BIOL 2035

Division: Natural Science and Mathematics
Department: Biology
Course: BIOL 2035
Title: Introductory Genetics Laboratory
Catalog Description:
This laboratory course allows for student experimentation and application of principles learned in the Introductory Genetics lecture course.
General Education Requirements: Individual Choice
Semesters Offered: Fall
Credit/Time Requirement: Credit: 1; Lecture: 0; Lab: 2
Clock/Hour Requirements: 0
Offered for Non-Credit: No
Prerequisites: Any biology core course such as BIOL 1010, 1050, 1610, etc. or instructor permission

Corequisites: BIOL 2030 (formerly BIOL 2760)

Justification:
The Introductory Genetics laboratory course (BIO 2035) and lecture (BIO 2030) are part of the biology majors lower division core. These courses are taught at every institution except Utah Valley State College. At Weber State University and Utah State University, the courses are ZOOL 3300 and BIOL 3200, respectively. Our students receive credit for the Utah State University lecture course and for the lab course BIOL 4100. The University of Utah has only the lecture course BIOL 2030. Some of the institutions have not yet changed the course designations and numbers. In order for Snow College students to transfer as juniors on track in their majors programs to these institutions, genetics should be offered. The laboratory component of this course (BIO 2035) is to give additional learning opportunities to our students so that they should be well prepared to transfer to the four year institutions. "Labs for learning" is a hallmark of Snow College.

Student Learning Outcomes:

Upon successful completion of this course, students will:

- understand basic gene function in prokaryotes and eukaryotes, cell division processes of fission and mitosis, recombination in viruses and bacteria and in eukaryotes (meiosis and molecular techniques), and how these relate to mechanisms of inheritance and gene expression in both individuals and populations
- begin to understand how mathematical models and simple statistics are used in applying the scientific method to basic concepts in genetics
- be introduced to current computer programs for genetic manipulation and genome analysis as well as some laboratory instrumentation including microscopes, computers, thermocyclers, microcentrifuges, laminar flow hoods, safety cabinets, etc., and to aseptic technique and other laboratory procedures for

manipulating genetic material

- have a basic understanding from which to evaluate critical issues surrounding "genetic engineering" and the Human Genome Project

Content:

This course will include:

- laboratory topics
  - mitosis (Allium, whitefish)
  - meiosis (Zea, {Lilium, Ascaris})
  - autosomal dihybrid F2 and testcross ratios (Zea)
  - epistatic ratios (Zea)
  - genome analysis promoter sequences, Shine-Dalgarno, ORFs (open reading frames), exons, introns, etc.
  - DNA restriction digests, ligation, gel electrophoresis and bacterial *(E.coli)* transformation
  - plasmid extraction and analysis
  - PCR experiment with an analysis of plasmid, human/or plant DNA
  - two-point mapping (Drosophila, Zea)
  - three-point mapping (Drosophila, Zea)
  - tetrad analysis (Sordaria)
  - X-linkage (Drosophila) and nondisjunction and aneuploidy, chromosomal mutations (human syndromes).

General Education Outcomes:

2) Write clearly, informatively, and persuasively.
Each student will submit written lab reports that will be evaluated for appropriate format, information content, and accuracy. There will also be one major laboratory write up to be written in the standard format for scientific literature and evaluated accordingly.

4) Retrieve, evaluate, interpret, and deliver information through a variety of traditional and electronic media.
Students will complete one major laboratory project which will require the use of traditional and electronic media.

7) Apply scientific reasoning to a variety of contexts.
Students will demonstrate scientific reasoning throughout the various topics considered in course content in their responses to lab projects, discussions, etc.

Key Performance Indicators:

- Lab reports include recording observations and data, appropriate calculations, results and discussion of results - what worked, what didn't and why. Also, some labs have included problems to be solved. The classical genetics portion (topics #1 to 4, 9 to 12) of the lab experience is worth 50% of the total grade.
- The molecular genetics portion (topics #5 to 8) of the lab is worth 50% of the total grade.

- The final exam is comprehensive by nature and includes objectives that should have been learned in the lab, but the final exam does not count toward the lab grade.

Percentages are approximate.

Representative Text and/or Supplies:

- Laboratory hand outs prepared by Joseph M. Papenfus, PhD and Kevin N. Sorensen, PhD.

Optimum Class Size: 12
Maximum Class Size: 24

Signatures:

I hereby submit this course syllabus:

Allan Stevens, , Professor

I hereby find this course consistent with the goals and resources of the Biology Department:

Allan Stevens, , Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

Michelle Olsen, MLS, Campus Librarian (Richfield Campus)