Summary of Course

This core course offered by the Institute for Public Health Genetics provides an introduction to the legal, ethical, policy, and social issues arising as genetic knowledge and technologies are developed and made available to individuals and populations. Students will learn to identify and anticipate potential legal, ethical, policy and social concerns that complicate incorporating new genetic advances into public health efforts. The course introduces the analytic tools used to examine public health genetics issues from multidisciplinary perspectives, including ethics, law, social sciences and policy. It examines the development and uses of genetic information in reproductive and medical decision-making, public health policy, and genetics research, as well as multidisciplinary examinations of privacy and confidentiality and genetic discrimination.

Course Objectives

Through lectures, case studies, class discussions, writing assignments, and examination, students will: develop introductory skills in legal, ethical and policy analysis as they pertain to public health genetics practice and policy; be able to recognize and analyze legal, ethical, policy and social issues arising in the context of public health genetics; become familiar with the diverse literature and research sources regarding legal, ethical, policy and social issues in public health genetics, including books, journals, and government reports; and increase the competence with which they make decisions in the area of public health genetics as issues arise in their practice and professional training.

Required Texts

The Course Materials for this course consist of a compilation of medical, scientific, legal, policy and public health journal articles, book excerpts, miscellaneous legal materials, and articles from the popular press. The vast majority are linked and available for downloading via the Syllabus webpage at:

You will need to log in with your UWNet ID when prompted. The remainder of the course readings must purchased in a bound course pack at the University Bookstore at 4326 University Way N.E. ("the Ave").

Since scientific advancements in genetics are occurring and being reported practically every day, from time to time throughout the course we will email news items of potential relevance to the class. Unless specifically identified as Required reading for the course, these news items are Optional readings—we will do our best to remember to label them "FYI ONLY."

Class Participation

This course provides an opportunity for students to discuss cutting-edge and controversial issues. Active participation by students is crucial to the success of this class. It is important that students prepare for class, having both read the materials and thought about the issues.

If you must miss class: Class handouts will be posted on the course website. If you miss class, it is your own responsibility to download handouts and obtain notes from your classmates.

Course Grade

Your course grade will be based upon a take-home midterm, take-home final examination, and two case study assignments. The take-home midterm will account for 25% of your grade and the final exam will account for 35% of your grade. The midterm and the final exam will be essay style. Both exams will be graded anonymously according to procedures discussed in class. Each of the case study assignments will be worth 20% of your grade. All exams and assignments are subject to the University of Washington’s Student Conduct Code and/or the University of Washington School of Law’s Honor Code, including sanctions and disciplinary actions [http://www.washington.edu/students/handbook/conduct.html; http://www.law.washington.edu/students/academics/HonorCode.aspx]

Important instructions for the Take-Home Midterm: The Take-Home Midterm will be distributed at the end of class on October 25, 2010 and is due no later than 4:30 pm on October 29, 2010. The midterm will cover course content through October 25 2010. You may use any relevant course materials (i.e., lecture notes, powerpoints, course readings, handouts) in the preparation of your midterm examination. Use of outside sources is not permitted. You are encouraged to study with classmates prior to midterm distribution but no consultation with classmates regarding course content or the midterm is permitted once the midterm is distributed. Please follow the submission directions provided on the midterm.

Important instructions for the Take-Home Final Exam: The Take-Home Final Exam will be distributed at the end of class on December 8, 2010 and is due no later than 4:30 pm on Monday, December 13, 2010. The final exam will be cumulative. You may use any relevant course materials (i.e., lecture notes, powerpoints, course readings, handouts) and any materials that you have played a substantial role in preparing in responding to the questions of your final examination. Use of outside sources is not permitted. You are encouraged to study with classmates prior to final exam distribution but no consultation
with classmates regarding course content or the final exam is permitted once the final exam is distributed. Please follow the submission directions provided on the final exam.

Important Instructions for Newborn Screening Case Study Assignment #1. This assignment is designed to further your skills at identifying policy issues, conducting stakeholder analyses, and sorting through policy options. You will write a short (3-4 pages) paper in which you identify a policy problem associated with newborn screening (expressed in the form “what is the problem, for whom, and with what consequences”), identify the stakeholders who care about this issue and their interest(s) in it, describe 2-3 policy options that might address this problem, and identify 2 advantages and 2 disadvantages associated with each option. (As with the DTC assignment, these advantages and disadvantages can include support or opposition of powerful stakeholder groups). More details on submission requirements will be provided in class. This paper is due **November 8, 2010 at 9:30 a.m.** Late papers will receive a 2 point deduction for each day (24-hours) late.

