BIOL 338: Introduction to Genomics

Structure and function of genomes; impact on other areas of biology

Lecture and tutorial course intended for third year students

Pre-req: Genetics (BIOL 234, 233; FRST 302)

Course learning objectives

At the end of this course students will be able to:

1. Demonstrate a working knowledge of concepts and recent discoveries in genomics
2. Explain how technological advances have led to conceptual advances in genomics
3. Apply concepts and discoveries in genomics to human diseases, crop plant improvement, other applied situations
4. Use major web resources in genomics
5. Identify the main results from a genomics research study, interpret figures from a primary research paper in genomics

Course organization

Five sections of the course:

1. Contents and organization of genomes
2. Genome sequencing and annotation
3. Genomics approaches to studying gene expression
4. Comparative genomics
5. Research in genomics

Challenges

- Discussion about broad range of topics from molecular biology to medicine, but no particular textbook available: what text should be provided?
- Genomics as a system-level biology, handling large number of data/samples in a consistent manner, requires bioinformatics skills: what level of bioinformatics would be adequate for 3rd yr?
- Hopes to provide the first exposure to genomics as a fundamental and exciting discipline: how to excite student about genomics?
- Tutorial sections consist of paper discussion, computer exercises, and other interactive modules.

Tutorials: paper, computer exercise, and interactive modules

- Interesting primary literature
  - Transposable elements, Sex chromosomes, Genome assembly, Proteomics, Exome sequencing, CRISPR
- Data-mining exercise: on-line databases
  - Sequence database, Predicting protein function, Gene expression/human genome
- Interactive modules
  - NGS technologies (teaching within a group of 4-5), Personal genomics (interview with neighbor/family member)
- Research in genomics
  - Guest lectures (research at UBC)

Interactive module: Interview

- Personalized genomics: 23andMe.ca service
- You may be asked to provide such info.
  - Interview someone that you know well about the public acceptance and knowledge about the advances of personalized genomics.
  - Male/Female bias: psychology
  - Age-dependent issues: newborn, marriage/job, improving the quality of living
  - Expected case scenarios will be provided as a brochure for the next round...