Genetics (BIOL200)
Spring Semester 2015
Dr. Anna Allen

Lecture Time and Place: T, Th 9:40-11:00am in E.E. Just Hall Room 320
Laboratory Time and Place: W 8:10-11:00am in E.E. Just Hall
Section 01 (CRN10151) = Room 143
Section 02 (CRN14878) = Room 243

Instructor: Dr. Anna Allen
Office: E. E. Just Hall (Biology Building), Room 244
Phone: 202-806-6957
E-mail: anna.allen@howard.edu
Office Hours: Tues 1:30-3:30pm & Wed 3-5pm or by appointment

Teaching Assistants:
Ruby Boateng Office: E. E. Just Hall (Biology Building), Room 242
E-mail: ruby.boateng@bison.howard.edu
Office Hours: Wednesday 11am - 12pm

Dondra Bailey Office: E. E. Just Hall (Biology Building), Room 317
E-mail: dsbailey@bison.howard.edu
Office Hours: Tuesday 1 - 2:30pm

Prerequisites:
BIOL101 (General Biology I) AND BIOL102 (General Biology II) with a minimum of a C.

Course Description:
An introduction to the study of the chemical composition and structure of the genetic material (DNA) and both its transmission and function in development and metabolism. This course combines both the classical and molecular approaches to the understanding of the mechanisms of inheritance.

This course is a flipped course wherein there are both online and face-to-face components. We will still meet in class every Tuesday and Thursday, however when noted in your syllabus, you will be required to complete the online activities/readings/assignments prior to coming to class and class time will be spent performing active learning techniques to enhance your learning experience.

Student Learning Objectives:
This course is designed to give the student a comprehensive overview of genetics. Upon successful completion, the student will be able to:
- Define the fundamental concepts of molecular, transmission, and population genetics.
- Debate issues involving the field of personal genetics.
- Relate the structure and function of the DNA molecule to its functional role in encoding genetic material.
- Describe the basic aspects of the flow of genetic information from DNA to proteins.
- Describe and order the steps involved in DNA replication and recombination.
- Explain the process of transcription and translation, and differentiate between the two.
- Explain and make deductions about gene regulation in bacteria, with an emphasis on the lac operon model.
- Describe the various methods that eukaryotes utilize to regulate gene expression.
- Describe the mitotic and meiotic cell cycle, and be able to differentiate between the two.
- Describe the normal chromosome number, structure, and behavior in human cells, and understand the cause and effect of alterations in chromosome number and/or structure.
- Understand how to identify and classify mutations in DNA.
- Apply the principles of inheritance as formulated by Mendel.
- Apply the principles of extensions of Mendelian inheritance, including multiple allelism, lethal alleles, gene interactions, and sex-linked transmission.
- Analyze genetic data using statistical procedures.
- Apply modern molecular techniques to solve a genetic problem.
- Deduce the relationships between genetic, physical, and cytogenetic maps.
- Perform genetic analysis of quantitative (complex) characteristics.
- Apply the Hardy-Weinberg Law in analyzing population genetics for gene frequency, sex linkage, equilibrium, and heterozygote frequency.
- Use the scientific process to analyze and interpret experimental genetic data.
- Recognize how genetic principles and analysis are applied to medicine and agriculture.
- Discuss current legal and ethical issues in the field of genetics.

Genetics is an analytic science and it is not enough to simply learn terms and concepts; you must be able to apply your understanding of terms and concepts to genetic analysis and problems. As you read the material in the textbook, play close attention to the worked examples in your book. They will help you learn how to apply terms and concepts to genetic problems.

**Course Organization**

**Textbook:** Genetics Essentials: Concepts and Connections by Benjamin Pierce (Second Edition)
- Publisher = W.H. Freeman and Company / New York

The readings and topics assigned will be based on the Pierce book, however, any current Genetics textbook has the same information within it. So if you wish to obtain a different textbook that is acceptable, just be sure you realize that all the references, figures, information and practice problems I present to you will come from the assigned pages from Pierce.

**Reading Requirements:**

Assigned readings are listed next to the lecture topic in the syllabus. Readings should be completed BEFORE each lecture. In addition, PDFs of additional reading material may be uploaded to Blackboard and are the responsibility of the student to download and read. Students will be notified of any new information posted on Blackboard via the announcement feature in Blackboard, so please ensure that you properly set-up your Blackboard account.
Course Structure:
This course consists of approximately 30 lessons that correspond to chapters in the textbook. Each lesson is approximately the equivalent of one chapter in your textbook, and most lessons require you to read one chapter.