Important Instructions for the Case Study Assignment #2: Direct-to-Consumer (DTC) Genetic Tests. This assignment is designed to introduce you to advocacy and policy development in a key area of public controversy in public health genetics, DTC genetic testing. It is a two part assignment. Late papers will receive a 2 point deduction for each day (24-hours) late.

- **In Part A**, we will assign a role of a key stakeholder to each of you and provide you with some general guidance and background materials. In order to be fully informed to defend your position you will need to conduct additional research. In one-page (typed), you will provide a one sentence summary of your position, a series of bullet points of your arguments in support of that position, and a list of sources consulted (your choice of bibliographic style, as long as it is consistent) ("DTC Role Playing Exercise"). In class you will be assigned to a small group in which you will present and defend your position. Please bring **four (4) copies** of your one-page document to class on **November 22, 2010**. You will turn in two copies at **1:30 p.m.** (beginning of class) and keep one for yourself for reference and one for sharing with your group. We will provide you with questions to guide your group discussion.

- **In Part B**, you will analyze a policy action relevant to the position you took in Part 1. In 2-3 pages, you will identify at least 4 stakeholder groups that will be affected by the policy action and describe their interests GENERALLY, NOT JUST WITH REGARD TO DTC. You will also describe the policy action you have chosen and at least 2 advantages of it and 2 disadvantages. (Note: An advantage can be the support of a powerful interest group; a disadvantage can be the opposition of a powerful interest group.) Be prepared to discuss your paper in class. This paper is due **November 29, 1:30 p.m.**

Assignments/Examinations and Due Dates are summarized below:

<table>
<thead>
<tr>
<th>ASSIGNMENT/EXAMS</th>
<th>DATE</th>
<th>GRADING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-Home Midterm</td>
<td>Distributed: Monday, October 25, 2010, 2:50 PM</td>
<td>25%</td>
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<tr>
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<td>Due: Friday, October 29, 2010, 4:30 PM</td>
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</tr>
<tr>
<td>Case Study #1: Newborn Screening</td>
<td>Monday, November 8, 2010, 9:30 AM</td>
<td>20%</td>
</tr>
<tr>
<td>Case Study #2: Direct-to-Consumer Genetic Tests</td>
<td>Monday, November 22, 2010, 1:30 PM (DTC Role Playing Exercise) Wednesday, December 1, 2010, 1:30 PM (DTC Policy Analysis)</td>
<td>20%</td>
</tr>
</tbody>
</table>
Disability-related Needs

To request academic accommodations due to a disability, please contact Disability Resources for Students (DRS), 448 Schmitz, (206) 543-8924 (V), (206) 543-8925 (TTY). If you have a letter from DRS, please present the letter to me so we can discuss the accommodations you might need in this class.

COURSE SYLLABUS AND READINGS

The following syllabus outlines the reading assignments and sets forth a preliminary timetable. It is possible, if not likely, that the timetable and reading assignments will be amended during the course, depending on our pace and new developments. However, this outline should serve as a rough guide as you plan your reading and study schedule. Please note that reading assignments should be completed prior to our coverage of that portion of the outline in class.

<table>
<thead>
<tr>
<th>Wednesday, September 29, 2010</th>
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<tbody>
<tr>
<td><strong>OVERVIEW – WHAT IS PUBLIC HEALTH GENETICS?</strong></td>
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<tr>
<td><strong>Professor Mastroianni</strong></td>
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**General Topic:**
- Course Introduction
- Overview: What Is Public Health Genetics?
- Introduction to “ELSI”
- Application: Bring your genes to Cal

**Session Objectives:**
- Define “public health genetics” and the relationship between public health and genetics
- Explain what ELSI means

**Readings:**

a. **Readings:**

b. **Readings continued: Bring your genes to Cal:**
   i. Lewin T: College Bound, DNA Swab in Hand NYtimes May 18, 2010
   ii. Council for Responsible Genetics Press Release
   iii. UC Berkeley Statement

c. **Optional Readings:**
   i. NPR interview with dean of biological sciences at Cal
   ii. Stanford to pursue a similar program for medical students, partnering with 23andMe and Navigenics
### Monday, October 4, 2010 – HEALTH CARE PROVIDER DUTY TO WARN AT-RISK RELATIVES: INTRODUCTION TO ETHICS

