Instructor: Dr. Jerald D. Hendrix  
Science 528  
470 578-6437  
jhendrix@kennesaw.edu  
http://science.kennesaw.edu/~jhendrix

Office Hours: Summer office hours by appointment

Prerequisite: A grade of “C” or better in BIOL 1107/1107L and CHEM 1211/1211L


Lecture: Monday & Wednesday, 8:00 – 10:45 am  
CL 2007

Scantron Sheets: You are required to provide your own Scantron Sheets, available at the KSU bookstore. The only approved and required form is the Scantron Answer Sheet Form No. 4521

**Catalog Description**

BIOL 3300 - Genetics  
3 Class Hours 0 Laboratory Hours 3 Credit Hours  
Prerequisite: A grade of “C” or better in BIOL 1107/1107L and CHEM 1211/1211L.  
This course presents fundamental principles and applications in genetics. Students learn how traits are inherited and to use this information in predicting and analyzing genetic outcomes. Students study nucleic acid structure, learn how DNA replicates and how genes are expressed. Mutation at the gene and chromosomal levels will be surveyed, and their effect on gene structure and function examined. Finally, students will explore various genetic methods, including pedigrees, mapping, and molecular techniques.

**Academic Integrity Statement**

Every KSU student is responsible for upholding the provisions of the Student code of Conduct, as published in the Undergraduate and Graduate catalogs. Section II of the Student Code of Conduct addresses the University’s policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic malicious/intentional misuses of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an “Informal” resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct’s minimum one semester suspension requirement.
Course Learning Outcomes

1. **Cell and Organism Reproduction:** Students will be able to
   - describe cellular and chromosomal events that occur during the eukaryotic cell cycle and gamete formation
   - describe chromosome behavior and changes in chromosome structure and number as a cell progresses through a cell cycle, meiosis I and meiosis II
   - explain how meiosis and random fertilization contribute to genetic variation in sexually reproducing organisms

2. **Principles of Heredity:** Students will be able to
   - explain Mendel’s principles of inheritance and apply these to problems of inheritance
   - describe the different forms of inheritance patterns and identify these in genetic data
   - use and interpret probabilities and statistics in the gathering, predicting, and analysis of genetic data
   - describe various types of genetic crosses and indicate when/why they would be used by a geneticist
   - explain more complex modes of inheritance and how sex influences the inheritance and expression of genes (e.g. sex-influenced traits, cytoplasmic inheritance, genomic imprinting)
   - use this information in predicting genetic outcomes and the analysis of genetic data

3. **Pedigrees:** Students will be able to apply principles of heredity in assessment of pedigrees to identify genotypes of family members, conclude the mode of inheritance for a trait, and predict mating outcomes.

4. **Eukaryotic Gene Mapping:** Students will be able to
   - compare the effect of linkage and independent assortment on genetic outcomes and assess data to determine if genes are linked or on separate chromosomes
   - explain how crossing over produces recombination and use recombination frequencies to construct a genetic map
   - use genetic maps to predict gametic and mating outcomes
   - describe some of the methods that can be used to place a gene on a particular chromosome (e.g. FISH)

5. **Chromosome Variation and Structure:** Students will be able to
   - describe and recognize a variety of abnormalities in chromosome structure and number and explain how these anomalies arise and are detected
   - explain the molecular structure of chromosomes as it relates to storage, gene expression, and sequence function

6. **Nucleic Acid Structure:** Students will be able to
   - describe early studies that led to DNA as the genetic material and/or interpret results from these studies
   - describe the molecular structure of DNA and RNA and indicate similarities and differences
7. **DNA Replication:** Students will be able to
   - describe the historic experiment that demonstrated DNA replication follows a semi-conservative model
   - describe the process of DNA replication in prokaryotes at the biochemical level
   - explain how proofreading and repair is accomplished during DNA synthesis
   - describe how DNA is replicated in viruses, plasmids, and eukaryotes and identify similarities and differences between these and replication in prokaryotes

