



Genetics PCB 3063
Tuesday and Thursday 11:00 am to 12:15 pm
Room: Rafael Diaz-Balart 1100
Spring 2017

Instructor:

Dr. Matthew DeGennaro

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Office: OE 205

Office Hours: Mondays 4:15 to 6pm & Wednesdays 3 to 6pm

Learning Assistants:

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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.

Course textbook & iClicker: Genetics, a Conceptual Approach by Benjamin Pierce, 5th edition. The textbook and iClicker 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, and group work. The goal is to 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, several people will be randomly chosen to ask me a question about the lecture or to make a comment for discussion. You will have 10 minutes to discuss the lecture with your group and LAs to help you come up with a question or comment. I will randomly call upon students in the class for questions for approximately 20 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 lectures on current research topics and concepts in genetics will 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 a 3-page paper on a molecular genetic technique and its application. The paper will include at least two figures with figure legends that are made by the group. The group project will represent 25% 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). More details on this will be provided as the semester moves forward. **Written portion of project MUST be turned in by April 6th at 11:59pm 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 by 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-b3gPxFZiXh4h2CKdrRCIfm-WG>

Course schedule

Date	Topic	Chapter
Jan 10 <i>Class 1</i>	Introduction to Genetics <ul style="list-style-type: none"> • <i>Before class: watch YouTube lecture 1 and TEDx talk “Mutant mosquitoes hold key to life-saving perfume” https://youtu.be/HbMhbrn1PoA, read chapter 1</i> • <i>Discussion of course design and expectations</i> • <i>In class reading – “The Salvation of Doug”</i> • <i>Discussion of reading and TEDx talk</i> • <i>Assessment exam</i> 	1
Jan 12 <i>Class 2</i>	Chromosomes and Cellular Reproduction <ul style="list-style-type: none"> • <i>Before class: watch YouTube lecture 2, read chapter 2</i> • <i>Question time – 20 minute discussion</i> • <i>Interactive case study</i> • <i>Quiz on chapter 1 and lecture 1 – 15 minutes</i> 	2

Jan 17 Class 3	Chromosomes and Cellular Reproduction <ul style="list-style-type: none"> • Before class: review YouTube lecture 2 & chapter 2 • Question time – 20 minute discussion • Group Assignments • Interactive Case study • Quiz on chapter 2 & lecture 2 – 15 minutes 	2
Jan 19 Class 4	Basic Principles of Heredity <ul style="list-style-type: none"> • Before class: watch YouTube lecture 3, read chapter 3 • Before class: watch video on Mendelian segregation http://www.youtube.com/watch?v=NWqgZUnJdAY • Before class: read news story about the case: http://abcnews.go.com/blogs/health/2012/03/02/wolfman-likes-hairy-face-as-do-ladies/ • Question time – 20 minute discussion • Interactive case study lecture: The “Wolfman” and the Chromosomal Basis of Heredity 	3
Jan 24 Class 5	Basic Principles of Heredity <ul style="list-style-type: none"> • Before class: review YouTube lecture 3, review chapter 3 • Question time – 20 minute discussion • Interactive on Chapter 3 • Quiz on chapter 3 & lecture 3 – 15 minutes 	3
Jan 26 Class 6	Sex Determination and Sex-Linked Characteristics <ul style="list-style-type: none"> • Before class: watch YouTube lecture 4, read chapter 4 • Before class complete online problem set: http://www.biology.arizona.edu/mendelian_genetics/problem_sets/sex_linked_inheritance/sex_linked_inheritance.html • Question time – 20 minute discussion • Interactive on Chapter 4 • Quiz on chapter 4 & lecture 4 – 15 minutes 	4
Jan 31 Class 7	Extension & Modification of Basic Principles <ul style="list-style-type: none"> • Before class: watch YouTube lecture 5, read chapter 5 • Interactive on chapter 5 • Quiz on chapter 5 & lecture 5 – 15 minutes 	5
Feb 2 Class 8	Pedigree Analysis and Applications <ul style="list-style-type: none"> • Before class: watch YouTube lecture 6 & “Pedigree Analysis” video, read chapter 6 • Question time – 20 minute discussion • Interactive on chapter 6 • Case study: “Hemophilia: “The Royal Disease” • Written responses to case study will be collected on Feb 7 • Quiz on chapter 6 & lecture 6 – 15 minutes 	6

