

Bemidji State University

BIOL 4447: Genomics

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: *.*

Lab Hours/Week: *.*

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

Genomics is the study of the content, structure, organization, evolution, and conservation of whole genomes. Because of its reliance on precision instrumentation and scale, and the unprecedented volume of data produced, genomics is unusual among biological disciplines in its integration of engineering, statistics, and information science. Genomics also requires the biologist to engage in systems thinking by taking a wide view of the dynamic physical and informational network that comprises a single genome. One must further consider the human genome as itself a component of an even larger network of genomes that make up the holobiont—that's us plus our always-changing resident community of microbial pals. After covering these and other topics, and carrying out a substantial genome annotation project for the lab component of the course, we explore personal genomics, or how all this information and understanding affects our lives as 21st century human beings. Prerequisite: BIOL 2360.

B. COURSE EFFECTIVE DATES: 08/21/2017 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Genome Technology
2. The Hologenome
3. The Informational and Three Dimensional Genome
4. The Personal Genome

D. LEARNING OUTCOMES (General)

1. . understand the scale of biological data being generated by whole genome sequencing and the reliance of biologists on computer scientists, mathematicians, statisticians, and engineers for the tools and algorithms necessary to generate, process, and analyze sequence data.
2. . use systems thinking to understand how genomes are complex, dynamic, and evolving networks and how multiple species' genomes can exist in larger competitive or cooperative networks.
3. . describe the origins and techniques of genome sequencing technology and the mechanisms and impact of so-called 'next-generation' sequencing and emerging single-molecule approaches.
4. . identify areas of the human body that are routinely colonized by microbes and explain the importance of those commensal biological relationships and the impact of their disruption on health and disease.
5. . compare informational and spatial organization of genomes between eukaryotes and prokaryotes, and analyze the role of different levels of organization in gene expression and disease.
6. . differentiate between realistic goals for precision or personal medicine and business- or policy-driven hype

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted