IB 204: Genetics (Lecture)
FALL 2023

Class time: MWF 12-1 pm Gregory Hall 112
Suggested text: Genetics, A Conceptual Approach, 7th Edition by Benjamin A. Pierce (note this is not essential and free online materials will be provided in class)
Required materials: iClicker, calculator, pen or pencil

COURSE OVERVIEW

Welcome to Genetics! As you might know from reading the news, genetic techniques and genetics research are exciting, fast-moving, and critical for solving many of the grand challenges facing society. Genetics is a "core" course for all Integrative Biology (IB) majors, but we also welcome many students with majors in other fields. Our lectures and labs are designed for students with career interests in a diversity of areas, including medicine and other health sciences, biological research, science writing, or education. This course will emphasize genetic data analysis throughout and we will cover the topics of molecular genetics, gene mapping, genetics of complex traits, genomics, and population and evolutionary genetics. This course is aimed at building a solid foundation in biology, developing 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.

Learning objectives

After taking IB 204, you will be better able to:

- Know what genetics is, how geneticists do their work, and what sorts of questions geneticists ask.
- Think like geneticists, using "genetic logic" based on an intuitive understanding of genetic mechanisms operating both at the level of individuals and populations.
- Synthesize facts and concepts to think critically and reason through problems.
- Draw and interpret graphical representations of data.
- Apply abstract/mathematical models to biological processes.

COURSE WEBPAGE

You will find links to all pre-lecture materials and assignments on the Moodle course webpage: https://learn.illinois.edu/course/. Login with your University NetID and password. We recommend that you bookmark this page after you accessed the course page for the first time.

CONTACT INFORMATION

Facilitator: Steven Burgess
Email: sjb287@illinois.edu
Location: 283 Morrill Hall
One-on-one support: August 21st – October 13th. Monday Study club: 4 – 5 PM NHB 2004, or one-on-one by appointment (Zoom and evening sessions available).

About me: I am an Assistant Professor in the Plant Biology department at UIUC. My research aims to develop better crops which can produce higher yields and withstand climate change through understanding the genetic basis of photosynthesis. We use a variety of approaches from molecular biology, genomics, genetics, biochemistry and synthetic biology. Visit our website to learn more about the exciting things going on. I am originally from the UK and obtained a bachelor's degree in Biochemistry from the University of Edinburgh and a PhD in Molecular Biology from Imperial College London. I came to UIUC as it is a fantastic place to conduct research on photosynthesis. When I'm not doing science I enjoy soccer, attempting to bake and hanging out with my cat.

Facilitator: Nick Anderson (he/him)
Email: nlndrsn2@illinois.edu
Location: 2002D Natural History Building
One-on-one support:

- Feel free to email me to schedule an appointment at any time during the semester!
- Scheduled office hours: October 16th - December 15th.
    - In-person Wednesday 3 - 4 PM NHB 2002D (check NHB 2092 if not in 2002D)
    - Zoom Tuesday 7 - 8 PM, Link, Meeting ID: 889 4358 9379, Passcode: 308979

About me: I am a lecturer in the School of Integrative Biology. My primary job duties are teaching and academic advising. I teach several courses for undergraduates - including IB 361 Ecology and Human Health next spring - and graduate students in the Online Master of Science Teaching (OMST) and MS in IB programs. I maintain a small research group investigating the importance of predators and habitat restoration in structuring native bee communities. You can visit my website to learn more. I am originally from north-central Wisconsin and obtained my bachelor's degree in general biology from the University of Notre Dame and a master's degree and Ph.D. in Entomology from UIUC in Dr. Alex Harmon-Threatt's lab. I came to UIUC to work specifically with Dr. HT and to be part of a globally renowned Department of Entomology. I chose to stay because of all the wonderful people and learning community. Outside of work, I enjoy spending time with my daughter, wife, and two cats and trying to relearn the guitar.

LEARNING COMMUNITY

Research shows one of the biggest factors determining student success is a sense of belonging. In IB204 we therefore strive to build a supportive learning community and hope to achieve this through class structure. We are a large group, and recognize that the format can sometimes be isolating, posing challenges to building the relationships with instructors necessary to support learning. To address this, **the class is arranged into sections which will determine** sitting arrangements in both lab and lecture. While this will mean that some students will not be able to sit with their existing friends in class, it is an important step to enable a closer relationship between you and TAs, for running in class activities, and providing timely feedback on class work. You are a key part of the community, and we ask for your help in making this a success, by participating in class and reaching out to others within your section, particularly if you see someone sitting alone. We hope that in time it will help build additional friendships and provide an environment which can best support your learning.