Feb 7	EXAMINATION I (15% of final grade)	
Feb 9 Class 9	<p>Group Research Day</p> <ul style="list-style-type: none"> • 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 14 Class 10	<p>Linkage, Recombination, & Gene Mapping</p> <ul style="list-style-type: none"> • Before class: watch YouTube lecture 7, read chapter 7 • Question time – 20 minute discussion • Interactive on Chapter 7 • Quiz on chapter 7 & lecture 7 – 15 minutes 	7
Feb 16 Class 11	<p>Gene Mapping & Genome Editing</p> <ul style="list-style-type: none"> • Before class: watch 29-minute lecture by Dr. Elinor Karlsson of the Broad Institute in Cambridge, MA http://www.hhmi.org/biointeractive/dog-genomics-and-dogs-model-organisms • 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” • Attendance will be taken 	
Feb 21 Class 12	<p>Chromosome Variations</p> <ul style="list-style-type: none"> • Before class: watch YouTube lecture 8 & “Visualizing Nondisjunction” video, review chapter 8 • Question time – 20 minute discussion • Interactive on Chapter 8 • Quiz on chapter 8 & lecture 8 – 15 minutes 	8
Feb 23 Class 13	<p>Group Research Day</p> <ul style="list-style-type: none"> • 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 28 Class 14	<p>Bacterial and Viral Genetic Systems</p> <ul style="list-style-type: none"> • Before class: watch YouTube lecture 9, read chapter 9 • Question time – 20 minute discussion • Interactive on Chapter 9 • Quiz on chapter 9 & lecture 9 – 15 minutes 	9

Mar 2 Class 15	Genetic Model Systems: Coral <ul style="list-style-type: none"> • Before class do Case study: “<i>Helicobacter pylori</i> and the Bacterial Theory of Ulcers” • <i>Written responses to case study will be collected at the beginning of class</i> • Research Lecture “Towards a Genetic Model for Coral Symbiosis” by Anthony Bellantuono, Ph.D. • Attendance will be taken 	
Mar 7 Class 16	DNA: The Chemical Nature of the Gene <ul style="list-style-type: none"> • Before class: watch YouTube lecture 10 & “The Secret of Life – Discover of DNA Structure” video, review chapter 10 • Important to sit with your group today • Question time – 20 minute discussion • <i>Written responses to case study will be collected next class (finish at home if necessary)</i> • <i>Group discussion of feedback on outline</i> • <i>Outline revision (if necessary)</i> • <i>Group discussion of figures for project</i> • <i>Begin drawing figures for project</i> • <i>Quiz on chapter 10 & lecture 10 – 15 minutes</i> 	10
Mar 9 Class 17	Genetic Model Systems: Mosquitoes <ul style="list-style-type: none"> • Research Lecture “Genetic Analysis of Mosquito Attraction” - 20 minutes; Attendance will be taken • <i>Discuss figures with instructor and LAs</i> • <i>Begin writing project</i> • <i>Email 1st draft of project figures over spring break if you want to receive feedback</i> 	
Mar 13-18	Spring Break	
Mar 21	EXAMINATION II (15% of final grade)	
Mar 23 Class 18	DNA Replication and Recombination <ul style="list-style-type: none"> • Before class: watch YouTube lecture 11 and “Building a Model of DNA Replication” video, read chapter 12 • Question time – 20 minute discussion • Case study: “Putting the Pieces Together: The Discovery of DNA Structure and Replication” • <i>Written responses to case study will be collected next class (finish at home if necessary)</i> • <i>Quiz on chapter 12 & lecture 11 – 15 minutes</i> 	12
Mar 28	Transcription <ul style="list-style-type: none"> • Before class: watch YouTube lecture 12, read chapter 13 	13