This course is a flipped course, meaning that instead of lecturing every class period, there will occasionally be pre-class material posted on Blackboard (short videos, reading assignments, quizzes, discussion questions, etc) that must be completed by the due-date, prior to attending class. This serves to “free up” classroom time and allow for more professor-student and student-student interaction. In this manner more classroom time can be spent helping students to apply the material that they learned online. I will utilize Blackboard’s tools to track each student’s online presence and activity. This will then be incorporated into the assessment of your course grade.

Whether a class period consists of a lecture or learning to apply pre-class online material, we will begin each class with a statement of all the desired learning objectives for that particular class. This will inform you of what you should be able to accomplish as you complete the lesson.

Lecture knowledge checks (aka quizzes) will be randomly given throughout the semester. These are designed to ensure that you adequately prepare for each lecture and effectively act to help boost your grade if you are doing what you’re supposed to do (i.e.- reading the assigned readings prior to class).

Problem sets given after class via Blackboard consist of two parts that help you master the material in the lesson. The first part is a list of key terms you must know to understand the lesson. The book’s glossary defines all the key terms. The second part of each problem set consists of a series of analytical questions that require you to grapple with important concepts, problem solve and/or analyze the results of experimental research. You should complete all parts of the self-study assignments in order to perform well in the course. None of the material in the self-study assignments is graded.

Class Attendance:
Regular class attendance at lectures is expected, however no attendance will be recorded for this course. It is the hope of the instructor that students will attend and actively participate in lecture. Learning is a very active process, and this course is designed to be actively engaging. You must come to class prepared, otherwise your learning and your grades will suffer. Whether you are present in lecture or not, ultimately YOU are responsible for all work covered in class. In addition, exams will cover information presented in the textbook, online, and in class lectures, as such, you are responsible for all the material. Students who anticipate missing class for official University business (i.e.- sports, administrative duties, etc.) shall notify the instructor prior to the proposed absent date. Students who are absent for health reasons are expected to present documentation as soon as possible.

Getting assistance outside of class:
Please use the Teaching Assistants as a first point of contact for routine questions, including clarification of lecture materials and exam grading. You can use the Blackboard discussion board to post general (i.e.- public) questions about course material and policies and are encouraged to do so. The TAs and Instructor will monitor the discussion on Blackboard to provide answers and
clarification when appropriate. Questions can also be sent directly to the TAs via e-mail or in person.

If additional assistance is needed, the best way to contact the instructor is to come to the scheduled office hours. If that does not work, contact the instructor to set up an appointment. Blackboard will also be employed for communication with the class, including the posting of lecture presentations, study questions, etc.

Examinations:
Examinations will emphasize material that is discussed in lectures. Any material presented in the lectures, but not appearing in the text is eligible to be presented for examination. The lectures will often not correspond to material in the textbook in terms of presentation order, examples used, or depth of coverage. Although the examination questions will be based on the materials presented in the lectures, it will be assumed that you have read the assigned pages in the textbook that related to that topic. In many cases, reading and understanding the textbook assignments will further illuminate the lectures, and make a crucial difference in students obtaining As and Bs in the course.

You will be required not only to regurgitate facts on exams, but also to understand the purpose and meaning of experiments. As such, exams will include multiple choice, fill in, and short answer questions to determine your mastery of the subject material. However, short essay questions and problems solutions will also be used to determine the depth of your understanding of lecture materials and your ability to reason. In other words, studying is only part of your job- you will also be asked to think!

Final Course Grading:
Your final course grade will be determined as follows:

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<tr>
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<th>With Final</th>
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<tbody>
<tr>
<td>Lecture Examination</td>
<td>40%</td>
<td>55%</td>
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<td>Lecture Knowledge Checks</td>
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<td>Laboratory Grade</td>
<td>30%</td>
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<td>Pharmacogenomics Study</td>
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<td>Final Examination (optional)</td>
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Lecture Grading:
There will be lecture knowledge checks and Blackboard assignments/quizzes to ensure that you are adequately preparing for the class (totaling 100 points).

There will be three lecture examinations, each worth 100 points. In addition, there is a final examination worth 150 points that is optional. NOTE- The final exam is only optional if you have taken all three lecture examinations. A student who misses an examination for any reason MUST take the final examination. If you have taken all three lecture examinations, and are satisfied with your grade in the course, you can be exempt from taking the final examination.
There will be no make up examinations. If you miss a lecture examination because of illness, religious observance (although exams are scheduled to avoid major religious observances), or other personal issues, you must take the final examination.

For any seniors in the class, as grades are due before the official final examinations occur, those students’ final grade will be determined by their three in-class lecture exams, the knowledge checks, and the laboratory grade. They will not factor in the Pharmacogenomics study or the final examination.