We are grateful to be joined by the following teaching assistants (TAs) and course assistants (CAs) who will be on hand to help you succeed in this class. Office hours will be held daily from 1-4 PM in the IB resource center Natural History Building (NHB) 2092

Teaching Assistants (TAs) are graduate students in the School of Integrative Biology. They teach the lab and merit sections of the course and are an excellent source of information about the topics covered in class and beyond. For lecture+lab students, your TAs are your first point of contact for concerns about your lab grades.

Name and email	**Sections**	**Office hours and location**
Shriram Bhat sb65@illinois.edu	Lab: ABD (Tues 3 - 6 PM, 3002 NHB) Lab: ABH (Thurs noon - 3 PM, 3002 NHB)	Tues 1-3 PM, NHB 2092
Elsa de Becker elsad2@illinois.edu	Merit (Thurs 3 - 5 PM, 4004 NHB) Lecture-only (AL2): A-M	Thurs 1-3 PM, NHB 2092
Avalon Feiler afeiler2@illinois.edu	Lab: ABF (Wed 1 - 4 PM, 3002 NHB) Lab: ABI (Thurs 3 - 6 PM, 3002 NHB)	Mon 2-4P M, NHB 2092
Amanda Griffin alg10@illinois.edu	Lab: ABE (Wed 9 AM - noon, 3002 NHB) Lecture-only (AL2): N-Z	Mon 1-2 PM, NHB 2092 Fri 3-4 PM, NHB 2092
Fabian Pallo Rivadeneira fabianp2@illinois.edu	Lab: ABC (Tues noon - 3 PM, 3002 NHB) Lab: ABJ (Wed 1 - 4 PM, 3011 NHB)	Tues 3-4 PM, Thur 3-4 PM, NHB 2092
Vincent Prayugo prayugo2@illinois.edu	Lab: ABB (Tues 9 AM - noon, 3002 NHB) Lab: ABG (Thurs 9 AM - noon, 3002 NHB)	Fri 1-3 PM, NHB 2092
Sarah Winnicki sarahkw2@illinois.edu	Lab AKL (Mon 1-4 PM, 3002 NHB) Lab ABK (Wed 9 AM - noon, 3011 NHB)	Wed 1-3 PM, NHB 2092

Classroom Assistants (CAs) are Integrative Biology undergraduates who excelled in IB 204. They can provide valuable insights into strategies that helped them to successfully learn the material. CAs do not do any grading, so please refrain from contacting them if you have concerns about how a specific assignment was graded or when grades will be uploaded.

Name	**Tutoring hours and location**
Natalie Monroe	Tuesday 11AM - 1 PM; Thursday noon - 1 PM; NHB 2092
Regina Roy	Monday, Wednesday, and Friday 9 - 11 AM; Tuesday 4 - 5 PM; NHB 2092

CONDITIONS FOR LEARNING

It is increasingly recognized that there are different ways of learning, and each of us has our own preferred style. To account for these differences, we will seek to provide opportunities to learn key topics in multiple ways, such as videos, articles to read, short podcasts, question sets and in class activities. However, we are always open to suggestions and would like to hear how we can best support your learning needs. To assist in this process there is an anonymous feedback form where you can leave comments here: https://forms.gle/922JbKk3CnUbbnbUA