8. **Gene Expression:** Students will be able to
   - describe at the biochemical level the events that occur to go from gene to phenotype
   - identify different types of RNA, note their properties, how they are processed to yield a functional form, and their function in gene expression
   - recognize the importance of regulating gene expression in prokaryotes and eukaryotes and describe the levels at which gene expression is controlled and the mechanisms used by prokaryotes and eukaryotes

9. **Mutations:** Students will be able to
   - define and identify the various types of mutations that occur at the DNA and protein levels
   - explain and recognize the relationship between mutations and new alleles

10. **Molecular Genetic Analysis:** Students will be able to
    - explain major methods and techniques used in molecular genetics to isolate, recombine, amplify, find and study genes of interest
    - use data to prepare a restriction map for a piece of DNA

11. **Genomics:** Students will be able to
    - describe map-based and whole genome shotgun sequencing approaches
    - explain how genetic and physical chromosome maps are prepare
    - access and use genetic information from public databases, given a particular problem in biotechnology, medicine, or biology

**General Class Policies: Maximizing your Chances for Success**

1. Learning is the responsibility of the student. The instructor’s role is to facilitate learning (by lecturing, answering questions, etc.) and to evaluate learning (by quizzes, exams, and other graded assignments). Remember that you are doing this work for yourself (to prepare for future endeavors), not for the instructor.

2. Success in this class will require a time commitment outside of class time. Each student should schedule specific blocks of study time devoted exclusively for this class. Ideally, there should be scheduled time between each lecture period for review and preparation. The amount of study time required will vary with individual students.

3. You must study assigned chapters in the textbook and other assigned readings before the lecture in which they are discussed.

4. Regular lecture attendance is essential for success in this class. If you must miss class, it is your responsibility to get the notes you miss from another student.
5. Be on time for class. Students who are chronically late may be refused admission.

6. Cellular telephones, pagers, and similar devices must be turned off or placed in silent mode during class. Use of cell phones should be restricted to emergencies. Texting, emailing, chatting, tweeting, or social networking are not permitted.

7. During lecture, avoid conversation and other disruptions that distract other students from listening and learning. If you have a question or comment, direct it to the professor.

8. Occasionally, it may be necessary for the instructor to make corrections or changes to the syllabus. Corrections or changes to the syllabus will be announced in class and posted on the course’s web site.

Examination and Grading Policies

1. The grade in this class is determined by the total number of points as listed below in “Grade Determination.” There is no opportunity for extra credit.

2. Examinations may consist of multiple-choice questions, short-answer questions, essay questions, and genetics problems. Exam questions cover lecture material and reading assignments listed in the course schedule, below. The major source of information is the lecture content.

3. The dates for examinations and quizzes are listed below. Please mark them on your calendar.

4. Makeup policy: Makeup examinations and quizzes will only be given for excused absences. Written verification for the reason the exam is missed will be required. Makeup examinations consist exclusively of essay questions, and they are usually more difficult than the scheduled examination.

Grade Determination

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 lecture quizzes @ 20 pt (Best 5 out of 6)</td>
<td>100 pt</td>
</tr>
<tr>
<td>Midterm examination @ 100 pt</td>
<td>100 pt</td>
</tr>
<tr>
<td>Comprehensive final examination</td>
<td>200 pt</td>
</tr>
<tr>
<td>Total</td>
<td>400 pt</td>
</tr>
</tbody>
</table>

