

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

GENERAL GENETICS
BIOL 2120

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 2.0

Date Revised: Spring 2011

Catalog Course Description:

Mendelian genetics, chromosomal inheritance, modified Mendelian ratios, chromosome mapping, linkage, gene and chromosomal mutations, recombination, gene expression, recombinant DNA technology, transposable elements, extranuclear genome, and population genetics, and quantitative genetics. Course includes three hours of lecture and three hours of laboratory applications each week.

Entry Level Standards:

The student should have a good understanding of basic biology and chemistry. Reading and writing at the college level is expected. Basic math skills (arithmetic, determining ratios) are needed as well.

Prerequisites:

BIO 1110 or CHEM 1110 or CHEM 1010 or BIOL 2010

Co-requisites:

None

Textbook(s) and Other Course Materials:

Russell, Peter J. 2006. *iGenetics A Mendelian Approach*. San Francisco: Pearson Education/Benjamin Cummings.

Palladino, Michael A. 2000. *Lab Manual for BiologyLabs On-Line. Genetics Version*. New York: Addison, Wesley and Longman. [Includes 6 month subscription to *BiologyLabs On-Line* Website.]

I. Week/Unit/Topic Basis:

Week	Topic
1	Genetics; An introduction, Chromosomal basis of Inheritance
2	Mendelian genetics
3	Extensions of Mendelian genetic principles
4	Non-Mendelian inheritance; Population Genetics
5	Variations in chromosome structure and number
6	Gene mapping in eukaryotes

- 7 DNA replication, Gene function
- 8 DNA the genetic Material
- 9 Gene function, Gene expression: Transcription
- 10 Gene expression: Transcription, Gene expression: Translation
- 11 DNA mutation and repair, and Transposable elements
- 12 Genetics of bacteria and bacteriophages
- 13 Regulation of gene expression in bacteria and bacteriophages
- 14 Regulation of gene expression in Eukaryotes
- 15 Recombinant DNA technology Applications of recombinant; Genetics of cancer

II. Course Goals*:

The course will:

- A. Gain knowledge and appreciation of the complex and dynamic processes of storing and retrieving genetic information within the cell. V.3, V.4
- B. Apply critical thinking skills in analyzing genetic data and determining modes of inheritance. V.2
- C. Develop skills in searching current and classic historical literature sources in genetics and evaluating the information in terms of scientific validity. V.3, VII.3, VII.4
- D. Develop an appreciation of the techniques and potential of genetic engineering, as well as the responsibility for scientific integrity. V.1, V.5

*Roman numerals after course objectives reference goals of the Natural Sciences program (Career Program Goals and General Education Goals are listed http://www.pstcc.edu/departments/curriculum_and_instruction/syllabi/)

III. Expected Student Learning Outcomes*:

Students will be able to:

- 1. Predict the outcome of crosses involving autosomal traits, sex-linked traits, multiple alleles, and incomplete dominance. A, B
- 2. Explain the connection between the chromosomal theory of inheritance and predictions of outcomes of crosses based on Mendelian genetics. A, B
- 3. Explain deviations in Mendelian ratios based on multiple alleles, lethal alleles, multiple genes, penetrance, expressivity and linkage. A, B
- 4. Compare results of genetic crosses with predicted ratios and evaluate significance of deviations using chi square analysis. B
- 5. Distinguish between mutations in somatic versus germ line cells and their impact on the individual and species. A

6. Predict the impact of silent, frameshift, deletion and insertion mutations within a gene. A, B
7. Compare and contrast mutations affecting chromosomal structure and number. A
8. Distinguish among various methods of genetic recombination in microorganisms: conjugation, transformation, and transduction. A
9. Discuss the use of recombination in microorganisms as a tool in mapping both prokaryotic and eukaryotic genomes. A, B
10. Explain the interactions among DNA, RNA and proteins in the Central Dogma of Molecular Biology. A, C
11. Discuss the steps involved in recombinant DNA techniques: restriction enzyme digestion, gel electrophoresis, restriction mapping, cDNA libraries, DNA libraries, Southern, Northern and Western blotting, cloning, DNA sequencing, RFLP mapping, DNA fingerprinting and PCR. A, B, D
12. Compare and contrast the structure of prokaryotic and eukaryotic DNA. A
13. Identify factors involved in changing allelic frequencies in populations: natural selection, mutation, inbreeding, genetic drift, immigration. A, B
14. Calculate allelic frequencies using Hardy-Weinberg equilibrium. B
15. Discuss the role of transposable genetics elements in retroviruses, bacteria and eukaryotes. A
16. Identify sources of extra-chromosomal inheritance and discuss classic examples of mitochondrial and chloroplast genes. A, C
17. Gather, organize and interpret genetic data, presenting the results in a formal laboratory report. B, C

* Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

IV. Evaluation:

A. Testing Procedures: : 47.3 % of grade (450 points)

Three exams, each worth 100 points, will be given during the semester. If an exam is missed, there will be no make-up exam. The student will receive a 0 for a missed exam. The lowest of these exam scores may be replaced by doubling the final exam score.

A final exam, worth 100 points, will also be given. This will be a comprehensive exam, though new material not covered on previous exams will be weighted more heavily. The final exam **MUST** be taken.

Exams will consist of a combination of multiple choice, essay, short answer, problem solving and matching questions. Essays will be evaluated on organization as well as content. Calculators may be used in the exams, though information **may not be stored** in memory in preparation for the exams.

In-class quizzes, and/or other assignments worth 50 points, the instructor will inform you of chapter quizzes and other assignments during the course of the semester.

B. Laboratory Expectations: 47.3 % of grade (450 points)

Participation in laboratory exercises is mandatory.

C. Field Work: 5.2 % of grade (50 points)

Genetic Disease report, worth 50 points, One (3-5 page) written report will be submitted by each student on a human genetic disorder of their choice. The report is expected to include introduction to the disease, phenotype and genotype of the disease, frequency in the population, and a pedigree showing inheritance pattern. More instruction will be provided at a later date.

D. Other Evaluation Methods:

None

E. Grading Scale:

A	850-950 points
B+	800-849 points
B	750-799 points
C+	700-750 points
C	650-699 points
D	550-649 points
F	Below 550 points

V. Policies

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of the Learning Division, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of the Learning Division.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at www.pstcc.edu/departments/swd/.

D. Other Policies:

Cell phone usage:

Use of cell phones in classroom is inconsiderate and disruptive. If cell phones must be brought into the classroom, they need to be turned off or placed on silent mode. During exams, all cell phones must be turned off and stored out of sight. Students wishing to use a calculator during exams MAY NOT use the calculator function on a cell phone.

Late assignments:

All assignments are due at the beginning of the class period. Late assignments will only be accepted as indicated above; 10% per day late penalties will be deducted from the grade, including the day the assignment is due.