COURSE STRUCTURE AND ASSIGNMENTS

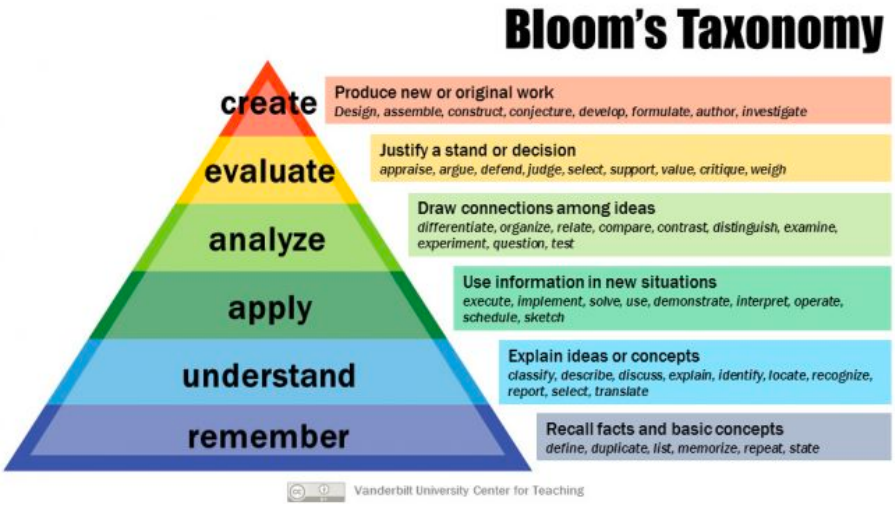
Depending on your enrollment this is a 3-credit lecture course or 4-credit lecture and a lab. Typically, each credit is ~3 hours of work a week, so you should plan on spending ~9-12 hours per week on this class. Time commitments may vary week to week, as well as depending on your motivation, needs, and study habits. All course material will be posted on Moodle where you will also submit most of your assignments.

Lectures

Lectures will be 50 min in duration and will involve a mixture of in-class activities and a more traditional format, but with plenty of opportunities to ask questions and try practice problems. The material covered in lecture will build on the pre-lecture videos and reading so it is advised to come prepared by reviewing the material prior to class to obtain maximum benefit from the course.

Assignments

We aim to use assessments which help students to gauge their level of understanding of a topic while providing scope for growth. IB204 is structured in accordance with Bloom's taxonomy (see below), which conceptualizes learning into categories of increasing complexity from remembering to creating. As a 200-level course we look to build on the foundation set in IB150 which covered topics up to the level of application, by incorporating activities to apply and understand material. The course therefore has three types of low stakes assignments to practice skills, and four summative exams to reflect upon mastery of the material.



Pre-lecture activities: Each class has a pre-lecture activity to complete before 11:59 AM on the associated day. These activities provide content to *understand* for class and assist with short term and long-term memory recall. Activities will be varied, but will consist of an assigned reading, video, or tutorial and an associated quiz delivered on Moodle. These questions are to help you gauge your understanding and unlimited attempts are allowed, with an average score given.

In-lecture activities: There will be activities in class that are designed to *apply* knowledge and *evaluate data* before examinations. These will be ungraded, but points provided for completion. The reason for this is that a degree in IB can provide preparation for careers in health, research, and industry, all of which place a strong emphasis on applying knowledge, and active participation during lectures has been shown to improve learning. This semester, we will be completing in-lecture activities using iClickers.

Post-lecture question sets: There will be **weekly (first half of the semester, 08/21 - 10/13)** and **daily (second half of the semester, 10/16-12/15) post-lecture question**

sets. **Weekly** post-lecture activities will open after the Friday lecture and will be due by 11:59 AM on the following Monday. **Daily** post-lecture activities will open after the associated lecture and are due by 11:59 AM on the day of the next lecture. We will send reminders, so make sure you are subscribed to the Moodle Announcement forum. These are designed to assist in consolidating knowledge and preparation for some of the types of questions that will be found on exams. Multiple attempts will be allowed for each question set, and an average score will be given.

Exams will cover lecture material, assigned readings, and material covered in activities and quizzes. Format of exams will be a combination of multiple choice and short answer/essay questions. Calculators (not phones or smart watches) may be used to perform calculations.

EXAM INFORMATION

There are four non-cumulative exams. Exams will be in-person during the designated class schedule. **Please note that Exam 4 is on Friday of finals week. Please plan your winter break travel plans accordingly.**

Exam dates and locations:

Exam	Date	Time	Location (by last name)
Exam 1	September 18th	12-1 pm	A-M: Gregory Hall 112 N-Z: NHB 2079
Exam 2	October 13th	12-1 pm	A-M: Gregory Hall 112 N-Z: NHB 2079
Exam 3	November 8th	12-1 pm	A-M: Gregory Hall 112 N-Z: NHB 2079
Exam 4	December 15th	1:30-2:30 pm	A-M: Gregory Hall 112 N-Z: TBD

Missing and Exam and Make-up policy

In the event you need to miss an exam due to illness, a university athletic event or a job, graduate or professional school interview, please contact the instructors to arrange a suitable make-up time.