Laboratory Grading:
Your grade in the laboratory course will be evaluated based on your laboratory notebook, lab reports and lab quizzes. The breakdown is as follows:

- Lab Reports: 70%
- Lab Notebooks: 20%
- Lab Quizzes: 10%

Final Course Letter Grades:
Because ample partial credit is given on exams, and because the ranges for each grade are already expanded beyond the typical 10 percentage points, there is NO normalization of grades based on class performance (“grading on a curve”). In other words, there is an absolute standard of quality in this class, not a relative standard, and it’s your job to get there.

- A: 89-100%
- B: 78-88.9%
- C: 65-77.9%
- D: 50-64.9%
- F: below 49.9%

Regrade Policy:
The regrading of examinations will be considered as unusual, rather than a routine request. Exams must be submitted in pen to be considered for regrading. A request for regrading of an examination must be submitted to the teaching assistant in writing (on a separate sheet of paper), along with the original copy of the exam, and should include a brief explanation for the regrading request. A regrade request MUST be submitted within ONE week after the graded examinations are returned to the class. Only one cycle of regrading will be considered per examination. By submitting an exam for regrading, you agree to accept the score of the entire regraded examination, not the original score. In other words, we will read and grade the exam again, and any errors in your favor would be corrected, while any errors initially missed will also be counted. Due to time constraints, the final examination will not be considered for regarding.

Policy Regarding Classroom Conduct:
Class attendance is mandatory if a student expects to truly develop a mastery of the concepts presented. Students are expected to be punctual for class, however if a student is late for class, it is expected that they enter the classroom as quietly and non-disruptive as possible. Please use common courtesy during class time and refrain from conversing with fellow students. This can be very distracting to classmates who are trying to pay attention. Cell phones and other electronic devices (with the exception of laptops if they are being used to take notes) must be turned off during regular lecture and laboratory periods and during examinations. Information on netiquette, or the rules of etiquette that apply when communicating over computer networks, can be found on pg. 8 of the syllabus and on Blackboard.
Opportunities for Extra Credit:
The Biology Department Seminar Series takes place every other Wednesday at 12pm in Just Hall, Room 224 or 320. Occasionally, the guest speaker’s research talk will cover areas of genetics. When that is the case, an announcement will be made in class and posted on Blackboard. If you attend the lecture and write a 1-2 page synopsis on the research presented during the talk and how this connects to the field of genetics, then you can get up to 5 extra credit points. The synopsis needs to be submitted via Blackboard through the “Extra Credit” assignment link no later than one week following the talk.

Academic Honesty:
The University has approved an “Academic Code of Conduct” which all students are required to read. The Code prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. Students are expected to adhere to the highest standards of academic integrity and honesty. Please review the university policies on academic integrity (which include what happens if you are caught doing something you shouldn’t) in the H-book or at the following address: http://www.howard.edu/policy/academic/student-conduct.htm

Statement on ADA Procedures:
Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to disability should contact the Office of the Dean for Special Student Services for verification and determination of reasonable accommodations as soon as possible at the beginning of each semester. Special Student Services can be reached at Howard Center Suite 725, 2225 Georgia Ave., NW, Washington DC 20059 or 202-806-5983 or see http://www.howard.edu/specialstudentservices/ for details.

Useful Genetics Websites:
The University of Utah has an award-winning site that is a great resource for you to learn more on your own about genetics, genes, heredity and traits:
http://learn.genetics.utah.edu/
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<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Date</th>
<th>Topic</th>
<th>Textbook Readings</th>
<th>Online Assignments</th>
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<td><strong>UNIT 1: Structure and Biochemistry of DNA, RNA and proteins</strong></td>
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<td>1</td>
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<td>Introduction to BIOL200 and Genetics</td>
<td>Ch. 1</td>
<td>BB - course intro</td>
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<td>Personal Genomics &amp; Natural Genetic Variation (NOVA: Cracking Your</td>
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<td>Genetic Code)</td>
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<td>DNA</td>
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<td>DNA Replication</td>
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<td>DNA Recombination</td>
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<td>Transcription: DNA to RNA</td>
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<td>Translation: RNA to Proteins</td>
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<td>8</td>
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<td>Control of Bacterial Gene Expression</td>
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<td>Control of Eukaryotic Gene Expression</td>
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<td>Mitosis: Mechanisms &amp; Genetic Consequences</td>
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<td>Meiosis: Mechanisms &amp; Genetic Consequences</td>
<td>Ch. 2</td>
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<td>7</td>
<td>13</td>
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<td>Mating: Mechanisms &amp; Genetic Consequences</td>
<td>pgs 34-35, 150-166</td>
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<td>Genetic Variation: Chromosome Variation</td>
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<td>Genetic Variation: Gene Mutations (mid-term status report due)</td>
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<td>Heredity (Mendel)</td>
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<td><strong>SPRING RECESS- No Classes</strong></td>
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<td><strong>UNIT 3: Linkage, Mapping, and Specialized Topics</strong></td>
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<td>3/24</td>
<td>Linkage &amp; Sex Linkage</td>
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<td>Genome Structure &amp; Function</td>
<td>Ch. 15</td>
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<td>4/14</td>
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<td>Ch. 18</td>
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<td>4/16</td>
<td><strong>EXAM 3 (covers lectures 19 – 25)</strong></td>
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<td>28</td>
<td>4/23</td>
<td>Pharmacogenomics (Last Day of Classes)</td>
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<td>4/27-28</td>
<td>Departmental Examinations</td>
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<td>16</td>
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<td>Spring Semester Ends</td>
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** BB = online assignments can be found on the Blackboard site **

