,000 face shields per week. The face shields have been distributed to medical staff at both Temple University Hospital and Temple’s Maurice H. Kornberg School of Dentistry. The goal is to expand distribution to other hospitals in the region.

Faculty address COVID-19 pandemic

As researchers around the world search for safe and effective drug treatments and vaccines, SARS-CoV-2, the virus that causes COVID-19 appears to be very stable in terms of its genomic, or complete DNA, makeup.

“At least at the moment, the SARS-CoV-2 virus is very homogenous and stable globally as it passes through the human population,” says Professor Sergei Pond, a researcher with Temple’s Institute for Genomics and Evolutionary Medicine. “That lack of significant change has tremendous significance for researchers looking to target the virus with potential drug treatments and vaccines.”

Pond bases that conclusion partly on data gathered by the Global Initiative on Sharing All Influenza Data (GISAID), a German-based, public-private partnership that, as of May 7, had made more than 17,000 SARS-CoV-2 genome sequences available to researchers.

Pond’s big-data analysis of the GISAID genome database indicates that, even though each virus genome contains approximately 30,000 different positions, any two randomly selected individual genomes only have eight to 10 different positions—an extremely small number—that indicate evidence of mutations.

“Given that most mutations have no effect and often aren’t transmitted, this should make it relatively easier to create an effective vaccine,” says Pond. "At least at the moment, the SARS-CoV-2 virus is very homogenous and stable globally as it passes through the human population," says Professor Sergei Pond, a researcher with Temple’s Institute for Genomics and Evolutionary Medicine. "That lack of significant change has tremendous significance for researchers looking to target the virus with potential drug treatments and vaccines."

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Temple's first female Goldwater Scholar

Leah DeFitch, a neuroscience: cellular & molecular major, has been named a Goldwater Scholar, the most prestigious undergraduate scholarship in STEM fields. She will receive $7,500 for tuition, housing and fees for her senior year as she continues neurobiology research that she has been conducting since her freshman year.

"Temple has been very conducive to undergraduate-led research," says the Pittsburgh native. "In my lab, we've basically been trying to understand the underlying molecular and genetic mechanisms of abrupt memory deficits, like delirium. It's been a great experience."

DeFitch, who has also served as a classroom assistant, has participated in CST's Science Scholars Program and Undergraduate Research Program, the Frances Velay Fellowship in STEM and the Diamond Research Scholars Program. She also is the co-president and founder of the Temple chapter of Scientista, an organization that encourages female STEM participation.

DeFitch says the cognitive decline associated with delirium can be a precursor to dementia-related disorders, like Alzheimer’s. She is excited by the potential her work can have for people suffering from these common degenerative ailments—which is why, after graduating next year, she plans to pursue a PhD in neuroscience.

Alumna now Penn State Schuykill professor

Last fall, Sarah DeVaul Princiotta (BS ’10, PhD ’16, Bio) became a tenure-track assistant professor of biology at Penn State Schuylkill. The microbial ecologist focuses her research on freshwater plankton. After earning her doctorate, Princiotta served as the director of research and education at the Lacawac Sanctuary and Biological Field Station in the Pocono Mountains. She also did NSF-funded postdoctoral research at Murray State University’s Hancock Biological Field Station in Kentucky.

"My springboard for getting into research was Temple’s Undergraduate Research Program, which I did my senior year after Professor Robert Sanders’ ecology course inspired me to pursue that field of study," says Princiotta, whose PhD advisor was Sanders.

She enjoys teaching the relatively smaller classes at Penn State Schuylkill. "I wouldn't have been qualified for this job if I hadn't served as a teaching assistant at Temple during my PhD program," she says.

Master's student reporting for newspaper

Kelly Franklin (BS ’16, Bio) who expects to earn her MS this summer, has been awarded an AAAS Mass Media Science & Engineering Fellowship by the American Association for the Advancement of Science. As a result, this summer Franklin will write science stories for The Austin American–Statesman in Texas.

Prior to coming to Temple, in 2009 Franklin earned a BFA in illustration from the Maryland Institute College of Art and then worked several years as a freelance artist and sign painter. Working with Assistant Professor Brent Sewell, Franklin’s conservation biology research focuses on the devastating effects of white-nose syndrome on little brown bats. "Since I was a child, I've always been extremely passionate about nature and art," says Franklin.

"After the fellowship, I hope to continue to build on the skills that I develop at the Statesman and cultivate a career where I utilize art and storytelling to bring science and nature to a broad audience."