

Bioinformatics Program

For more information, please visit: <http://www.bioinformatics.med.umich.edu/>

Bioinformatics is a new discipline that is developing to meet the need for computational methods to integrate, model, store and retrieve biomedical data and ultimately to use this information to better understand biological systems. Scientists in biomedical informatics need multi-disciplinary skills and knowledge distinct from those of other disciplines. The goal is to elucidate and to quantify the complex web of interactions that link the numerous hierarchical levels of organization from DNA sequence to integrated behavior of the intact organism in its environment.

We are rapidly assembling the "parts catalog" for many organisms. Yet, by comparison, we still know relatively little about the integrated system -- what makes it a living cell, or how it will respond to a novel environment or to a specific change in its genome. In short, our knowledge is still fragmented and descriptive; we have almost no understanding of the "design principles" that govern interactive biological systems. From this perspective it is clear that the principal goal of bioinformatics for some time to come will be to understand the integrated behavior of the intact organism (the phenotype) in relation to its underlying molecular determinants (the genotype).

Program Requirements for a Ph.D. Degree

Coursework: In addition to all PIBS requirements, Bioinformatics students demonstrate knowledge in five core areas of Bioinformatics:

- Molecular biology
- Molecular structure and physics
- Databases and computational methods
- Probability, statistics and pattern recognition
- Systems modeling

This knowledge may be gained through coursework, prior knowledge or independent reading. In addition, specific coursework may be required to prepare for a student for their specific thesis project.

Specific Course Requirements: Students are required to take at least one semester of Bioinformatics Seminar (Bioinfo 511) and are strongly recommended to take the Computational Molecular Biology Journal Club (Bioinfo 602) and Introduction to Bioinformatics (Bioinfo 526).

Research: Students must complete at least two full rotations (Bioinfo 990) with Program affiliated faculty members, and are expected find their thesis lab by the end of their first year.

Preliminary Examination: The Preliminary Examination in Bioinformatics has both written and oral components. For the written component, the doctoral pre-candidate will prepare a condensed version of an NIH grant proposal for a research project that is not their thesis project. In the oral component, the student will defend that proposal to an examining committee composed of Bioinformatics affiliated faculty and will respond to questions from the committee to demonstrate their general knowledge of Bioinformatics.

Teaching Requirement: One semester as Graduate Student Instructor (GSI).

Bioinformatics Students

Since Bioinformatics is a new program, no Ph.D. degrees have been conferred yet. The Program expects the students to complete their Ph.D. degree in 4-5 years. Considering the multidisciplinary nature of Bioinformatics, the Program expects their students upon graduation to see fit variety of careers ranging from academic positions to industry work and work in governmental agencies.