**Professor Mastroianni**

#### General Topic:
- Ethics - Fundamental Principles and Approaches

#### Session Objectives:
- Define moral dilemma and provide at least one genetics example
- Define and contrast utilitarianism (outcomes) and Kantian (moral rules & duties) ethics
- Identify, describe and apply 5 methods to resolve a moral disagreement
- Identify, describe and apply the 4 principles of bioethics developed by Beauchamp and Childress
- Briefly describe the framework for public health ethics proposed by Childress et al.

#### a. Readings:

- Excerpt from: Beauchamp TL et al. Contemporary Issues in Bioethics (7th ed. 2008) 4-7 (4 pages)
- Tarasoff v. The Regents of the University of California, 131 Cal. Rptr. 14 (1976)

#### b. Additional Ethics Resources (OPTIONAL):

- Coughlin SS. Case Analysis and Moral Reasoning Ch. 1 in Case Studies in Public Health Ethics (1st. ed. 1997), 1-18 (18 pages) (on Course Reserve at Gallagher Law Library)
### Wednesday, October 6, 2010 - HEALTH CARE PROVIDER DUTY TO WARN AT-RISK RELATIVES: INTRODUCTION TO LEGAL APPROACHES

**Professor Mastroianni**

<table>
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<tr>
<th>General Topic:</th>
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<tr>
<td>- Introduction to Law</td>
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**Session Objectives:**
- Describe the relationship between law and morality
- Describe the roles and relationships among the federal constitution, state constitutions, federal and state statutes and regulations, and federal and state common law
- Define and explain the role of precedent and stare decisis in the US legal system
- Define genetic exceptionalism, explain the pros and cons of genetic exceptionalism, and explain its potential impact on medical practice and health policy

**a. Readings:**

1. **Read for background understanding and reference:** Clayton EW. Genetics, public health and the law, Ch. 25 in Genetics and Public Health in the 21st Century: Using Genetic Information to Improve Health and Prevent Disease (Khoury MJ, Burke W, Thomson EJ eds., 2000), 489-503 (15 pages) *(in Course Pack)*
2. Review Tarasoff v. The Regents of the University of California, 131 Cal. Rptr. 14 (1976)
4. Pate v. Threlkel, 661 So.2d 278 (Fla. 1995)

**b. For non-law students:**

2. Excerpt from: Burnham W. Legal Methodology. Ch. II.A in Introduction to the Law and Legal System of the United States (3th ed. 2002), 37-41 (5 pages)

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### Monday, October 11, 2010 – EUGENICS & HISTORICAL PERSPECTIVES ON PHG

**Professor Mastroianni**

<table>
<thead>
<tr>
<th>General Topic:</th>
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<tr>
<td>- Historical Perspectives on PHG</td>
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<tr>
<td>- Eugenics</td>
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<tr>
<td>- Experiences with Genetic Testing and Screening Programs in the US</td>
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**Session Objectives:**
- Define positive eugenics and negative eugenics
- Explain how the science of genetics has been misused in history
- Explain the three alternate definitions of eugenics discussed by Diane Paul, and identify which definition geneticists and other interested parties might likely adopt
- Distinguish between genetic testing and genetic screening
- Contrast and compare the history of development of genetic screening programs for Tay Sachs Disease and Sickle Cell Disease, and explain the implications of these experiences for future screening efforts
### Wednesday, October 13, 2010 – Introduction to Policy

**Guest Speaker:** Catharine Riley, MPH, PhD candidate, Health Services Consultant: Office of Newborn Screening, Washington State Department of Health

**General Topic:**
- Public Policy
- Policy Framework

**Session Objectives:**
- Outline the tools available to government
- Provide an overview of public health policy
- Present a framework for policy development
- Outline the Genetic Information Nondiscrimination Act and describe what this policy does and does not cover

