

Course Description

5-11-2016

BIOMG 1290 - Personal Genomics And Medicine -- Why Should You Care About What's In Your Genes?

Spring semesters. 3 credits. Letter Grade.

Instructor: Dr. Charles F. Aquadro (Professor, Dept Molecular Biol & Genetics)

MWF 11:15 am -12:05 pm (Lectures Mondays and Wednesdays in Rm 233 Plant Sci, Bldg, Small Group Discussion on Fridays in 8 different locations). Please only attend the location to which you are registered.

Prerequisite: None. Everybody welcome, but freshman and sophomores from all disciplines are particularly encouraged.

Distribution Category: Physical and Biological Sciences (PBS) in CAS; Life Sciences/Biological Sciences in CALS.

This a University Course that highlights cross-disciplinary dialogue and debate. *“University Courses at Cornell are designed to teach you to think from the perspectives of multiple disciplines, across departments, and among diverse fields of study. All these courses foster intellectual discovery, promote debate, and address complex issues. By taking a University Course you participate in coursework with students from across the university and examine engaging subjects through new and different lenses.”*

Course Description: Do you have allergies to milk or wheat? Curious about your family ancestry? Does a relative suffer from a genetic disease, and you wonder if you might also be at risk? How will medicine be impacted by DNA testing? How will your own future, your quality of life, your decisions regarding children be impacted? What are the ethical, legal, and social challenges we all face as this genetic technology becomes rapidly available to anyone with as little as \$99 and a saliva sample? This course is not just for those interested in science, it is a topic we all need to have a basic understanding of to ensure we are prepared for what is rapidly becoming part of all of our futures.

Grading: Two take-home prelims (30 pts each), class participation (clicker questions; 10 pts), several short writing assignments and Discussion section participation (10 pts), and a take-home final (20 pts) for 100 pt total. Participation in class and discussion sections is really important, and will be important in your grade.

Learning Objectives for BioMG 1250 Personal Genomics and Medicine

To gain a basic knowledge of core concepts and methods in genomics, statistics, anthropology, law and social sciences which are relevant to genetic testing for ancestry and medical inference and diagnosis.

To be able to discuss intelligently the ethical, legal and social implication (ELSI) challenges and debates regarding the growing use of genetics in medicine.

To be able to critically read, interpret, evaluate and discuss new scientific as well as ELSI findings and debates regarding personal genomics and medicine.

To gain an understanding of and appreciation for the diverse views that people have concerning the application of genetic testing to their life choices and views of their own racial/ethnic/social identity.

Diversity Statement for BioMG1290 Spring 2016 from Charles Aquadro

It is my intent that all students from diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. Course materials and activities are designed to be respectful of diversity: gender, sexual orientation, disability, age, socioeconomic status, ethnicity, race, culture, perspective, and other background characteristics. Your suggestions on how this course can more effectively address more diverse points of view are appreciated at any time during or after the course.

Each student in this course is expected to contribute to a class and discussion environment that is both respectful and inclusive. Students of all backgrounds including gender, sexual orientation, race, ethnicity, and religion are to be treated fairly and with honesty, integrity, and respect. You will be asked to share your views on what may be uncomfortable topics in some cases. A major goal of mine is to expose you to various perspectives on topics and deepen your understanding of different viewpoints by hearing why some people feel differently than you do, or would make different decisions based on the same evidence (e.g., genetic test results). Civil discourse, reasoned thought, sustained discussion, and constructive engagement without degrading, abusing, harassing, or silencing others is required of all students in this class since it will deepen the learning experience for you, other students, and for me.

Textbook (Required Reading): Collins, Francis S. 2010. The Language of Life, DNA and the Revolution in Personalized Medicine. HarperCollins, New York

Additional readings will be posted on Blackboard throughout the semester.