A = 90 – 100 % of total points; B = 80 – 89 % of total points; 
C = 70 – 79 % of total points; D = 60 – 69 % of total points;
F = Below 60 % of total points
Biology 3300 Summer 2016 Lecture Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Exam/Quiz</th>
<th>Lecture Topic</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wed, June 1</td>
<td>No quiz</td>
<td>Introduction to Genetics</td>
<td>1</td>
</tr>
<tr>
<td>Mon, June 6</td>
<td>No quiz</td>
<td>Mitosis and Meiosis</td>
<td>2</td>
</tr>
<tr>
<td>Wed, June 8</td>
<td>Quiz / June 1 – 6</td>
<td>Mendelian Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Mon, June 13</td>
<td>No quiz</td>
<td>Extensions of Mendelian Genetics</td>
<td>4</td>
</tr>
<tr>
<td>Wed, June 15</td>
<td>Quiz / June 8 – 13</td>
<td>Chromosome Mapping in Eukaryotes</td>
<td>5</td>
</tr>
<tr>
<td>Mon, June 20</td>
<td>No quiz</td>
<td>Sex Determination and Sex Chromosomes</td>
<td>7</td>
</tr>
<tr>
<td>Wed, June 22</td>
<td>Midterm Exam / June 1 – 20</td>
<td>Chromosome Mutations</td>
<td>8</td>
</tr>
<tr>
<td>Mon, June 27</td>
<td>No quiz / Withdrawal Deadline</td>
<td>Chromosome Organization</td>
<td>12</td>
</tr>
<tr>
<td>Wed, June 29</td>
<td>Quiz / June 22 – 27</td>
<td>DNA Structure and Analysis</td>
<td>10</td>
</tr>
<tr>
<td>Mon, July 4</td>
<td>No quiz</td>
<td>Independence Day! (No class)</td>
<td></td>
</tr>
<tr>
<td>Wed, July 6</td>
<td>Quiz / June 29</td>
<td>Recombinant DNA Technology</td>
<td>20</td>
</tr>
<tr>
<td>Mon, July 11</td>
<td>No quiz</td>
<td>DNA Replication</td>
<td>11</td>
</tr>
<tr>
<td>Wed, July 13</td>
<td>Quiz / July 6 – 11</td>
<td>Transcription, RNA Processing, and Regulation</td>
<td>13</td>
</tr>
<tr>
<td>Mon, July 18</td>
<td>No quiz</td>
<td>Translation and Proteins</td>
<td>14</td>
</tr>
<tr>
<td>Wed, July 20</td>
<td>Quiz / July 13 – 18</td>
<td>Gene Mutation and DNA Repair</td>
<td>15</td>
</tr>
<tr>
<td>Mon, July 25</td>
<td>Final Exam</td>
<td>Comprehensive Final Exam, 9:00 am – 11:00 am</td>
<td></td>
</tr>
</tbody>
</table>

Academic Withdrawal Policy

Students may withdraw from one or more courses anytime before the last three weeks of the semester. **However, as of Fall 2004, students will be allowed a maximum of eight total withdrawals if they enter KSU as a freshman. Transfer students will be allowed one withdrawal per fifteen credit hours attempted, for a maximum of eight.** Students who choose to pursue a second degree at KSU will be allowed two additional withdrawals. Students who entered KSU before the Fall of 2004 will be allowed one withdrawal per fifteen credit hours attempted for a maximum of eight. To withdraw, the student should complete an official withdrawal form in the Office of the Registrar. Students who officially withdraw from courses on or before the last day to withdraw without academic penalty will receive a “W”. Students who officially withdraw after the last day to withdraw without academic penalty (and before the last three weeks of the semester) will receive a “WF”, which will be counted as an “F” in calculation of their grade point average. The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances, which are fully documented. Students may appeal to the academic standing committee for consideration of unusual circumstances.

Disabled Student Support Services

Kennesaw State University provides program accessibility and reasonable accommodations for persons defined as disabled under Section 504 of the Rehabilitation Act of 1973 or the Americans with Disabilities Act of 1990. A number of services are available to help disabled students with their academic work. In order to make arrangements for special services, students must visit the Office of Disabled Student Support Services and arrange an individual assistance plan. Certification of disability is required. Please contact the Office of Disabled Student Support Services for more information.