Request for re-grades

We aim to be fair in grading and will provide a rubric upon return of the exams. However, sometimes there will be mistakes in grading, and as this is a large class, to assist the instructors in processing regrade requests it is requested they are submitted by email to the instructors within one week after the rubric is posted online, with a description of how the answer matches the rubric to assist in regrading.

COURSE SCHEDULE

Week	Date	Topic		Instructor
1	21-Aug	Course introduction		Dr. Burgess
	23-Aug	Nature vs Nurture		Dr. Burgess
	25-Aug	Drug Discovery (Mitosis)		Dr. Burgess
2	28-Aug	Virgin Birth (Meiosis)		Dr. Burgess
	30-Aug	Endosymbiotic theory		Dr. Burgess
	1-Sep	DNA as genetic material		Dr. Burgess
3	4-Sep	No class - Labor Day		Dr. Burgess
	6-Sep	Understanding how DNA replicates		Dr. Burgess
	8-Sep	Mechanism of DNA replication		Dr. Burgess
4	11-Sep	Eukaryotic DNA replication and aging		Dr. Burgess
	13-Sep	Mutagenesis and repair		Dr. Burgess
	15-Sep	Review of Module 1		Dr. Burgess
5	18-Sep	Exam 1: Covers material from 08/21-09/13		Dr. Burgess
	20-Sep	Transcription		Dr. Burgess
	22-Sep	Translation		Dr. Burgess
6	25-Sep	Protein analysis		Dr. Burgess
	27-Sep	Bacterial gene regulation		Dr. Burgess
	29-Sep	Eukaryotic gene regulation (transcriptional)		Dr. Burgess
7	2-Oct	Eukaryotic gene regulation (post-transcriptional)		Dr. Burgess
	4-Oct	Eukaryotic gene regulation (DNA packaging)		Dr. Burgess
	6-Oct	Epigenetics		Dr. Burgess
8	9-Oct	Cancer biology		Dr. Burgess
	11-Oct	Review of Module 2		Dr. Burgess
	13-Oct	Exam 2: Covers material from 9/20-10/09		Dr. Burgess
9	16-Oct	Chromosomal Mutations	Introduction and Aneuploidy	Dr. Anderson
	18-Oct		Polyploidy & Structural Changes	Dr. Anderson
	20-Oct	Genetics of Sex	Sexual life cycles	Dr. Anderson
10	23-Oct		Sex determination	Dr. Anderson
	25-Oct	Quantitative Traits	How do we get some traits that are so variable?	Dr. Anderson
	27-Oct		Variance components and response to selection (breeder's equation)	Dr. Anderson

11	30-Oct	Evolutionary and Population Genetics	Defining species and inferring evolutionary relatedness	Dr. Anderson
	1-Nov		Hardy-Weinberg Equilibrium and tracking movement	Dr. Anderson
	3-Nov		Inbreeding	Dr. Anderson
12	6-Nov	**REVIEW for Exam 3**		Dr. Anderson
	8-Nov	**Exam 3: Covers material from 10/16-11/06**		Dr. Anderson
	10-Nov	How do we find genes?	Fly screens and Linkage mapping	Dr. Anderson
13	13-Nov		QTL mapping and sequencing	Dr. Anderson
	15-Nov		Next Generation Sequencing (NGS) and GWAS	Dr. Anderson
	17-Nov	Strange Genetic Material (1/2)	Bacterial and viral genetic material	Dr. Anderson
14	20-Nov	**NO CLASS - Fall break**		Dr. Anderson
	22-Nov	**NO CLASS - Fall break**		Dr. Anderson
	24-Nov	**NO CLASS - Fall break**		Dr. Anderson
15	27-Nov	Strange Genetic Material (2/2)	Transposons	Dr. Anderson
	29-Nov	Biotechnology	mRNA vaccines and STR/microsatellites	Dr. Anderson
	1-Dec		Plasmids and transformation	Dr. Anderson
16	4-Dec		CRISPR & RNAi	Dr. Anderson
	6-Dec	**REVIEW for Exam 4**		Dr. Anderson
	8-Dec	**NO CLASS - Start of final exam period**		Dr. Anderson
17	15-Dec	**Exam 4: Covers material from 11/10-12/06 DURING FINALS WEEK! (1:30-4:30 PM)**		Dr. Anderson

ASSESSMENT INFORMATION

This class uses a standard grading procedure and marks will not be curved at the end of the semester.

