

BI122 Introduction to Human Genetics, Fall 2014

Course Overview

We will explore 1) the genetic and molecular basis of heredity and inherited traits, 2) how genetics & genomics reveals an understanding of the human condition, including genetic diseases, cancer, and human evolution, 3) how basic and translational genetics research is leading to improvements to human health, and 4) current ethical discussions related to human genetics.

This is a special and newly offered section of BI122 taught as part of the University's Science Literacy Program (<http://scilit.uoregon.edu>): "SLP courses promote student-centered teaching and communication of science where non-science majors are empowered to consider scientific approaches to societal issues and have the opportunity to learn how to process and critique scientific information."

We will explore innovative pedagogical approaches focused around *active learning*. Therefore, be prepared to fully engage in classroom activities. Further, be aware syllabus changes may occur during the term as the instructors make adjustments based on an ongoing assessment of the learning experience.

Learning Outcomes

Consider, summarize, and debate the efficacy and ethics of modern genetic/genomic testing from the perspective of understanding what genes are, how they are inherited, how they result in traits or human disease, and how genomic analyses are performed & interpreted.

Comprehend a given current affairs article, news story, or documentary related to human genetics (e.g. genomics testing, human disease, human evolution); confidently summarize the major points to family, friends, and colleagues including conveying the issue's significance (including any ethical concerns) and explaining the underlying genetics and molecular biology.

Appreciate the origins of many fundamental biology and human health breakthroughs in genetic studies of model organisms. Apply the scientific method to design a hypothetical, straightforward genetics experiment to test an unresolved scientific question and/or to appraise/rebut a claim based on scientific results (or the lack thereof).

Research a given genetically inherited disease or trait and then explain why the causative mutation(s) is inherited in a particular manner (e.g. as a dominant or recessive trait, autosomal or sex-linked, etc.) and why the abnormal/variant gene product produces the given phenotype. For a disease trait, propose an approach to treat or prevent the disease based on its underlying genetic and molecular origins.

BI122 - Syllabus

Instructor

Kryn Stankunas, Ph.D.
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Teaching Assistants

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Joint Office Hour: Fridays 1-2pm, Location TBD

Briana Jones (SLP Undergraduate Scholar)
Human Physiology Major (Senior)
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Email Communication

Please include "BI122" in the subject line when e-mailing the instructor or TAs. This helps ensure we will not overlook your email. We will try to answer your email in a timely manner. However, we do not always check our email in the late evening or on weekends.

Class Format

Classes are held from 8:30-9:50am on Mondays and Wednesdays. Unlike conventional lectures, each class session will consist of a changing variety of mini-lectures, Q&A sessions (using iClicker), in-class group discussions & problem solving, and other group activities. Required media viewing and readings will be provided and/or posted on Blackboard prior to the lectures. Slides shown in class sessions will be posted on Blackboard.

Discussion Sections

The two discussion sections are on Friday mornings. Please attend the section that you registered for. Discussion attendance is mandatory and will include a variety of activities, including material not covered in full class sessions.

During the discussion sections, the TAs will review particular challenging questions from that week's quiz (see "Grading" below). You may also post questions through the

“Discussion” tool on the course’s Blackboard site. The TAs will review these questions at least once per week and answer select ones during the Friday discussion sections.

Reading & Viewing Materials

There is no required textbook. However, if you anticipate (or subsequently find) you would benefit from having a textbook resource, several good options are available, including:

Human Heredity: Principles and Issues, Michael R. Cummings (10th edition). ISBN: 978-1-133-10687-6. Available on Amazon.com and at the Duck Store.

Human Genetics: Concepts and Applications, Ricki Lewis (10th edition). ISBN: 978-0-073-52530-3. Available on Amazon.com.

Older editions of both textbooks are on reserve at the Science Library.

Most of the class sessions will involve discussions of online lectures and reading materials. *Required* viewings & materials will be posted on Blackboard or links will be provided. All content in these materials may be included in quizzes and exams.

Grading

1) Weekly online quizzes: 20%

There will be seven weekly at-home quizzes of 20 minutes duration. These will be conducted through Blackboard and *must* be completed during a time-restricted period beginning Wednesday evenings (exact times TBD). The quizzes must be taken as individuals and should not be discussed until the quiz availability period closes and answers are posted. Working as groups or sharing answers is a breach of classroom ethics. Your six highest scores will count towards your final grade. Combined, the quizzes will comprise 20% of your grade.

2) iClicker questions/participation: 15%

We are using iClickers as a way to facilitate classroom participation and discussion. Please bring your iClicker to class sessions as you will receive credit for participating in iClicker questions. This grade will be a mixture of participation and accuracy of answers. You may “fail to click-in” two times before losing participation points. Register your iClicker on Blackboard *before* the second week of classes.

