

Minor in Bioinformatics

In the early 21st century we have gained the ability to decipher and (in some cases) manipulate the genetic instructions of living organisms. We have also seen dramatic advances in imaging technologies from the macro to nano scales (Satellites/UAVs, hyper-spectral imaging, GPS, MRI, confocal and two-photon microscopy, x-ray crystallography, etc.). Concomitant with, and underlying these advances, has been a revolution in information technology in which we have seen ever-accelerating computational processing speeds and ever more massive data sets. These changes are driving a fundamental transformation of the biological sciences.

In order to provide our students with the educational foundation they need to not just flourish, but to lead in this dramatically altered environment, we are instituting a new **minor** in the area of **Bioinformatics**, to provide effective training at the interface of biological applications and computational tools. While students will be trained using the most advanced instruments, tools and applications available, the minor will focus on core concepts and approaches, to provide a durable skill set that can be applied to new tools and applications that will inevitably arise at an accelerating rate. The core curriculum of the minor will cover the essentials of effective computation, as well as the handling, exploration and utilization of large data sets.

Core curriculum (16-17 cr total): A student must complete at least one course in each of 5 categories. In addition, while not required, independent research is strongly encouraged.

Introduction to computation (4 cr)

Choose one of the following courses:

CSCE 110, Programming I (4 cr)

CSCE 111, Introduction to Computer Science Concepts and Programming (4 cr)

Biological molecules and processes (3 cr)

Choose one of the following courses:

BIOL 213, Molecular and Cell Biology (3 cr)

GENE 302, Principles of Genetics (3 cr)

GENE/BIMS 320, Biomedical Genetics (3 cr)

Bioinformatics fundamentals (3 cr)

BIOL 451, Bioinformatics

Computational bioinformatics (3 cr)

BIOL 350 (BIOL 470/670 in fall 2016), Computational biology (3 cr)

Applied bioinformatics (3-4 cr)

Choose one of the following:

BIOL 450, Genomics (4 cr)

BICH 464, Bacteriophage Genomics (3 cr)

BICH/GENE 419 Computational Techniques for Evolutionary Analysis

VTPP 438, Analysis of Genomic Signals (3 cr)

BIOL 430, Biological Imaging (4 cr)

STAT 446, Statistical Bioinformatics (3 cr)

Independent research

Independent experiences that are tailored to student interests and administered through 491 Research courses offered in multiple departments/programs are strongly encouraged

NOTE: If a course in statistics is not already required for the student's major then STAT 211, 301, 302, or 303 is strongly recommended.