Genetics PCB 3063
Tuesday and Thursday 11:00 am to 12:15 pm
Room: Rafael Diaz-Balart 1100
Spring 2018

Instructor:
Dr. Matthew DeGennaro
mdegenna@fiu.edu
Office: AHC1 319A
Office Hours: Tuesday 1:30 to 4:30pm or by appointment

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Wissam Khalaf wkhal006@fiu.edu
Silvia Cabal scaba022@fiu.edu

Objective: This course is designed to give you an understanding of the fundamentals of genetics. Genetics is a powerful way of seeing nature that has uncovered many mysteries about how living things function. You will learn how genetic information forms the basis for all biological systems including ourselves.

Course textbook & i<Clicker: Genetics, a Conceptual Approach by Benjamin Pierce, 6th edition. The textbook and i<Clicker are REQUIRED.

Laptops: Please bring your laptop computers to class. Please use them for class related activities. Take a break from social media and gaming during class. NO LAPTOPS WILL BE PERMITTED IN CLASS DURING EXAMINATIONS.

Course design: This is a “flipped”, active learning course. You will watch my lectures and read the textbook chapters BEFORE CLASS. In class, we will have discussions, individual assignments, group work, and quizzes. The goal is the create an environment where we will work together to expand our knowledge of genetics. This will include:

- **Question time** – at the beginning of each class, you will have the opportunity to ask questions about the lecture. We will discuss the online lecture for about 10 minutes.

- **Case Studies** – Case studies will include activities and problem sets to help you understand genetic principles. These will be homework. Written responses of each student will be collected and reviewed.
• **Research-based and interactive lectures** – During class, i<clicker based questions will be asked about the lecture that was viewed on youtube. Lectures on current research topics and concepts in genetics will also be presented. Students will have the opportunity to answer questions with their i<clicker or ask questions.

• **Group project** – each group will work together to produce an outline, a 3-page paper, and a scientific poster on a molecular genetic technique and its application or the biology of a genetic disease. The paper will include at least two figures with figure legends that are made by the group. The group project will represent 30% of the final grade in the course. Groups will get a chance to present their work to the entire class during the poster sessions at the end of the course and to receive extra credit on their final grade (up to 8 points- 6 points for presenting, 2 points for reviewing). More details on this will be provided as the semester moves forward. **Written portion of project MUST be turned in by April 6th before Midnight in Word or PDF format via email. Final draft of poster is needs to be printed by group members by class time on April 11th.** In addition, a PDF version needs to be emailed to me before class time on April 11th.

• **Quizzes** – in class quizzes will be given throughout the course.

• **YouTube Channel** – Lectures will be posted online to be viewed before class at: [https://www.youtube.com/playlist?list=PLDqEfZV-b3gPxFZiXh4h2CKdrRClfWm-WG](https://www.youtube.com/playlist?list=PLDqEfZV-b3gPxFZiXh4h2CKdrRClfWm-WG)