**Readings:**


**Optional Reading:**

### Monday, October 18, 2010 – GENETIC DISCRIMINATION & HEALTH INSURANCE

**Guest speaker:** Professor Sallie Sanford, University of Washington

**Professor Sanford’s Bio**

**General Topic:**
- Health Insurance and Insurance Discrimination

**Session Objectives:**
- Define the insurance terms adverse selection, experience rating, and underwriting in the context of concerns about genetic discrimination in insurance
- Describe the circumstances under which state laws concerning genetic discrimination apply to individual and group plans
- Describe GINA’s protections against health insurance discrimination
### Wednesday, October 20, 2010 – GENETIC DISCRIMINATION & EMPLOYMENT
**Professor Mastroianni**

**General Topic:**
- Genetic Discrimination

**Session Objectives:**
- Define genetic discrimination
- Define the purpose of workplace genetic screening and testing and the justifications in favor of workplace screening from the perspective of workers, employers, and society
- Identify primary ethical concerns with workplace genetic screening and testing, applying the Beauchamp and Childress principles
- Describe how the state of science can influence the acceptability of workplace genetic screening
- Identify some of the current legal limitations on workplace genetic screening derived from GINA, the Bloodsaw case and the BNSF settlement with EEOC

### a. Readings:

1. **Greely HT. Banning Genetic Discrimination.** New England Journal of Medicine, 2005, 353(9):865-867 (3 pages)
2. **Billings PR. Genetic nondiscrimination.** Nature Genetics, 2005, 37(6):559-560 (2 pages)
4. **Norman–Bloodsaw v. Lawrence Berkeley Laboratory,** 135 F.3d 1260 (9th Cir. 1998)
5. **EEOC, Press release, EEOC And BNSF settle genetic testing case under Americans with Disabilities Act (May 8, 2002).** Available at: http://www.eeoc.gov/press/5-8-02.html

### b. Please identify sections of GINA that apply to employment and come to class prepared to discuss:

1. **GINA Legislation**

### c. For Reference:


### d. Optional Reading:

Monday, October 25, 2010 – class rescheduled to Tuesday, November 2, 2010
William H. Gates Hall, Room 118, from 1:30-2:50 PM
MIDTERM posted to Assignments webpage at 2:50PM
Submit by 4:30 PM, Friday Oct. 29 on Catalyst Collect-It Dropbox

Wednesday, October 27, 2010 – GENETIC COUNSELING: A PRACTITIONER’S PERSPECTIVE
Guest Speaker: Ms. Corrie O. Smith, M.S., C.G.C., Certified Genetic Counselor,
University of Washington, Genetic Medicine and Neurology
Ms. Smith’s Bio

General Topic:
- Genetic Counseling

Session Objectives:
- Understand what training is required to provide genetic counseling
- Define nondirectiveness and describe how it applies to genetic counseling
- Describe the current status of licensure for genetic counselors

a. Readings: Note: These readings may be changed by the guest speaker
   i. Bennett RL Genetic Counseling, in Principles of Molecular Medicine
      (Runge MS, Patterson C eds., Humana Press 2006) 46-52 (7 pages) (in Course Pack)
       (9 pages)

Monday, November 1, 2010 –NEWBORN SCREENING
Guest lecturer: Ms. Catharine Riley MPH, PhD candidate, Health Services
Consultant: Office of Newborn Screening, Washington State Department of Health

General Topic:
- Genetic Testing and Screening
- Newborn Screening

Session Objectives:

a. Readings:
   iii. Howell RR. We Need Expanded Newborn Screening. Pediatrics, 2006, 117(5):1800-1805 (6 pages)
   iv. Review: Chapter 246-650 WAC
   v. Review: Chapter 70.83 RCW

b. Optional:
   i. Review: What is the Office of Newborn Screening?,
      http://www.doh.wa.gov/ehspih/phl/newborn/default.htm
## General Topic:
- Overview of Genetic Testing
- Clinical Utility
- Application: Testing for Huntington’s Disease

## Session Objectives:
- Apply the Burke-Pinsky-Press Model to Newborn Screening
- Define the terms: genetic testing, autosomal dominant; autosomal recessive; penetrance; clinical validity; clinical utility
- Describe and explain the genetic testing classification scheme devised by Burke, Pinsky and Press and then by McPherson and compare the two schemes adequacy in addressing the relevant ELSI issues;
- Describe Huntington’s Disease and how it is inherited, why people choose to be tested or not to be tested, and the primary ethical and social issues that arise in genetic testing

