Course Title: The Future of Medicine
Course Number: FYSEM-UA 745

Number of credits: 4
Prerequisites: None

Instructor: Justin Blau
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Class time: Wednesday 2.00-4.30pm
Class location: 25W4 C-7

Office hours: Mondays 2-3pm, Thursdays 2-3pm and by appointment Brown 1055, Silver Center

Easiest way to office hours: Enter the Silver Center and take the Waverley elevators to the 10th floor. Turn left when you come out of the elevator and call 88261 on the phones by the door.

*** This syllabus is subject to change ***

Course description:
How will Medicine evolve in the future? Will Doctors ever be able to prevent disease rather than react to it? And how can your DNA sequence be used to develop personalized treatments? Healthcare is arguably the most important place where science meets society and technical advances are raising important ethical issues about healthcare such as genetic discrimination and designer babies. This course will look at the science, economics and politics behind medicine and healthcare systems and use healthcare as a tool to study the relative roles of the individual and government.

Learning outcomes:
Students who successfully complete this course will be able to:
• understand the potential contribution of whole genome sequencing for personalized medicine as well as understanding the underlying Biology;
• understand the social and ethical implications of knowing an individual’s DNA sequence;
• evaluate the accuracy of media portrayals of genomic medicine;
• evaluate the role of individuals, government and industry in health;
• write and speak about these issues concisely and precisely.

Teaching and learning methods:
There are 3 main teaching and learning methods employed in this course:
1. Class discussions. During each class, there will be numerous questions posed by the Instructor to help students engage in topics and promote discussion. Texts including primary scientific papers, review articles and more popular texts will be discussed in depth. Students will be guided on how to understand primary scientific papers.
2. Short written papers. These will help students use their knowledge of the topics to focus on specific aspects of the class material. Students will write a set of short papers
and a longer paper during this course. There will be opportunities to receive feedback and then edit these papers.

3. Oral presentations. Oral presentation is a major part of this course – students will present short talks as well as longer presentations. There will be feedback for each presentation and guidance for further improvement from the Instructor.

Course text:

Additional readings will be posted on NYU Classes.

Assignments and grades:
There will be a mixture of written and oral assignments that will develop students’ abilities to communicate effectively.

Written assignments:
- 4 short pieces (2-3 pages each). These will come from the material and guidelines will be given for each piece.
- Final paper (4-6 pages).

Presentations. Students will give 6 short talks and presentations to the class on a range of topics. Students will receive detailed feedback on these talks.

Class participation will be assessed by the quality, clarity and regularity of student contributions in class. This is not an attendance grade and is separate from the oral presentation assessments.

There are no exams for this course.

Grading:
The final grade will consist of the following:
- 4 written assignments 40%
- 6 presentations & debate contributions 36%
- Class participation 10%
- Final paper 14%

Class attendance. You are expected to attend every class.

No plagiarism. Ever. What’s the point? NYU expects its students to adhere to the highest possible standards of scholarship and academic conduct. Students should be aware that engaging in behaviors that violate the standards of academic integrity will be subject to review and may face the imposition of penalties in accordance with the procedures set out in the NYU policy. Full details at: http://cas.nyu.edu/ewp/writing-resources/statement-on-academic-integrity.html

Disability Disclosure Statement: Academic accommodations are available for students with disabilities. The Moses Center website is www.nyu.edu/csd. Please contact the Moses Center for Students with Disabilities (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

The NYU Writing Center is a valuable resource. Information about hours and how to set up an appointment is available at http://www.nyu.edu/cas/ewp/html/writing_center.html
Syllabus

Class 1. Wed Sep 4: Introductions
Introduction: What is medicine? What is its purpose? What factors influence health?
Introduction to molecular biology: genes, proteins, mutations and polymorphisms

For Class 2:
- Read: Topol Chapter 2: Eminence-based medicine; p.15-37
- Read: Topol Chapter 4: Angelina Jolie: My choice; p.37-55
- Read: Angelina Jolie’s Op-Ed pieces in the New York Times
- Graded assignment 1: Summarize the factors influencing health.