### Course schedule

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>Jan 9</td>
<td><strong>Introduction to Genetics</strong></td>
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<tr>
<td>Class 1</td>
<td>• Discussion of course design and expectations&lt;br&gt;• In class reading – “The Salvation of Doug”&lt;br&gt;• Discussion of reading&lt;br&gt;• Assessment Quiz</td>
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<tr>
<td>Jan 11</td>
<td><strong>Introduction to Genetics</strong></td>
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<tr>
<td>Class 2</td>
<td>• Before class: watch YouTube lecture 1 and TEDx talk “Mutant mosquitoes hold key to life-saving perfume”&lt;br&gt;<a href="https://youtu.be/HbMhbrn1PoA">https://youtu.be/HbMhbrn1PoA</a>, read chapter 1&lt;br&gt;• Question time – 10 minute discussion&lt;br&gt;• Discussion of TEDx talk&lt;br&gt;• Clicker questions on chapter 1&lt;br&gt;• Quiz on chapter 1 and lecture 1 – 15 minutes</td>
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<td>Jan 16</td>
<td>Class 3</td>
<td>Chromosomes and Cellular Reproduction</td>
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<td>Jan 18</td>
<td>Class 4</td>
<td>Basic Principles of Heredity</td>
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<td>Jan 23</td>
<td>Class 5</td>
<td>Basic Principles of Heredity</td>
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<td>Jan 25</td>
<td>Class 6</td>
<td>Sex Determination and Sex-Linked Characteristics</td>
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<td>Jan 30</td>
<td>Class 7</td>
<td>Extension &amp; Modification of Basic Principles</td>
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<td>Feb 1</td>
<td>Class 8</td>
<td>Pedigree Analysis and Applications</td>
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<td>Feb 6</td>
<td>EXAMINATION I (15% of final grade)</td>
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| Feb 8 | Linkage, Recombination, & Gene Mapping  
  - Before class: watch YouTube lecture 7, read chapter 7  
  - Question time – 10 minute discussion  
  - Interactive on Chapter 7  
  - Quiz on chapter 7 & lecture 7 – 15 minutes |
| Feb 13 | Group Research Day  
  - Before class: Watch the film The Biology of Skin Color (http://www.hhmi.org/biointeractive/biology-skin-color)  
  - Hand in Biology of Skin Color case study at the beginning of class  
  - Important to sit with your group today  
  - Group project topics handed out (useful to look at Chapter 19)  
  - Group discussion and research about project topics  
  - Selection of group topics  
  - Begin group research |
| Feb 15 | Gene Mapping & Genome Editing  
  - Before class: watch 29-minute lecture by Dr. Elinor Karlsson of the Broad Institute in Cambridge, MA  
  - Before class: finish case study: Mapping Genes to Traits in Dogs Using SNPs  
  - Written responses to case study will be collected at the beginning of class  
  - Research Lecture “Genome Editing” |
| Feb 20 | Chromosome Variations  
  - Before class: watch YouTube lecture 8 & “Visualizing Nondisjunction” video, review chapter 8  
  - Question time – 10 minute discussion  
  - Interactive on Chapter 8  
  - Quiz on chapter 8 & lecture 8 – 15 minutes |
| Feb 22 | Group Research Day  
  - Important to sit with your group today  
  - Group research and writing  
  - Write 1st draft of project outline  
  - Submit 1st draft of project outline at the end of class |
| Feb 27 | Bacterial and Viral Genetic Systems  
  - Before class: watch YouTube lecture 9, read chapter 9  
  - Question time – 10 minute discussion  
  - Interactive on Chapter 9 |
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<th>Date</th>
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<tr>
<td>Mar 1</td>
<td>15</td>
<td>DNA: The Chemical Nature of the Gene</td>
<td>• Quiz on chapter 9 &amp; lecture 9 – 15 minutes</td>
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<td>Mar 6</td>
<td>16</td>
<td>Group Research Day</td>
<td>• Important to sit with your group today</td>
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<td>Mar 8</td>
<td>17</td>
<td>Genetic Model Systems: Mosquitoes</td>
<td>• Research Lecture “Genetic Analysis of Mosquito Attraction” - 20 minutes; Attendance will be taken</td>
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<td>Mar 12-18</td>
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<td>Spring Break</td>
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<td>Mar 20</td>
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<td>EXAMINATION II (15% of final grade)</td>
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<td>Mar 22</td>
<td>18</td>
<td>DNA Replication and Recombination</td>
<td>• Before class: watch YouTube lecture 11 and “Building a Model of DNA Replication” video, read chapter 12</td>
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<td>Mar 27</td>
<td>19</td>
<td>Transcription</td>
<td>• Before class: watch YouTube lecture 12, read chapter 13</td>
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<td>• Question time – 10 minute discussion</td>
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<td>• Interactive on chapter 13</td>
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<td>• Quiz on chapter 13 &amp; lecture 12 – 15 minutes</td>
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| Mar 29 | Class 20 | The Genetic Code and Translation                                     | - Before class: watch YouTube lecture 13, read chapter 15  
- Review of DNA replication, Transcription, and Translation  
- Interactive on Chapter 15  
- Quiz on chapter 15 & lecture 13 – 15 minutes |
| Apr 3  | Class 21 | Control of Gene Expression in Bacteria                               | - Before class: watch YouTube lecture 14, read chapter 16  
- Question time – 10 minute discussion  
- Interactive on Chapter 16  
- Group preparation of final draft of paper, figures, and figure legends  
- Formatted group paper and figures with legends MUST be emailed to me as a Microsoft Word or PDF document by Midnight on April 9th  
- Quiz on chapter 16 & lecture 14 – 15 minutes |
| Apr 5  | Class 22 | Control of Gene Expression in Eukaryotes                            | - Before class: watch YouTube lecture 15 & read chapter 17  
- Question time – 10 minute discussion  
- Interactive on Chapter 17  
- Discussions of poster with instructor and LAs  
- Quiz on chapter 17 & lecture 15 – 15 minutes  
- FINAL POSTER must be emailed to me as a powerpoint file or PDF by April 9th at 5pm |
| Apr 10 | Class 23 | Poster Presentations on Molecular Genetic Techniques                | - FINAL POSTER MUST BE PRINTED BY CLASS TIME TODAY  
- Extra credit for presenters (up to 6 points on final grade)  
- Extra credit to attendees/reviewers (up to 2 points on final grade) |
| Apr 12 | Class 24 | Poster Presentations on Molecular Genetic Techniques                | - Extra credit for presenters (up to 6 points on final grade)  
- Extra credit to attendees/reviewers (up to 2 points on final grade) |
| Apr 17 |         | Final Exam Review part 1                                             |                                                                                                                                           |
| Apr 19 |         | Final Exam Review part 2                                             |                                                                                                                                           |
| Apr 19 |         | Presentation of Poster Awards                                        |                                                                                                                                           |
| Apr 27th |        | CUMULATIVE FINAL EXAMINATION (15% of final grade)                  |                                                                                                                                           |
Grading: Grades will be based on attendance, classwork, performance on exams and quizzes as well as the completion of the group project as follows:

- Exams: 45% of final grade
  - You can choose to drop Exam I or II, if you do this the final exam will be worth 30% of the final grade
  - The final exam is mandatory
  - There will be **NO questions answered about anything during exams.**
  - Exams cannot be rescheduled unless you have a documented excuse
- Group Project: 30% of final grade
- Case studies, Quizzes, & Attendance: 25% of final grade
  - Case studies 5% of final grade
  - Quizzes 15% of final grade
  - Attendance 5% of final grade

- Poster Session Extra Credit: Earn up to 8 points on final grade

Group Project Details:

The group project consists of several parts all leading up to a poster presentation at the end of the semester. Each group will present on their chosen molecular biology technique and a application of that technique or a genetic disease. As an alternative, a group may decide to describe the technique and how it was discovered. In that case, it would be good to briefly mention how the technique is being currently used.

Key points:

1. The technique must be clearly described in words and in original figures.
2. The application or how the technique was discovered must also be clearly described in words and in original figures.
3. If you are doing a genetic disease, make figures representing how the disease was discovered and its phenotype as well as the techniques used to discover its genetic basis.

4. Each group will prepare one of each of these items below as the semester progresses.

30% of your final grade will be based on:

An outline (5%) must include:
- Summarizes what you want to achieve in the project
- Defines the technique in one or two sentences
- Has a proposed title for the poster
- Briefly describes what will be talked about in each section of the poster
- Lists at least one reference the group proposes to use
- List group members and their Panther IDs
- Includes group number
- Assigns which group members will take the lead on what aspects of the project
  - Research
  - Figure design
  - Figure legends
  - Writing
  - Poster design

