COURSE SYLLABUS 2012 – IB 204: GENETICS

INSTRUCTORS

Dr. Katy Heath
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Office hours talk to Dr. Heath after lecture M & W or email to set up another time

Dr. Barry Pittendrigh
518 Morrill Hall (his office is at the back of the lab – Room 518A)
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Phone: 244-0567
Office hrs: M and W – 1:00-2:00 PM
Or by appointment

Nick Morphew
Lab Coordinator
300 Natural History Building
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Phone: 244-7350

For all three instructors email is the GREATLY preferred method of contact. Please only phone in an emergency. Also, do not expect e-mail responses during the evenings or weekends.

TEACHING ASSISTANTS

Catherine Dana, Michelle Duennes, Sarah Giers, Tania Jogesh, Julia Ossler, Miranda Segura

COURSE INFORMATION

Course website: https://moodle.life.illinois.edu/
Classes: MWF 12:00-12:50 pm; 114 David Kinley Hall
Lab: 309 Natural History Building.
Credit: 4 hours (3 hours for students taking without the lab)
Prerequisites: IB 150 and MCB 150

REQUIRED TEXTS and MATERIALS (both at Illini Union Bookstore)

Sanders and Bowman. 2012. *An Integrated Approach to Genetic Analysis*

iClicker: Register your iClicker at **http://www.iclicker.com/registration/**

INTRODUCTION TO IB 204

Welcome to Genetics! As you know from reading the newspapers and other popular media, Genetics is an exciting and fundamental discipline within biology. Genetics is a core course in IB, and is therefore required for all IB majors. Many students with majors in MCB and in other fields also enroll in this course. Our lectures and labs are designed for students with career interests in a diversity of areas, including medicine and other health sciences, research, science writing, or education. We assume that you have mastered all the genetic material covered in IB 150, and we will not revisit most of this information. This course will emphasize genetic data analysis throughout and will introduce you to the topics of gene mapping, genetics of complex traits, genomics, and population and evolutionary genetics. This course is aimed at building up a solid foundation for biology students, developing students' abilities in critical thinking, sorting through many possible explanations for genetic data, and applying the knowledge of genetics to many areas of endeavor even outside the field of genetics itself.

We frequently use active learning activities in lecture, because these have been demonstrated to improve student learning. These include clicker questions, small group discussions (think-pair-share), and in-class workdays to help you synthesize the lecture material and better prepare you for exams.

SUGGESTED LEARNING STRATEGIES FOR LECTURE

1. **Listen and think during lecture – it's actually a very efficient use of your time. Don't attempt to multitask (Facebook, texting), even if it means turning off your phone or leaving the computer at home. Take good notes! One major key to success in this class is taking good notes!!!!**
2. Read textbook (following lecture outline) once prior to and once after each lecture. Focus on those parts of the text that relate to lecture material.
3. Feel free to print the lecture slides prior to each lecture, if they help you keep up with note-taking. Please be aware that these **slides are not lecture notes**. Take detailed notes on the print-outs during lecture. Our explanations are more important than what is printed on the lecture outlines!
4. Participate fully in all active learning exercises. Engage with your peers. Ask for help when you need it.
5. Learn definitions of all unfamiliar terms that appear in slides, and in the assigned reading.
6. Review figures in text and on PPT slides to practice generating and interpreting figures. Pay particular attention to understanding how to interpret figures and tables.
7. Master all computational skills and data interpretation skills that are critical components of the scientific process; be able to apply these skills when confronting a new genetics problem.

