

Vanderbilt University
Department of Biomedical Informatics
BMIF 311: Systems Biology

Instructor: Shawn Levy, PhD

Time: M-W 2:00 – 3:30 pm

Location: TBA

This survey course presents the student with the historical, conceptual and technical foundations of systems biology as it relates to biomedical research using model systems as well as human disease. Prerequisite: BMIF 310 Foundations of Bioinformatics.

Major topics include:

- 1) Philosophy of systems biology
- 2) Origins of systems level analysis
- 3) Systems biology and its role in biomedical research
 - a) Basic research
 - b) Translational research
 - c) Clinical records and systems biology intersection
- 4) Experimental design
 - a) Linking discovery and hypothesis-driven science
 - b) Design considerations for high dimensionality data
- 5) High throughput protein detection, quantification, and analysis
- 6) High throughput DNA detection, quantification and analysis
- 7) High throughput RNA detection, quantification and analysis
- 8) Strategies for implementation and analysis of high throughput technologies
- 9) Integration of biological data platforms for enhanced analysis
 - a) Integration of genomic and proteomic data
 - b) Genomic variation and integration with phenotypic data
 - c) Genomic structure data and integration with expression data
 - d) Integration of bench work and computational biology
- 10) Examples of ongoing systems biology projects