BioMG1290: Personal Genomics and Medicine Spring 2016 4-22-2016

Tentative Lecture and Discussion Syllabus

- 1 1/27 W Course intro: why care about your genome?
1/29 F Discussion: Steve Pinker and Angelina Jolie (NY Times articles)
- 2 2/1 M What's DNA, and Genomics and Ancestry terms and concepts
- 3 2/3 W Genetic ancestry testing and the Cornell Genetic Ancestry Project
2/5 F Discussion: personal genetic ancestry predictions, risk, and rewards
- 4 2/8 M Basics of Population Genetics: Hardy-Weinberg and genetic drift
- 5 2/10 W Basics of Population Genetics: natural selection
2/12 F Section: Sampling of students for ancestry testing
- 2/15 M No Class – February Break Feb 13-16, 2016**
- 6 2/17 W Basic “genomics” methodology and concepts for assaying DNA variation
2/19 F Discussion: Exercise in lineage estimation from DNA data and geographical mapping
- 7 2/22 M Ancestry estimation from DNA data & geographical mapping using indigenous populations
- 8 2/24 W Concepts of race and ethnicity
2/26 F Discussion: If genes are related to geography, and race is often geography based, doesn't genetics then play a role in race?
- 9 2/29 M The use of genetic ancestry, race and cultural identity in medicine
- 10 3/2 W Misuse of genetics and the eugenics movement: historical examples
- 11 3/4 Fri Special lecture: Ashkenazi Jewish Genetic Screening: perspective from a clinician: Dr. Susan Klugman, Dir, Division of Reproductive Genetics, Albert Einstein College of Medicine
- 12 3/7 M What can you learn about your health from genome testing of DNA variants
Example: 23andMe genetic health analysis (look at Chip's results)
- Take-home Prelim 1 distributed Mon. March 7, 2016, Due Wed March 16 by 4pm.**
- 13 3/9 W Guest Lecture: Dr. Joanna Mountain, Senior Director of Research, 23andMe.com (via skype), Direct to Consumer Genetic Testing
3/11 F Discussion: Debate: Genetic, Social, Legal and Ethical issues of Dor Yesohorim
- 14 3/14 M How do scientists link genetic variation to disease? Genome Wide Association Studies
- 15 3/16 W Interpreting genome wide association studies (GWAS) for complex diseases
Take-home Prelim 1 due Wed March 16 by 4pm.
- 3/18 F Discussion: NCAA Athlete Required Testing for Sickle Cell Trait: Agree or Disagree?
- 16 3/21 M Genetics of human disease, the medical & ethical challenges of genome screening for disease
- 17 3/23 W Pre-implantation genetic testing and “designer babies”
3/25 F Take-home writing assignment: Design a baby genetically (Due Wed 4/6/2016 by class)
- 3/26 – 4/3 Spring Break – no class**
- 18 4/4 M Legal & Insurance implications of genetic testing; the Genetic Information Nondiscrimination Act (GINA)
- Take-home Prelim 2 distributed Mon. April 4, 2016, Due Wed April 13th by 4pm.**
- 19 4/6 W Newborn genetic screening
Designer baby writing assignment due by class Wed. 4/20/2016
4/8 F Discussion: Debate between students assigned “For” and “Against” “designer babies”
- 20 4/11 M HeLa cells, the Havasupai genetics lawsuit, and informed consent
- 21 4/13 W Behavior and Genetics
Take-home Prelim 2 due Wed April 13th by 4pm using Turnitin on Blackboard.
- 4/15 F Discussion: Debate regarding responsibility for genetically influenced behavior
- 22 4/18 M Pharmacogenomics, nutritional genomics and personalized drugs
- 23 4/20 W Nutritional Genomics
4/22 F Discussion: 23andMe DTC genetic research studies: would you participate?
- 24 4/25 M Genetic and personal genomics of cancer diagnosis and treatment
- 25 4/27 W Guest lecture: Dr. Angela Gonzales (Dept. Devel. Sociology, Cornell) – Personal perspective on Native American opposition to genetic testing and ancestry inferences.
4/29 F Discussion: Editing genes in humans and human embryos
- 26 5/2 M Genetic Ancestry Summary Results and Stories for BioMG1290 students
- 27 5/4 W Guest Lecture: Dr. Kristy L. Richards, MD, PhD, Assoc Prof, Cornell CVM. Genetically personalized treatments for Lymphoma in dogs and humans.
- Take Home Final Exam Distributed Wed May 4th 26, Due by 11:30am May 18 2016**
- 5/6 F Discussion: Discussion of student ancestry results and interpretations
- 28 5/9 M Treating Genetic Disease: options and challenges
- 29 5/11 W Dealing with a “bad gene” testing result, and perspective on the semester.

Grading: Two take-home prelims (30 pts Prelim 1, 30 pts Prelim 2), in-class participation (clicker questions; 10 pts), short writing assignments and section participation (10 pts), and take-home final (20 pts).