Course Point Breakdown

Lecture 70%

		Total
Exam 1, 2, 3, 4	16.25% each	650 pts
Iclicker	50 pts max	50 pts
		700 pts

Lab 30%

Fast plants and Review	15	
Pippetting Practical	20	
PTC allele Primer-Design Week 1 hand in sequence	10	
PTC project lab report 2 pg results and discussion	35	
Drosophila Mid-project methods analysis	30	
Drosophila Project Lab Report	80	
Drosophila Project Presentation	25	
Pop Gen	25	
Quatitative Genetics I	25	
Quantitative Genetics II	35	
	300 pts	

Absences: The University does not have a comprehensive system for tracking student absences, and students have taken advantage of that in the past. Therefore, we have a strict absence policy. The only excuse for missing labs or exams is personal illness or tragedy in your immediate family. Notify Nick Morphew and your TA BEFORE the lab or the exam if you have a problem. You must provide documentation (i.e. written doctor's note excusing the student for specific days, athletic dept letter, etc.) as well as an emergency dean letter in order to be excused from the exam or lab. Any documentation must be submitted no later than two weeks after the absence. Travel, weddings, jobs, other courses, etc., must be planned around the lecture, laboratory, and exams. Any missing grades will be prorated. If there is a chronic illness or multiple missed labs/ exams, the student should work with a Dean to verify and document their absences. If a student misses a lot of major assignments, then they may have to withdrawal from the class. If you have any questions regarding these policies, please see Nick Morphew. If you foresee having any long term problems, contact Nick immediately to make arrangements at the beginning of the semester, accommodations cannot be made after the fact.

Exams: Exams will cover lecture material, assigned readings, and material covered in homework and recommended problems. Format of exams will be a combination of multiple choice and short answer/essay questions. Calculators may be used only to perform calculations. Storing formulae or notes in a calculator is a violation of course policy.

Any requests to regrade exam questions must be submitted in writing to Nick Morphew within one lecture after the rubric is posted online.

The Final Exam will not be cumulative and will take place **at 7:00-10:00PM, Tuesday, December 17.** Our "final" exam is an hour exam, just like the others in our class (i.e. contains the same amount of test material). You will be given 1 hour to complete it.

Class Attendance: Your grade will benefit from attendance and from reading the assigned material before lectures! In general, students that regularly attend lectures achieve a full letter grade higher than those who do not.

Class Participation: We strongly encourage you to speak up during lectures. Class participation allows you to check your understanding of lecture material, and allows us to clarify difficult or confusing material.

iClicker: There will be iClicker questions in each lecture. These questions are not extra credit, and there is no chance to make-up the points if you forget your iClicker, it does not function properly, or are absent. Students are responsible for bringing a working clicker to class. All iClickers need to be registered by the second exam, or students will not receive their points. We will update iClickers every 2-3 weeks, so students can verify their registration. You will receive 1 pt for answering each question. At the end of the semester the total will be added up and scaled to 50 points. Bringing in someone else's iClicker in their absence is cheating. If a student is found using an iClicker of another student or otherwise misusing the iClicker system, students will receive a minimum penalty zero iClicker points for the semester.
Final Grades: The TA's are required to have their final grades entered in the Compass gradebook by the last day of class. If you see an error, then you have until the day of the final at noon to notify Nick and your TA of any errors. The faculty roughly set the grading scale at 1000-900 points (A+ to A-), 899-800 (B+ to B-), ect. The (+)(-) system, and any curve are applied after looking at the entire class distribution. Historically little to no curve is applied to the class (< 25 course points), and we do not curve individual assignments. There will be

students who will always be a few points away from the next cutoff, but no exceptions will be made once the cutoffs are set.

COURSE POLICIES

General:
This course will follow all policies in the Student Code: http://www.admin.uiuc.edu/policy/code/index.html.

Academic Integrity:
This course will follow Article 104 (1-401 through 1-406) of the Student Code http://www.admin.uiuc.edu/policy/code/article_1/a1_1-402.html. This rule defines infractions of academic integrity, which include but are not limited to cheating, fabrication, and plagiarism. To learn about possible penalties for such a violation, see http://www.admin.uiuc.edu/policy/code/article_1/a1_1-403.html. You are responsible for being knowledgeable of what these infractions are and for following these guidelines. Plagiarism of scientific writing in the laboratory will be carefully monitored. If you do not feel you fully understand what constitutes plagiarism, see your TA or Nick Morphew.

Accommodations:
If you require special accommodations, please tell Nick Morphew at once. All accommodations will follow the procedures as stated in Article 1-110 of the Student Code (http://www.admin.uiuc.edu/policy/code/article_1/a1/1-110.html).