3) Midterm exam: 20%

A midterm exam will be held during class on **November 5th**.

4) Final exam: 30%

The final exam is on **December 8th**. The exam is *cumulative* and may cover material from any part of the course.

5) Term assignment: 15%

As individuals, you will complete an assignment due on (or before) 11:59pm on **December 4th**. This assignment will take the form of a "fill in the blanks" report on the genetic inheritance and molecular basis of a human trait or disease. Your report will also highlight the societal or medical significance of the trait/disease. Further information will be provided in class and posted on Blackboard. Late assignments will have 25% of the grade deducted each day they are late.

All grades will be posted on Blackboard.

General Policy on Missed Quizzes & Exams

There are no early or "make-up" quizzes or exams. If you have a genuine illness or emergency that prevents you from taking a quiz or exam, please contact the instructor.

Classroom Etiquette

Please arrive on time. Lectures and discussion sections begin promptly as scheduled. If an unusual circumstance requires you to anticipate leaving early, please sit near the exit so that you may leave quietly.

Your full attention to class activities is required at all times. Therefore, laptops and tablets (NOT phones) are allowed ONLY for note taking or to assist with classroom activities. There is zero tolerance for non class-related use of computing devices.

Plagiarism & Cheating

You are expected to perform your own work on all online quizzes, exams, and the term assignment. Using another student's iClicker during class (i.e. to "click-in" for them) constitutes cheating. While you are strongly encouraged to discuss ideas with other students and study together, do not copy anyone else's work and do not allow anyone to copy yours. All students are expected to conform to the student conduct code (see URL below) - students not in compliance will be brought to the attention of the University.

Student Conduct Code

http://www.uoregon.edu/~stl/programs/student_judi_affairs/conduct-code.htm

Inclusiveness

The University of Oregon is working to create inclusive learning environments. Please notify the instructor if aspects of the instruction or course design result in barriers to your participation. You may also wish to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Class Schedule:

Genetics: Genes to Traits		
09/29/2014	Session 1	Introduction to current issues in human genetics
10/01/2014	Session 2	Genes and inheritance in the context of cells, nuclei, chromosomes, and DNA
10/03/2014	Discussion 1	Mendelian genetics and pedigree analyses
10/06/2014	Session 3	Genetic analyses & problem solving; sickle cell anemia
10/08/2014	Session 4	Genetics & human disease; population genetics; sickle cell anemia
10/08/2014	Online Quiz #1	
10/10/2014	Discussion 2	Genes to proteins to traits; visit museum exhibit on genetics of skin color
10/13/2014	Session 5	Meiosis & recombination; sex determination; non-Mendelian genetics
10/15/2014	Session 6	Molecular genetics and treatments for genetic disease; cystic fibrosis
10/15/2014	Online Quiz #2	
10/17/2014	Discussion 3	Review: basic genetics
Genomics: Disease & Evolution		
10/20/2014	Session 7	Genomics I: SNPs & identifying disease genes
10/22/2014	Session 8	Genomics II: genome sequencing, diagnostics & ethics
10/22/2014	Online Quiz #3	
10/24/2014	Discussion 4	Genomics & sequencing
10/27/2014	Session 9	Evolutionary genetics I: origin of modern humans
10/29/2014	Session 10	Evolutionary genetics: are humans evolving?
10/29/2014	Online Quiz #4	
10/31/2014	Discussion 5	Human evolution

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11/03/2014	Session 11	Review: in-class problem solving
11/05/2014	MIDTERM EXAM	
11/07/2014	Discussion 6	Review midterm exam
Topics in Genetics & Genomics		
11/10/2014	Session 12	Cancer genetics I: multi-hit hypothesis, inherited vs. acquired cancer, cancer genomics
11/12/2014	Session 13	Cancer genetics II: cancer stem cells, designer drugs
11/12/2014	Online Quiz #5	
11/14/2014	Discussion 7	Cancer genetics
11/17/2014	Session 14	Model organisms & genetics research I
11/19/2014	Session 15	Model organisms & genetics research II
11/19/2014	Online Quiz #6	
11/21/2014	Discussion 8	Model organisms / gene regulation
11/24/2014	Session 16	Gene regulation & developmental biology
11/25/2014	Online Quiz #7 (note: on Tuesday)	
11/26/2014	Session 17	Epigenetics & imprinting
11/28/2014	Thanksgiving – No Class	
12/01/2014	Session 18	Genetics & genomics of neurobiology / autism
12/03/2014	Session 19	Stem cells & regenerative medicine
12/03/2014	Term Assignment Due	
12/05/2014	Discussion 9	Review: cumulative material; in-class problem solving
12/08/2014	FINAL EXAM	