BIOL 4350 DNA: CODE OF LIFE SPRING 2018

Dr. Jennifer Cooper
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Th 2-3pm
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Include **BIOL 4350** in subject line of all emails.
Check your CSU Stan email **every day**.

COURSE PREREQUISITES
None (but 1 semester of **college biology** is beneficial)

COURSE DESCRIPTION
This course will focus on exploration and discussion of genetic concepts that have the most relevance for everyday life: inheritance of simple and complex traits, cancer genetics, the genetic foundation of behavior and mental illness, and how recent developments in molecular genetic techniques have impacted biotechnology and forensic science.
Non-Biology majors: This course satisfies G.E. area F1.
Biology majors: If you are in the Honors program, this course satisfies G.E. area F1. If you are not in the Honors program, this course will not meet the upper-division genetics requirement, nor may it be used as an elective for the major.

This course is based on discussion, not lecture. To do well, one must devote the necessary time and effort to preparing for class discussion every class meeting. **You will be asked to explore and achieve basic mastery of scientific concepts on your own time.** Class discussion will reinforce and enhance your understanding of these concepts.
Expect to dedicate a minimum of **6 hours** of preparation and/or review outside of class every week. **If you are not prepared to dedicate the time and effort needed for this course, you should reconsider your enrollment.**

REQUIRED TEXTS/MATERIALS

- Learning materials will consist entirely of no-cost, web-based resources.
- **I-clickers are required**, and will be used every class meeting.
- There is no required textbook.

CENSUS DATE
Students must attend the first three class sessions or they will be dropped from the course.
This course can be taken for CREDIT/NO CREDIT. Students can change the grading option or drop the course prior to the census date of February 21. After this date, a student cannot **withdraw** from the course, but I will be happy to sign a change of grading option form at any time during the semester.

GRADING
Grades are determined by the points you earn, out of a total of 500. I use whole letter grades (no +/- grades).
It is expected that students will keep track of their i-Clicker scores for the duration of the term.
I reserve the right to deduct points from those students who consistently fail to participate in class discussions.

In-class quizzes (25 x 10 points each)	250 points
I-clicker knowledge-based questions	175 points
I-clicker opinion-based questions	25 points
Final exam essay	50 points

IN-CLASS QUIZZES
To assess whether you have prepared for the class discussion, there will be a total of 25 short in-class quizzes, administered at the beginning of every class. Quizzes will typically consist of ~6 multiple choice or T/F questions. Questions will be based on the online learning modules and activities (available on BlackBoard), as well as your understanding of any in-class videos we watched in the preceding class period.
You will need **short (10 question) Scantrons** for these quizzes; I will not accept long Scantrons.
If you prepare for class discussion, you will be more likely to earn points on that day's quiz.

i-CLICKER QUESTIONS

To earn daily in-class i-clicker points, you must vote on every question.

Knowledge-based questions

Every class period, you will be asked a set of questions that asks you to demonstrate your grasp of essential **information** or **ideas** that we are **currently discussing**. If you pay attention, ask questions, and engage in discussion, you will probably be able to understand and answer correctly. Please shield your i-clicker hand unit from the eyes of your classmates when you vote. For some questions, I will allow group members to discuss before answering.

Opinion-based questions

Every class period, you will be asked a set of questions that asks you to demonstrate your willingness to share your opinion. Often you will be shown a question and asked to **discuss it with your learning group members** before you vote. There are no correct or incorrect answers; instead, you get points for participating. I will walk around the room and listen to discussions, and qualitatively assess student participation.

FINAL EXAM ESSAY

During the final exam period you will write a 1-page essay. You will answer one of three question prompts, using the answer sheet I provide you. Your essay will be crafted from material you pull from your memory, as you will not be allowed any notes or other memory aids. You will be given 45 minutes to write your essay response. The essay is scheduled for the first 45 minutes of the final exam period (if you arrive after that time, you will not be allowed to write an essay).

Midway through the semester, I will create a fairly long list of possible question prompts that you might see, to guide you as you prepare for this essay.

PERSONAL INTEGRITY AND CLASSROOM BEHAVIOR

Cheating and plagiarism will be dealt with as severely as university and state regulations allow. This includes receiving an F in the course, and being reported to University Judicial Affairs.

You are expected to have finished the web-based activities before class begins, therefore I expect you to put your electronic devices away at the beginning of class. Turn your cell phones to vibrate.
Do not text in class. It is rude, and I will ask you to leave.

COURSE OBJECTIVES

- Provide an overview of the issues, principles, methodologies, and perspectives of genetics;
- provide a working background to critically evaluate relevant issues within the field of genetics and develop continuous inquiry and life-long learning;
- explore the relationships between the fields of genetics, biology, chemistry, ecology, ethics and the other sciences with an emphasis on how these fields are closely inter-related;
- develop more informed and responsible citizens with respect to issues concerning genetic technology, genetic services and genetic health.