LECTURE SCHEDULE, READING ASSIGNMENTS, AND LAB DATES

Week	Date	Lecture (chapter)		Lab
1	8/26	Mendel (Chapter 2)	Pittendrigh	Meiosis and Review of DNA structure and replication. Fast Plant Activity.
	8/28	Mendel & Meiosis (Chapters 2 and 3)	Pittendrigh	
	8/30	Non-mendelian inheritance (Chapter 4)	Pittendrigh	
2	9/2	Labor Day-No Class	Pittendrigh	No labs
	9/4	Linkage and Mapping (Chapter 5)	Pittendrigh	
	9/6	Mapping (Chapter 5)	Pittendrigh	
3	9/9	Mapping (Chapter 5)	Pittendrigh	NCBI introduction and Primer Design. Pipetting practical.
	9/11	In class exercise on mapping	Pittendrigh	
	9/13	Transcription and Translation (Chapters 8 and 9)	Pittendrigh	
4	9/16	Transcription and Translation (Chapters 8 and 9)	Pittendrigh	PTC genotyping: DNA sampling, extraction, PCR, and allele-specific restriction cutting.
	9/18	Recombinant DNA (Chapter 16; pages 531-561)	Pittendrigh	
	9/20	Recombinant DNA and reverse genetics (Chapter 17)	Pittendrigh	
5	9/23	Recombinant DNA (Chapter 17), forward genetics (Chapter 16; pages 522-530) and reverse genetics (Chapter 17) (End Exam I Material)	Pittendrigh	PTC genotyping: Run gels. Plant Quantitative Genetics Plants
	9/25	**Exam I**	Pittendrigh	
	9/27	Genomics (Chapter 18)	Pittendrigh	
6	9/30	Genomics (Chapter continued 18)	Pittendrigh	Project Week 1: DNA extraction
	10/2	Genomics continued (Chapter 18 continued)	Pittendrigh	
	10/4	Proteomics, Metabolomics, and Systems biology (no specific chapter)	Pittendrigh	
7	10/7	Developmental Genetics (Chapter 20)	Pittendrigh	Project Week 2: PCR of DNA
	10/9	Developmental Genetics (Chapter 20)	Pittendrigh	
	10/11	Immunogenetics (End Exam II Material) (No specific chapter in the textbook)	Pittendrigh	
8	10/14	Transgenics and Risk Assessment (No specific chapter)	Pittendrigh	Project Week 3: Electrophoresis, ligation into vector, bacterial transformation, and clone selection
	10/16	**Exam II**	Pittendrigh	
	10/18	Bacterial Genetics I	Heath	
9	10/21	Bacterial Genetics II	Heath	Project Week 4: Vector recovery and sequencing .
	10/23	Sex Determination I	Heath	

	10/25	Sex Determination II	Heath	
10	10/28	Chromosome Mutations I	Heath	Project Week 5: Sequencing & BLAST of clone sequence
	10/30	Chromosome Mutations II	Heath	
	11/1	Chromosome Mutations III	Heath	
11	11/4	Extranuclear Inheritance	Heath	Population Genetics Lab
	11/6	Transposons	Heath	
	11/6	Retrotransposons & Viruses (End exam III material)	Heath	
12	11/11	In-class workday	Heath	Quantitative Genetics Lab I
	11/13	**Exam III**	Heath	
	11/15	Population Genetics I	Heath	
13	11/18	Population Genetics II	Heath	Quantitative genetics lab II (*Drosophila* lab reports due)
	11/20	Quantitative Genetics I	Heath	
	11/22	Quantitative Genetics II	Heath	
14	11/25			Fall Break
	11/27			
	11/29			
15	12/2	Quantitative Genetics III	Heath	*Drosophila* project presentations
	12/4	Evolutionary Genetics	Heath	
	12/6	Cancer Genetics	Heath	
16	12/9	TBA	Heath	*No labs*
	12/11	In-class workday	Heath	