### a. Readings:

### b. HD example:
- Fact Sheet on Huntington's Disease.

### c. Optional Readings:
- Autosomal dominant handout
- Autosomal recessive handout
**Wednesday, November 3, 2010 – NEWBORN SCREENING & POLICY**
**Guest Speakers: Ms. Catharine Riley, MPH, PhD candidate, Health Services, Consultant, Office of Newborn Screening, Washington State Department of Health; Professor Ray Nicola, Director, Community Oriented Public Health Practice program, Health Services, Senior Consultant, Centers for Disease Control & Prevention; and Professor Mastroianni**

Prof. Nicola’s bio

<table>
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<tr>
<th>General Topic:</th>
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<tbody>
<tr>
<td>- Newborn Screening Policy—Case Study Discussion</td>
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<tr>
<th>Session Objectives:</th>
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<tbody>
<tr>
<td>- Provide an overview of newborn screening policy</td>
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<td>- Explore stakeholder analysis</td>
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<tr>
<td>- Apply framework to NBS</td>
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<tr>
<th>a. Readings:</th>
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<tbody>
<tr>
<td>i. Letters to the Editor. Every Child is Priceless: Debating Effective Newborn Screening Policy, Hastings Center Report, 2009, 39(1):4-8 (5 pages)</td>
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<tr>
<td>ii. Hubbard HP. Policy Issues Related to Expanded Newborn Screening: A Review of Three Genetic/Metabolic Disorders. Policy, Politics &amp; Nursing Practice, 2007, 8(3):201-209 (9 pages)</td>
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**Monday, November 8, 2010 – APPLYING THE BPP MODEL; PRENATAL TESTING**

**Professor Mastroianni**

**NBS assignment due: submit by 9:30 AM on Catalyst Collect-It Dropbox**

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<tr>
<th>General Topic:</th>
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<tr>
<td>- BPP Model Applications: predisposition testing (hereditary Breast Cancer)</td>
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<td>- Prenatal Testing</td>
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<tr>
<th>Session Objectives:</th>
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<tbody>
<tr>
<td>- Apply the BPP model to hereditary Breast Cancer</td>
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<td>- Identify and describe the societally approved goals and the controversial goals associated with prenatal genetic screening and testing, as presented in the article by Nancy Press</td>
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<td>- Define, compare and contrast the medical definition of chronic illness and disability and the social definition of chronic illness and disability</td>
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<td>- Describe how the social definition of chronic illness and disability may or may not be reconciled with reproductive choice and how the definitions impact genetic counseling, medical practice and policy</td>
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<tr>
<th>a. Readings:</th>
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<tbody>
<tr>
<td>i. Press N. Assessing the expressive character of prenatal testing: the choices made or the choices made available in Prenatal Testing and Disability Rights (Parens E, Asch A eds., 2000), 214-233 (20 pages) (in Course Pack)</td>
<td></td>
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</table>
**Wednesday, November 10, 2010 – GENETIC RESEARCH: ETHICS AND REGULATORY ENVIRONMENT**  
**Professor Mastroianni**

### General Topic:
- Overview of ethics and regulatory environment
- Exploration of hot topics in genetics research

### Session Objectives:
- Identify and define the three ethical principles from The Belmont Report applicable to research conducted on humans and describe the specific applications of each principle to research
- Describe the conditions under which the federal regulations known as the Common Rule apply to genetic research
- Describe the role of the IRB in the review of human subjects research
- Describe the administrative sanctions and legal recourse for noncompliance with the federal regulations
- “Hot topics” in genetics research

### Readings:

6. Attached are the two pieces on returning individual genetic results to research participants that utilize ethical frameworks:  
8. Another important (and fascinating) case in the history of research ethics -- Henrietta Lacks: [http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/books/non-fiction/article7143286.ece](http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/books/non-fiction/article7143286.ece) (this is a review of Rebecca Skloot's recent book *The Immortal Life of Henrietta Lacks*)
### Monday, November 15, 2010 – ETHICAL ISSUES IN WHOLE GENOME AND EXOME SEQUENCING
**Guest Lecturer:** Professor Holly Tabor, PhD, Pediatrics, Division of Bioethics, UW School of Medicine & Treuman Katz Center for Pediatric Bioethics.

