

BIOL 3444, GENETICS

Fall Semester, 2014

Biology Department, Dr. Jacqueline Horn, Department Chair

COURSE DESCRIPTION

This course deals with the molecular and chromosomal basis of inheritance. Topics include Mendelian and non-Mendelian inheritance, population genetics, and molecular genetics. This course includes one semester hour credit for laboratory sessions.

COURSE SEQUENCE IN CURRICULUM

This course should generally be taken after Biology 2454, 2455, and 3301 and before the other upper level biology courses.

PRE-REQUISITE INFORMATION

BIOL 2454, 2455, and BIOL 3301 or BIOL 2404, 2414

INSTRUCTOR INFORMATION

Name: Dr. Curtis Henderson
E-mail: chenderson@hbu.edu
Office Phone: 281-649-3192
Office Location: S220
Office Hours: Wednesday and Thursday 2:00-4:00
Web Page Address, Web Board, ListServ: learn.hbu.edu

LEARNING RESOURCES

Course Text: Genetics, from Genes to Genomes, Fourth edition. Hartwell, Leland, et.al. McGraw Hill, Boston, MA, 2011
Laboratory Text: None
Supplementary Text: as chosen by instructor.
Other Required Materials: Genetics Workbook, Jackie Horn, HBU.

COURSE OBJECTIVES

Purpose of the course:

This course provides the student with a general understanding of the principles and mechanisms of inheritance and reproduction. These principles and mechanisms are universal throughout life and must be understood by all biologists. The course deals with the physical and chemical basis of inheritance and includes both classical genetics and modern molecular genetics. Emphasis is placed on problem solving. Forty-four hours of laboratory work are included.

Aims for the course:

To give students an appreciation of the complexity and universality of genetic concepts and their importance to all aspects of biology.

On completion of this course, students should be able to:

1. understand the principles of Mendelian genetics.
2. understand the role of DNA in heredity.

3. understand the mechanism of sex determination in humans and selected other organisms.
4. understand mechanisms used to study human genetics.
5. learn how several genes cooperate to produce a given trait.
6. learn the effects of inbreeding.
7. understand the nature of chromosomes and chromosomal aberrations.
8. understand the mechanisms and effects of gene mutations.
9. attain a proficiency in solving complicated genetics problems.
10. learn how genes on the same chromosome behave during genetic analysis.
11. understand the mechanisms and importance of gamete formation.
12. understand the behavior of genes in populations.
13. understand the use of genetic engineering in detecting, analyzing, and correcting genetic information.

RELATION TO DEPARTMENTAL GOALS AND PURPOSES

“The Biology Department will:”

“...prepare students for their careers by offering biology courses with an academically rigorous, contemporary curriculum to support their major requirements or liberal arts education and to encourage a lifetime of learning.”

“...offer experiences for undergraduate research in the biological sciences that provide the opportunity to develop professionalism and skills in experimentation and data analysis, interpretation, and presentation.”

“...provide mentoring and experiences that enable students to graduate in an appropriate time with the appropriate qualifications and professional attitudes required for success and service.”

“...provide a Christian environment in which students, faculty and staff integrate the principles of the biological sciences with their faith.”

RELATION TO COLLEGE GOALS AND PURPOSES

“...to prepare students for careers and further education in the natural sciences and mathematics in a nurturing Christian environment. The College will also serve the HBU community by providing science and mathematics classes that empower HBU students to meet the goals and requirements of their field of study and enrich their liberal arts education.”

RELATION TO THE PURPOSE STATEMENT OF THE UNIVERSITY

University mission and purpose statement from the Houston Baptist University Catalog, 2009-2010: “...to provide a learning experience that instills in students a passion for academic, spiritual, and professional excellence as a result of our central confession, “Jesus Christ is Lord”

“...Committed to providing a responsible and intellectually stimulating environment that:

- fosters spiritual maturity, strength of character, and moral virtue as the foundation for successful living
- develops professional behaviors and personal characteristics for life-long learning and service to God and to the community
- meets the changing needs of the community and society
- remains faithful to the ‘**Nature of the Institution**’ statement”

“...Promotes learning, scholarship, creative endeavor, and service”.

ATTENDANCE

Please see the official Attendance Policy in the HBU Classroom Policy on Blackboard. Students missing more than 25% of the class will be given a failing grade.

I will permit students to be absent from a maximum of three class meetings that are scheduled in this syllabus for MWF and two for TTH courses during the Fall and Spring semesters. Upon the next and each subsequent absence, one point will be subtracted from the overall final grade.

ACADEMIC ACCOMODATIONS

Students needing learning accommodations should inform the professor immediately and consult the Academic Accommodations section of the HBU Classroom Policy posted on Blackboard.

COURSE REQUIREMENTS & GRADE SCALE

Course requirements:

There will be three lecture exams, three problem-based lab exams, and one comprehensive Final exam during the semester. Each lecture exam and the Final exam will count 15% of the student's course grade. Each of the problem-based exams will count 10% of the student's course grade. In addition, students will engage in active learning assignments (ALAs) throughout the course as assigned by the instructor.