**Final Examination: TBA    Just Hall, Room 320**
Netiquette

In posting messages to the online discussion activities (Discussion Board), please follow these guidelines or "netiquette":

• Post your initial message as early in the week as possible so people will have time to read and respond to your contribution. Post additional messages throughout the week that are either new contributions or replies to someone else.

• Keep your messages concise and clearly written. Most ideas can be stated in a couple of paragraphs, although sometimes a longer message may be needed to develop your thoughts adequately. Keep in mind that people are more apt to read and digest shorter messages than long ones.

• Be respectful of other's ideas, opinions, and beliefs. It's fine to disagree with someone, but please respect their right to think differently.

• Avoid posting simple two or three word statements such as "I agree" or "Good point". If you think someone has made an especially cogent point and you want to say so, then explain why by adding a few sentences and describing your response or adding to the original point.

• A message that demonstrates substance contributes to the understanding and application of ideas by doing one or more of the following:
  - **Reflection about meaning**: Describe thoughtfully what something means or new insights it provides, or raise a question as a seed for clarification or further discussion.
  - **Analysis**: Discuss relevant themes, concepts, main ideas, components, or relationships among ideas. Or, identify hidden assumptions or fallacies in reasoning.
  - **Elaboration**: Build on ideas of others or ideas found in the readings by adding details, examples, a different viewpoint, or other relevant information.
  - **Application**: Provide examples of how principles or concepts can be applied to actual situations, or discuss the implications of theory for practice.
  - **Synthesis**: Integrate multiple views to provide a summary, a new perspective, or a creative refashioning of ideas.
  - **Evaluation**: Assess the accuracy, reasonableness, or quality of ideas.

• Avoid using all caps. IT SEEMS LIKE SHOUTING!

• Maintain the privacy of participants, including privacy of comments made during electronic conversation that is to be shared only with those participating in the course.

• Abide by Family Educational Rights and Privacy Act (FERPA) rules which find academic information is confidential and forbids disclosure of academic information without the participant's consent.

• Operate within the guidelines of Howard University’s Technology Use Policy.

Notify the course instructor as far in advance as possible of any time exceeding 3 days in which participation will not be possible during an online course.

(adapted from source: “Message Guidelines.” Copyright of Dr. Chris Olgren, University of Wisconsin-Madison, Distance Education Certificate Program, DEPD 101.)
Your Personal Grade Record

**Lecture**
- Exam 1 \(_____\) out of 100
- Exam 2 \(_____\) out of 100
- Exam 3 \(_____\) out of 100
- Pharmacogenomics Study \(_____\) out of 100
- Final Exam (optional, see syllabus) \(_____\) out of 150
- Lecture Knowledge Checks \(_____\) out of 100

**Laboratory**
- Notebook Check 1 \(_____\) out of 50
- Notebook Check 2 \(_____\) out of 50
- Notebook Check 3 \(_____\) out of 50
- Notebook Check 4 \(_____\) out of 50
- Laboratory Report 1 \(_____\) out of 100
- Laboratory Report 2 \(_____\) out of 100
- Laboratory Report 3 \(_____\) out of 100
- Laboratory Report 4 \(_____\) out of 100
- Laboratory Report 5 \(_____\) out of 100
- Laboratory Report 6 \(_____\) out of 100
- Laboratory Report 7 \(_____\) out of 100
- Lab Quizzes \(_____\) out of 100
  - Lab Quiz 1 \(_____\) out of 10
  - Lab Quiz 2 \(_____\) out of 10
  - Lab Quiz 3 \(_____\) out of 10
  - Lab Quiz 4 \(_____\) out of 10
  - Lab Quiz 5 \(_____\) out of 10
  - Lab Quiz 6 \(_____\) out of 10
  - Lab Quiz 7 \(_____\) out of 10
  - Lab Quiz 8 \(_____\) out of 10
  - Lab Quiz 9 \(_____\) out of 10
  - Lab Quiz 10 \(_____\) out of 10