**Professor Tabor’s Bio**

**General Topic:** Ethical issues in whole genome and exome sequencing

**Session Objectives**

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<tr>
<th>a. Readings</th>
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<tbody>
<tr>
<td>i. SB. Exome sequencing identifies the cause of mendelian disorder. Nature Genetics, 2010, 42(1):30-35 (6 pages)</td>
</tr>
</tbody>
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### Wednesday, November 17, 2010 – GENETIC TESTING IN CHILDREN
**Guest Speaker:** Benjamin Wilfond, MD, Director, Treuman Katz Center for Pediatric Bioethics, Seattle Children’s Research Institute and Professor of Pediatrics, University of Washington School of Medicine

**Dr. Wilfond’s Bio**

**General Topic:** Genetic Testing in Children

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<tr>
<th>a. Readings</th>
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### Monday, November 22, 2010 – DTC GENETIC TESTING IN CLASS ROLE-PLAYING EXERCISE: ADVOCACY
**Professor Mastroianni**

**DTC Part A assignment due: submit by 1:30 PM on Catalyst Collect-It Dropbox AND bring 4 copies to class**

**General Topic:** Direct-to-consumer genetic testing

**Session Objectives**

<table>
<thead>
<tr>
<th>b. Readings</th>
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<tbody>
<tr>
<td>i. Executive Summary of the Secretary’s Advisory Committee on Genetic Testing Report: U.S. System of Oversight of Genetic Testing: A Response to the Charge of the Secretary of Health and Human Services</td>
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</table>


v. Locate and Review Websites for the following companies: 23andMe, DeCode, Navigenics

c. Optional Readings:

Wednesday, November 24, 2010: NO CLASS – HAPPY THANKSGIVING!

Monday, November 29, 2010 – DTC GENETIC TESTING IN CLASS ROLE-PLAYING EXERCISE: POLICY DEVELOPMENT
Professor Mastroianni

General Topic:
Policy framework and stakeholder analysis

Session Objectives:
Apply Policy Framework to Direct to Consumer Genetic Testing

a. Readings:
   i. Institute of Medicine Report: The Value of Genetic and Genomic Technologies, Workshop Summary (2010), Ch. 4, 25-35 (11 pages)
**Wednesday, December 1, 2010 – BIOSAMPLES AND GENETIC RESEARCH: THE HAVASUPAI CASE**  
Professor Mastroianni  
**DTC Part B assignment due: submit by 1:30 PM on Catalyst Collect-It Dropbox**

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<tr>
<th>General Topic:</th>
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<tr>
<th><strong>Session Objectives:</strong></th>
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<tr>
<td>- Identify the relevant facts and identify, describe, and analyze the ethical, legal and policy issues arising in the Havasupai genetics project</td>
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<td>- Compare and contrast the three legal cases related to ownership and control of DNA samples in research (<em>Moore, Greenberg, &amp; Catalona</em>)</td>
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<td>- Identify and describe the legal and ethical requirements for informed consent in human subjects research</td>
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<th><strong>Readings:</strong></th>
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<tr>
<td>iv. Havasupai tribe of Havasupai Reservation v. Arizona Board of Regents Court of Appeals of Arizona, Division 1, Department D. Nov. 28, 2008.</td>
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<tr>
<th><strong>Optional Readings:</strong></th>
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<tr>
<td>iii. Washington University v. Catalona, 400 F.3d 667 (8th Cir. 2007)</td>
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**Monday, December 6, 2010 – NO CLASS**  
NO CLASS MEETING
**Wednesday, December 8, 2010**

**Sum up and Review**

**TAKE HOME FINAL HANDED OUT**

**Professor Mastroianni**

<table>
<thead>
<tr>
<th>General Topic:</th>
<th>Pedigree Research</th>
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<tbody>
<tr>
<td><strong>Session Objective:</strong></td>
<td>Describe the kind of information that a pedigree can reveal, the potential harms that can arise from revealing this information to family members and others through publication, alternative strategies to protect privacy and confidentiality</td>
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<tr>
<th>a. Readings:</th>
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<tbody>
<tr>
<td>-Abstract &amp; Introduction</td>
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<tr>
<td>-&quot;Japanese American family study&quot;</td>
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<tr>
<td>-&quot;Protecting privacy and confidentiality of family members&quot;</td>
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<tr>
<td>-&quot;Publication of pedigrees&quot;</td>
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<tr>
<td>-&quot;Summary and Conclusions&quot; (optional)</td>
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**Monday, Dec. 13, 2010**

**Take-home Final due: submit by 4:30 PM on Catalyst Collect-It Dropbox**