Lecture accounts for:

- 70% of total grade for students enrolled in lecture and lab (lab is 30% of the final grade)
- 100% of total for students enrolled in lecture only.

Grade percentage assignments

A+ = 97.5-100; A = 92.5-97.4, A- = 89.5-92.4, B+ = 87.5-89.4, B = 82.5-87.4, etc.

Lecture point breakdown

Assessment type	**Percent**
Exams (4 non-cumulative)	50%
Pre-lecture activities	20%
In-lecture activities	10%
Post-lecture activities	20%

EXPECTATIONS AND GUIDELINES FOR COMMUNICATION

Your instructors are here to help, so please reach out if you need help. As a first step we encourage you to post questions to the Moodle discussion forum if you have queries regarding the material. If you are struggling, it is likely others will be in the same situation, so your actions will benefit everyone in the class. In the event you need a more personal one-on-one consultation, you are welcome to contact the instructors to set up an office hours appointment or ask questions before, during or after class. We will do our best to respond within 24 h Mon-Fri between 8 am and 5 pm, although response times may be longer at weekends. If you have not heard back within several days, please follow up, it is likely your message was missed. Finally, we recognize that we all have lives outside class and sometimes challenging events occur. If you are struggling, or must miss a particular class or assignment, we encourage you to reach out to try and arrange an alternative assessment.

Assessment feedback turnaround time

It is recommended to check Moodle regularly to ensure your assignments are submitted correctly and being marked. Please allow 1-2 weeks for grading of exams and assignments, papers will be returned to you after a test so you can review your answers.

ATTENDANCE

Your regular attendance and engagement with course materials are vital to your success in IB204, and **non-attendance may affect financial aid.** Student attendance is defined as active participation in the course as described in the course syllabus. This course will have multiple mechanisms for student participation, which can be documented by any of the following methods:

- Completion of exams
- Submission/completion of assignments and/or quizzes
- Communication with the instructor
- Or other course participation

As a component of attendance, student email, course announcements, and discussion forums should be checked frequently (daily is recommended). The student is solely responsible for checking updates related to the course.

Excused absences: The university's absence policy can be viewed here: https://studentcode.illinois.edu/article1/part5/1-501/. If your absence qualifies as an excused absence, please follow the steps outlined below.

Process for missing class with an excused absence:

1. Complete Google Form linked in the course Moodle page for every lecture that you are going to miss. For example, if you test positive for COVID and will miss three lectures, you must submit the form three times, one for each lecture.
2. On Friday of the week with an excused absence, you will receive a Word document via email with all the week's activities. We address excused absences one week at a time.
3. Complete the missed activities using the Word document and upload the finished document using the associated link on the course Moodle page.
4. Lecture recordings will be uploaded ASAP, typically within 1 to 2 hours, and appear as a link within the associated page on Moodle.

We will aim to manually grade the make-up forms within one week of their due date. Please let us know if something has not been updated for a long time, as we may have accidentally overlooked your submission.

ACCOMMODATIONS

To obtain disability-related academic adjustments and/or auxiliary aids, you must contact your instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail: disability@illinois.edu or go to the DRES website.

ADDITIONAL RESOURCES

- Are you interested in a career in science? if so, we encourage you to get involved with research. See more here, or talk to the instructors for advice: https://undergradresearch.illinois.edu/
- If you are experiencing personal difficulties and need someone to talk to, you can contact the Student Counseling Services here: http://counselingcenter.illinois.edu/
- Emergency Response information: http://police.illinois.edu/emergency-preparedness/.
- Sexual Misconduct Support: https://wecare.illinois.edu/resources/students/#confidential.
- Student code for academic integrity: http://studentcode.illinois.edu.
- If you have suppressed your directory information in accordance with the Family Educational Rights and Privacy Act (FERPA) it is advised to self-identify to the instructors to ensure protection of privacy https://registrar.illinois.edu/academicrecords/ferpa/.