BIOINFORMATICS

Emerging technologies coupled with advances in computing have enabled scientists to collect vast quantities of biological data. Genome sequencing is just one area experiencing a massive influx of information. Bioinformatics enables us to translate huge blocks of data into new, powerful knowledge with the potential to improve the human condition and tackle important environmental challenges. As we enter the era of personalized genomics for medical purposes and delve into human and environmental microbiomes, for example, the amount of data to analyze will be staggering.

At Illinois Tech the bioinformatics major blends courses in biology, chemistry, and physics with courses in programming, statistics, and other methods. Our program produces graduates who are strong in both science and their ability to develop and use tools to process data and usher in new discoveries.

Our program is scientifically rigorous, particularly in the physical sciences, while providing you with in-demand programming and other skills. It features a solid, balanced offering in STEM courses, while other programs may be more biased in one direction (biology) or the other (computer science).

Most bioinformatics positions require an advanced degree. The Illinois Tech major will prepare you for graduate school as well as entry-level technical positions.

**BIOINFORMATICS PROGRAM AT ILLINOIS TECH**

Illinois Tech's bioinformatics program offers the following pathways:

- Bachelor of Science in Bioinformatics (B.S.)
- Minor in Bioinformatics
- Bachelor of Science in Biology (B.S.) and Master of Science in Computer Science (M.S.)

Illinois Tech's accelerated master's degree programs allow you to receive both your bachelor's and master's degrees in as few as five years.

Our major combines courses from the biology, applied mathematics, and computer science departments, and it benefits from the university's traditional strengths in computer science/computation. Courses include programming in Perl, C++, and Java; data structure and algorithms; data mining; statistics; human biology; genetics; genomics and transcriptomics; and more.

**You can choose from two tracks:**

Applied Bioinformatics focuses on the use of computer science, statistics, and information technology to create tools to process and analyze biological data. This track has more required and elective courses in computer science.

Computational Biology is the advancement of understanding of living systems through computation. This track has more required and elective courses in biology.

**BE AN INNOVATOR—IPRO AND PROJECT-BASED LEARNING**

In Illinois Tech’s signature Interprofessional Projects (IPRO) Program, you'll work with students from various majors to solve real-world problems. This hands-on collaborative experience gives our students a big advantage after graduation.

Recent IPROs involving biological sciences, computing, and big data include:

- Using big-data visualization to improve responsiveness to natural disasters
- User interfaces for novel computer-aided drug design tools
- Simulating and visualizing molecules moving through biological nanopore sensors

**RESEARCH—EVEN AS AN UNDERGRAD!**

Undergraduates at Illinois Tech get the opportunity to work on major research right from the start. You might participate in a professor’s research lab, work for a company on campus in University Technology Park, or do an internship in the city. Our new Elevate program consists of summer courses that allow all undergraduates to experience research early in their careers at Illinois Tech (the summer after your first year, or the summer before your first year for transfer students). We also offer $5,000 Undergraduate Summer Research Stipends to select students. The university has strong partnerships with nearby Argonne National Laboratory, Fermilab, and other leading research institutions and universities. Illinois Tech has also launched a new Center for Interdisciplinary Scientific Computation.

If you're interested in both biology and computer science, bioinformatics may be a good fit for you.
TAKE A VIRTUAL TOUR

Visit us now! Log on to it.edu/virtualtour to view a cool online virtual tour of our buildings, labs, open spaces, and more!

Maximize Your Education

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RESEARCH ON THE EDGE

Bioinformatics program head Jean-François Pombert, assistant professor of biology, is an expert in computational genomics and a former Louis-Berlinguet/Genome Québec-Postdoctoral Fellow with more than 20 years of experience in the field. In the Pombert Lab, research revolves primarily around comparative genomics and the evolution of pathogenicity. The lab uses a mixture of open-source tools from the community or developed in-house to sequence, assemble, annotate, and analyze genomes from all kingdoms of life.

In a current project funded by the National Institutes of Health, Pombert and his undergraduate student researchers are sequencing the DNA of microsporidia, parasites often found in HIV patients, and developing new approaches to investigate the metabolic profiles of these organisms. Through sequencing and computational analysis, they hope to increase an understanding of these parasites, which could lead to techniques for improved treatment.

“When I started, generating genome sequence data required weeks to months of lab work. Now? Massive amounts of data can be generated on any given day. That data must be analyzed, and this is done on computers. Genomics and transcriptomics could not exist without bioinformatics.”

—Assistant Professor of Biology Jean-François Pombert

HANDS-ON BIOINFORMATICS

As a research assistant in Assistant Professor of Biology Jean-François Pombert’s lab, Ali Mahmoud (Bioinformatics 4th Year) studied genetic divergence between species with the support of a College of Science Undergraduate Summer Research Stipend. A Camras scholar and vice president of the Arab American Association of Engineers and Architects, Ali won first place at Arch Hacks hackathon at Washington University in St. Louis for the health development app he co-created. The app obtains patients’ health data and transmits it to a live website, where it is analyzed and can be accessed by patients’ physicians.

“The co-terminal program was something I really wanted to do because it’s very versatile.”

—Iva Veseli (Biology/M.S. Computer Science ’18)

During Iva’s first year at Illinois Tech, her advisor pointed her toward Jean-François Pombert’s lab, where she conducted research in computational biology for three years. Her research included sequencing the DNA of six bacteria that had never been sequenced previously. While working in Pombert’s lab, she was awarded a National Science Foundation Graduate Research Fellowship Program scholarship to pursue her Ph.D. in the biophysical sciences at the University of Chicago. Iva held a research fellowship with the American Society for Microbiology and also received a College of Science Undergraduate Summer Research Stipend. Iva also participated in Illinois Tech’s co-terminal/accelerated master’s degree program, which allows students to complete master’s degrees in as early as their fifth year of study. With her Advanced Placement credits, Iva was able to complete the combined program in four years.

Opportunity Awaits

Although the U.S. Bureau of Labor Statistics does not provide information on the outlook for people in bioinformatics, it forecasts a 19 percent annual growth for computer and information research scientists from 2016–2026, and it reported $118,370 median pay in 2018.