Class 19	<ul style="list-style-type: none"> • Question time – 20 minute discussion • Interactive on transcription • Quiz on chapter 13 & lecture 12 – 15 minutes 	
Mar 30 Class 20	The Genetic Code and Translation <ul style="list-style-type: none"> • Before class: watch YouTube lecture 13, read chapter 15 • Review of DNA replication, Transcription, and Translation • Clicker case study • Quiz on chapter 15 & lecture 13 – 15 minutes • Figures must be emailed by 6pm today 	15
Apr 4 Class 21	Control of Gene Expression in Bacteria <ul style="list-style-type: none"> • Before class: watch YouTube lecture 14, read chapter 16 • Question time – 20 minute discussion • 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 8pm on April 6th • Quiz on chapter 16 & lecture 14 – 15 minutes 	16
Apr 6 Class 22	Control of Gene Expression in Eukaryotes <ul style="list-style-type: none"> • Before class: watch YouTube lecture 15, read chapter 17, & Making of the Fittest: Evolution of the Stickleback Fish — HHMI BioInteractive Video http://www.youtube.com/watch?v=Pv4Ca-f4W9Q&feature=youtu.be • Question time – 20 minute discussion • Case study: “Modelling the Regulatory Switches of the PITX1 Gene in Stickleback Fish” • Written responses to case study will be collected next class • Discussions of poster with instructor and LAs • Quiz on chapter 17 & lecture 15 – 15 minutes • FINAL POSTER must be emailed to me by April 11th at 11am 	17
Apr 11 Class 23	Poster Presentations on Molecular Genetic Techniques <ul style="list-style-type: none"> • FINAL POSTER MUST BE PRINTED BY CLASS TIME TODAY • Extra credit for presenters (up to 8 points on final grade) • Extra credit to attendees/reviewers (up to 2 points on final grade) 	
Apr 13 Class 24	Poster Presentations on Molecular Genetic Techniques <ul style="list-style-type: none"> • Extra credit for presenters (up to 8 points on final grade) • Extra credit to attendees/reviewers (up to 2 points on final grade) 	
Apr 27th 9:45 to 11:45am	CUMULATIVE FINAL EXAMINATION (20% 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: 50% of final grade
 - You can choose to drop Exam I or II, if you do this the final exam will be worth 35% 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: 25% of final grade
- Classwork, Quizzes, & Attendance: 25% of final grade
 - Classwork 5% of final grade
 - Quizzes 15% of final grade
 - Attendance 5% of final grade
- Extra Credit: Earn up to 10 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 an application of that technique. 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. Each group will prepare one of each of these items below as the semester progresses.

25% 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
- 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 FEBRUARY 23th

The paper (5%) must include:

- 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
- 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 BY 8pm ON APRIL 6th

A poster (15%) must include:

- An *abstract* (250 words)
- An *introduction*
 - Includes a description of the technique
 - One figure should be part of the introduction
- A *Technical review section* for those focusing on how the technique was discovered
 - 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
 - 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
- Poster should be made using the PowerPoint template available on blackboard
- Final posters should be emailed to me in PDF format.
- Final posters need to be printed by group members for presentation.

POSTER IS DUE by 11am ON APRIL 11th

Poster Presentations

- The poster will be presented on both April 11th and April 13th 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 8 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 three posters and rank them per the poster evaluation form.
 - You will receive up to two 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 top three posters.

Grading Scale: A 100-94 A- 93-90 B+ 89-87 B 86-84 B- 83-80 C+ 79-77 C 76-74 C- 73-70 D+ 69-67 D 66-64 D- 63-60 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, you are stating that you have read this form and understand the expectations for the course.