EXAM Schedule

Lecture Exam 1	15%
Problem Exam 1	10%
Lecture Exam 2	15%
Problem Exam 2	10%
Lecture Exam 3	15%
Problem Exam 3	10%
Final Exam	15%
ALAs	10%

Last Day to drop WITH a 'W' – October 31

Grading standards:

The grading scale is as follows:

A = 100-89.5;	B = 89.4-79.5;	C = 79.4-69.5;
D = 69.4-59.5;	F = Below 59.5.	

PROFICIENCIES:

Technology component:

The students are expected to use Internet sources to access assigned problem-solving material.

Designated essay/writing component:

Exam questions will include essays and explanations.

Reading component:

Reading the textbook will be essential to understanding of course material and for completion of Active Learning Assignments.

Oral communication component:

Class discussions expect each student to present their ideas in a concise, convincing manner when topics are discussed.

Mathematics component:

Some of the problems involve algebraic and statistical concepts in order to solve them. Interpretation of graphs and data is also expected.

Critical thinking component:

The laboratory includes exercises which require students to make observations, formulate hypotheses, perform experiments, analyze data, and reach scientifically sound conclusions based on the data and observations obtained. Students learn problem solving strategies. Exams reflect the necessity for critical thinking.

LATE WORK & TEST POLICY

Late work:

Missing a class will be the responsibility of the student. The student must get notes from other students or arrange to have the lecture recorded. Ten points are subtracted if the assignment is 1 minute to 24 hours late. Ten additional points will be subtracted for each 24 hours that an assignment is late. Remember, an in-class A/Q assessment can NOT be made-up; you must be in class to participate in these "Pop" grading opportunities.

Missed tests:

A medical (including a note from a physician) or other instructor-approved excuse is necessary to take a make-up exam. Each student will be allowed ONLY ONE make up exam. Any other missed exam will receive a grade of zero.

EVALUATION

Method of student appraisal of faculty:

Students will be given an opportunity to appraise the professor by completing the IDEA Faculty Evaluation Questionnaire, and/or the COSM course evaluation at the end of the semester. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

Method of evaluating student response to course:

Students will be given an opportunity to describe their response to the course by completing the IDEA Faculty Evaluation Questionnaire and/or the COSM course Evaluation at the end of the course. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

LABORATORY DRESS CODE

Students may be asked in advance to wear closed-toed shoes and long pants during certain experimental procedures.

LABORATORY CONDUCT AND SAFETY

IMPORTANT INFORMATION FOR THIS COURSE: IF A STUDENT IS PREGNANT OR NURSING, SHE WILL NOT BE ALLOWED TO ATTEND THE LABORATORY SESSIONS BECAUSE SOME OF THE CHEMICALS, WHICH ARE NORMALLY INNOCUOUS, USED IN THESE LABORATORY EXPERIMENTS, MAY BE HARMFUL TO A DEVELOPING FETUS. IF A STUDENT BECOMES PREGNANT DURING THE COURSE, SHE MUST STOP ATTENDING THE LABORATORY SESSIONS IMMEDIATELY AND SHE IS TO NOTIFY HER PROFESSOR. THE PROFESSOR WILL DISCUSS OPTIONS THAT THE STUDENT WILL HAVE TO ENABLE HER TO COMPLETE THE COURSE REQUIREMENTS.

TOPICAL OUTLINE - *include table, calendar, or topical outline with dates*

Lecture Topic Outline:

Elements of Heredity and Variation (Chapter 2,3)
Chromosome Theory of Inheritance (Chapter 4)
Gene linkage and Chromosome Mapping (Chapter 5)
The Eukaryotic Chromosome (Chapter 12)
EXAM 1 – September 15 (in lab time)

DNA Replication, Transcription, Translation (Chapter 6, 8)
Mutations and Mutagenesis (Chapter 7)
Chromosomal Rearrangements (Chapter 13)
EXAM 2 – Oct 13 (in lab time)

Last Day to drop WITH a 'W' – October 31

Recombinant DNA Technology (Chapter 9, 10)
EXAM 3 – November 10 (in lab time)

Regulation of Gene Expression in Prokaryotes (Chapter 15)
Regulation of Gene Expression in Eukaryotes (Chapter 16)
Genetics of Cancer (Chapter 17)

FINAL EXAM - TBA

Topic Outline (Laboratory):

Mendelian Genetics and Extensions of Mendel
Chi Square
Pedigree Analysis
Lab Exam 1 – September 22
Gene Linkage
Predictions Based on Linkage Maps
Biochemical Pathways and Complementation Groups
Lab Exam 2 – October 20
Population Genetics and Hardy-Weinberg 1
Population Genetics and Hardy-Weinberg 2
Lab Exam 3 – November 17
DNA Restriction and Analysis – Part 1
DNA Restriction and Analysis – Part 2

The content of this outline and the attached schedule are subject to change at the discretion of the professor.

Student Signature – I have read and understand the syllabus for this class. I understand that the content of this syllabus and the topical outline are subject to change at the discretion of the professor. I have read and understand the HBU Classroom Policy posted on Black Board. **I promise to uphold the Code of Academic Integrity at Houston Baptist University and will not tolerate its violation by others.**