Day	Topic for Discussion	Preparation	Time	i-clicker pts
Thurs Jan 25	Introduction	Discussion group formation.		
Tues Jan 30	Cell division and Chromosomes	BB module: Inside a Cell BB module: Tour of basic genetics (4 modules) BB module: Chromosomal abnormalities (5 modules) BB module: Karyotypes (3 modules)	65 min	
Thurs Feb 1	Heredity	BB module: How inheritance works (4 modules) BB module: More about DNA & genes (6 modules)	75 min	
Tues Feb 6	Heredity	BB module: Observable Human Characteristics BB doc folder: 23 & me: Observable Human Characteristics BB doc folder: Color blind test BB module: Genes and blood type BB article: Double Immunity	30 min	
Thurs Feb 8	Heredity	BB module: Sex linkage BB video: X linked recessive BB module: Genetic linkage	35 min	
Tues Feb 13	Structure of DNA Reproducing DNA	BB module: What is mutation? BB module: The outcome of mutation BB module: Mutation and haplotypes	25 min	
Thurs Feb 15	Gene Expression	BB module: Epigenetics and Inheritance BB module: The Epigenome learns from its experiences In-class video: Epigenetics	40 min	
Tues Feb 20	Gene Expression **Wednesday is the Census Date!**	BB video: The epigenome at a glance BB virtual lab: Gene control BB video: DNA Packaging	30 min	
Thurs Feb 22	Gene Expression	BB module: Nutrition and the epigenome BB video: Epigenetics and the human brain	30 min	
Tues Feb 26	Cutting and Joining DNA	BB module: What is cloning? BB module: Why clone? BB video: The science behind dog cloning	40 min	
Thurs Mar 1	Making Transgenic Organisms	BB video: Transgenic animal creations BB module: Transgenic mice BB module: Pharming for Farmaceuticals BB module: Genetically modified foods	1 hr	
Tues Mar 6	Application of Human Genetics	BB module: DNA applications 1	2 hrs	
Thurs Mar 8	Application of Human Genetics	BB virtual lab: DNA extraction BB virtual lab: PCR	40 min	
Tues Mar 13	Application of Human Genetics	BB virtual lab: Gel electrophoresis BB module: Can DNA demand a verdict? BB video: The Innocence Project	40 min	
Thurs Mar 15	Application of Human Genetics	BB module: What is gene therapy? BB module: Gene delivery, tools of the trade BB video: What is CRISPR?	50 min	
Tues Mar 20	Application of Human Genetics	BB virtual lab: DNA microarrays BB module: Measuring gene expression	50 min	
Thurs Mar 22	Cancer Genes	BB module: Cancer BB module: The eukaryotic cell cycle and cancer BB module: Are telomeres the key to aging and cancer? BB module: Precision cancer care	2 hrs	
Tues Mar 26	Obesity Genes	BB article: Obesity gene? Gene discovered that could be an important cause of obesity BB video: Obesity risk a function of both genes and environment BB article: Good news for feast lovers? Obesity – promoting genes discovered	25 min	
Thurs Mar 29	Behavior Genetics: Neurotransmitters and receptors	BB module: Neurons transmit messages in the brain BB module: Crossing the divide BB module: The other brain cells	30 min	
April 2-6	SPRING BREAK Have an awesome holiday!			

Day	Topic for Discussion	Preparation	Time	i-clicker pts
Tues Apr 10	Behavior Genetics: Intelligence, personality, and violence	BB video: Should you blame genes for your grades? BB article: Major personality study finds that traits are mostly inherited BB article: Two genes linked with violent crime	1 hr	
Thurs Apr 12	Behavior Genetics: Sexual orientation	BB article: Twin Study on Male Homosexuality BB video: Nature or nurture – are people born gay? BB video: Homosexuality has genetic or biological basis	25 min	
Tues Apr 17	Behavior Genetics: Mental Illness	BB article: Why it is useful to understand the role of genetics in behaviour BB article: Five major mental disorders share genetic roots BB video: What's the genetic link between mental disorders? BB video: What triggers schizophrenia? New genetic mutations shed light on disorder	35 min	
Thurs Apr 19	Behavior Genetics: Addiction	BB module: The science of addiction (5 modules) BB article: The amount of sex you have may determine how vulnerable you are to drug addiction	90 min	
Tues Apr 24	Neanderthal Genes in Human Genome?	BB doc folder: 23&me: Neanderthal Ancestry Images BB article: Neanderthal DNA has subtle but significant impact on human traits BB article: Neanderthal gene cluster more common in Europeans BB module: DNA applications 2	1.5 hrs	
Thurs Apr 26	Population-specific Genetic Markers in Humans: "Where are you from?"	BB doc folder: 23&me Ancestry Composition Images BB video: Momondo: The DNA Journey BB article: Genetic mapping fact sheet	35 min	
Tues May 1	Stem Cell Research	BB module: The nature of stem cells BB module: Reversing cell differentiation BB video: NOVA Science NOW: Stem Cells Breakthrough BB module: Stem cell quick reference	45 min	
Thurs May 3	Stem Cell Research	BB module: Stem cells in use BB module: Therapeutic Uses of Stem Cells BB module: The stem cell debate: is it over?	1 hr	
Tues May 8	Genomics	BB article: An overview of the human genome project BB video: Gene Patents: 5 Things You Should Know BB article: Can genes be patented?	30 min	
Thurs May 10	Personalized Medicine	BB module: Family health history (4 modules) BB module: DNA applications 3	1.5 hrs	
Tues May 15	Personalized Medicine	BB module: What is precision medicine? BB video: Mayo clinic: Pharmacogenomics: right drug, right dose, right time BB module: Your doctor's new genetic tools	45 min	
Tues May 22	FINAL EXAM ESSAY 11:15 a.m.-1:15 p.m			