OUTLINE IS DUE MARCH 6th

The paper (5%) must include:
- List group members and their Panther IDs
- Include group number
- An introduction
- A description of the technique in detail
- At least two original figures
  - The figures do not count towards the page number
  - Additional figures beyond two can be included
  - Feel free to use any drawing program
  - Hand drawn figures are acceptable if they are legible
    - Inkscape is a free open source alternative to Adobe Illustrator
      http://inkscape.org/en/download/
- Figure legends for each figure (8 point font)
- An application of the technique to a biological question or how the technique was discovered
- Feel free to propose experiments to either improve the technique or solve a biological question
• Additional techniques can be used, if the chosen technique is clearly explained
• A summary of how the technique is currently used or current knowledge about the disease
• At least three references from the scientific literature
• Typed and double spaced with an 11 point font
• The paper should be at least 3 pages but can be up to 5 pages long
• Figures should be included after the text and do not count towards the page number

PAPER IS DUE BEFORE MIDNIGHT ON APRIL 9th

A poster (20%) must include:
• An abstract (250 word limit)
• An introduction
  • Includes a description of the technique or disease
  • One figure should be part of the introduction
• A Technical review section for those focusing on how the technique or genetic disease was discovered and its importance
  • Describe the crucial experiments that identified the technique
  • Describe how the technique has been used to generate data
• A Proposed Experiments section for those trying to answer a biological question with the technique or use an experiment to answer questions about the genetic disease chosen
  • Must describe the biological question
  • Can included additional techniques
  • Describe what experiments will be done
  • Describe expected results from the proposed experiments
• A Summary or Future Directions section
• At least four references from the scientific literature
• Text from the submitted paper can be reused in the poster
• At least three original figures (more is better)
• The Title and names of all group members must be listed
• An Author Contribution section that states what each member of the group did to make the poster.
• Poster should be made using the PowerPoint template available on blackboard
• Final posters should be emailed to me in PDF format on APRIL 9th.
• Final posters need to be printed by group members for presentation.

POSTER MUST BE PRINTED by 11am ON APRIL 10th
Poster Presentations

- The poster will be presented on both April 10th and April 12th during our regular class meeting.
- Presenters should tell the story of their posters in an engaging way
- For presenting the poster you will receive up to 6 extra credit points on your final grade
- Half the group will present on the first day
- The other half of the group will present on the second day
- If you are not presenting, you will judge the other posters
  - Each judge must write a review of FOUR posters and rank them per the poster evaluation form.
  - You will receive up to 2 extra credit points on your final grade for reviewing posters
- External judges will join our class to help judge the posters

Prizes will be awarded to the best poster presented on each poster session day.

Grading Scale: A 100-93 A- 92-90 B+ 89-87 B 86-83 B- 82-80 C+ 79-77 C 76-70 D 69-60 F < 60

Academic Misconduct: Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

Full handbook and information can be found at:
http://www.fiu.edu/~oabp/misconductweb/1acmisconductproc.htm

DEFINITION OF ACADEMIC MISCONDUCT: Academic Misconduct is defined as the following intentional acts or omissions committed by any FIU student:

1.01 Cheating: The unauthorized use of books, notes, aids, electronic sources; or assistance from another person with respect to examinations, course assignments, field service reports, class recitations; or the unauthorized possession of examination papers or course materials, whether originally
authorized or not. Any student helping another cheat may be found guilty of academic misconduct.

1.02 Plagiarism: The deliberate use and appropriation of another’s work without any indication of the source and the representation of such work as the student’s own. Any student who fails to give credit for ideas, expressions or materials taken from another source, including internet sources, is guilty of plagiarism. Any student helping another to plagiarize may be found guilty of academic misconduct.

1.08 Academic Dishonesty: In general, by any act or omission not specifically mentioned above and which is outside the customary scope of preparing and completing academic assignments and/or contrary to the above stated policies concerning academic integrity.

If found cheating, YOU WILL RECEIVE AN “F” FOR THE CLASS, NO EXCEPTIONS.

TURN-IT-IN plagiarism software will be used to check all written reports for plagiarism. If plagiarism is found to exist, YOU WILL RECEIVE AN “F” FOR THE CLASS, NO EXCEPTIONS.

***Syllabus subject to change***

By taking the assessment exam that will be given on the first class meeting, handing in any assignment, or taking any quiz, you are stating that you have read this form and understand the expectations for the course.