

Biology 544 Your Genes Your Life?

The first draft human genome sequence (the entire sequence of 46 chromosomes) is less than ten years old. The theme of this course stems from the technological revolution that is driving down the cost of DNA sequencing, so that shortly it will be feasible to determine your individual genome (the entire sequence of your DNA) for less than \$1000. The foci of the inquiry attribute are the Ethical Social and Legal Issues arising from the Genomics Revolution.

Currently several departments in CoLA currently offer General Education courses at the 500 level. The Discovery Program is designed to allow students to explore concepts beyond their freshman year. The course has been targeted to sophomores, who should be better prepared to deal with more detailed and complex course content. The course content is based on recommendations by the American Society for Human Geneticists, for concepts that non-science majors need to facilitate decision mapping for issues they will confront over their lives.

Biol 544 has been divided into three sections each of which incorporate inquiry based activities. Students will present their findings to their classmates using a variety of formats. Discussion and student presentations will take place during class sessions. The "laboratory" uses computer-aided instruction to enhance cognitive learning processes and to explore genetic information available from human data bases.

1. Basic aspects of heredity: Students will be tasked with collecting examples of genetic/genomic discovery that make the headlines of popular media. Each student will be asked to provide a synopsis of a recent discovery (from the popular media) and briefly envision what might be ethical, societal and legal issues surrounding potential applications of the discovery.
2. Genomics and Molecular Genetics: Student teams will be tasked to research individual genetic problems and present information both orally and in poster format. The genetic problems will illustrate more complex concepts (genetic anticipation, imprinting, evolutionary forces). These activities will emphasize: "scholarly investigation, critical evaluation of information, ability to present results systematically and to formulate accurate conclusions regarding technological advances."
3. Personalized medicine: Students will be asked to explore and debate ethical, social and legal issues in Genetic Testing and personalized medicine: Can more precise genetic information improve medical interventions? What are the psychological consequences of knowing your genetic predisposition if the outcome (early painful death) is untreatable? Who should have access to your personal genetic information? Is there a place for personal responsibility in responding to genetic predisposition? What are resulting societal issues? Should commercial genetic testing be regulated? Where do we draw the limit between gene therapy to correct an existing genetic deficiency and pre-implantation genetic selection for gender or athletic prowess?

Examples of Ethical Social and Legal Issues arising from the Genomics Revolution which will be examined during the semester and which fulfill inquiry criteria are given below:

INQUIRY CRITERIA

1. Inspire curiosity. An Inquiry student will compose open-ended questions that lead to further investigation into increasingly focused problems and issues: *What does it mean to know your complete DNA sequence? To what extent does our DNA sequence control what we look like and how we respond to our environment?*
2. Develop understanding and perspective taking: An Inquiry student will explain a central issue or question of the course using at least two unique perspectives. *A genetic test is designed that can*

establish whether or not an individual is going to succumb to a debilitating and expensive disease. Who should get the test? Who has a right to know the results of the test? Should an insurance company be allowed to deny long term health care insurance based on such a test? Should anyone be forced to modify their behavior based on the results of a genetic test, if lifestyle modification may avert or lessen the disease?

3. Clarify standards of thinking: An Inquiry student will be able to identify, compare, and evaluate different interpretations (hypotheses, explanations) of a given phenomenon. *What is the basis of genetic variation in human populations? How much genetic variation is there between populations versus within populations? Does genetic variation contribute to different outcomes for a disease or different efficacies for medication? [These topics lead to a discussion of the basis of race and ethnicity, and race/gender based medical interventions].*

4. Create effective communicators: An Inquiry student will present in clearly organized form the results of the investigation into questions or problems they have posed. *Over the course of the semester students will be tasked to write short papers and give poster and oral presentations. For a final project each student will explore the Ethical Social and Legal issues related to a genetically determined trait. As a writing intensive course, students will receive frequent feedback both from classmates and the instructor; these interactions should enable students to become more effective communicators.*