Class 2. Wed Sep 11: Actionable gene variants 1
Actionable gene variants 1: Angelina Jolie

For Class 3:
- Read Worthey et al, (2011) Genetics in Medicine, 13: 255-62*
  Making a definitive diagnosis: successful clinical application of whole exome sequencing in a child with intractable inflammatory bowel disease
- Read Bainbridge et al, (2011) Science Translational Medicine, 3: 87re3*
  Whole-genome sequencing for optimized patient management

Class 3: Wed Sep 18: Actionable gene variants 2
DNA sequencing and patient care. Discuss Worthey et al and Bainbridge et al.

For Class 4:
- Assignment 2: Write a Science Times type article on how DNA testing is changing medicine drawing from at least 2 of Angelina Jolie / Worthey et al / Bainbridge et al. This will require re-reading Worthey et al* / Bainbridge et al* after the class discussion.

Class 4. Wed Sep 25: Knowing my genome sequence: Social issues 1: Gattaca
Peer-editing in class on Assignment 2
Brief advice on presentations

For Class 5:
- Graded assignment 2: Edit and submit Science Times article on DNA testing & medicine
- Graded assignment 3: Prepare presentation for Class 5. A set of suggestions for technical readings* will be provided relevant to your specific presentation.

Class 5. Wed Oct 2:
Gattaca discussion
Presentations: Gattaca: Fact or fiction?
Topics to include:
1. Genetic Information Non-discrimination Act (GINA, 2008)
2. A child from 3 parents?
3. Genome editing: Crispr/Cas9
4. Advances in genome sequencing
5. Pre-implantation genetic diagnosis (PIGD)
6. Limb lengthening
7. Eugenics

Discussion: Would you want to know your genome sequence?

For Class 6:
- Graded assignment 4: Writing: Pick one (or more) of the following topics to write about:
  1. Why I would want to know my genome sequence
  2. Why I would not want to know my genome sequence
  3. Why I would and would not want to know my genome sequence
  4. Getting the results: Imagine your thoughts and feelings as you check the data

Reading: Topol Chapter 9: My (Smartphone) Doctor; p.159-182

For Class 7:
Graded assignment 5: Prepare presentation for the business of genome sequencing. Include the science (how they do it), what you can learn and the business strategy. A set of suggestions for technical readings* will be provided relevant to your specific presentation.

Class 7. Wed Oct 16: Presentations: The business of genome sequencing:
23andme  Ancestry.com  Dog.com  Helix  Callico
Additional companies tbd

For Class 8: Gene x environment effects
Reading:

Class 8. Wed Oct 23: Discussion: Gene x environment effects

For Class 9: Prepare for debate on stem cells:
Should stem cells be restricted to the lab or used in the clinic?
Washington Post: ‘Miraculous’ stem cell therapy has sickened people in five states
February 27, 2019
more reading to follow

Class 9. Wed Oct 30: Debate: Stem cells: for the lab, the clinic or both?
Contributions to debate will be graded (assignment 6)

For Class 10:
Readings to follow (I am currently talking to an expert in the field to help design this class and find suitable readings)

Class 10. Wed Nov 6: Healthcare
tbd
For Class 11: Pick a specific product, place, event or activity advertised as “healthy”. Objectively evaluate its claims to health.

Class 11. Wed Nov 13: Food and health 1:
Evaluate a healthy product – graded assignment 7
Participatory medicine introduction

For Class 12:
Graded assignment 8: Writing: Evaluate a specific healthy product. What would be required to validate the claim(s)?
Reading: The island where people forget to die, Dan Buettner
NY Times, October 12 2012
Microbiome paper (details tbd).

Class 12. Wed Nov 27: Food and health 2:
Blue Zones.
The microbiome. Fecal transplants. The hygiene hypothesis.

For Class 13:
Reading:
More to follow

Class 13. Wed Dec 4:
Debate:
Contributions to debate will be graded (assignment 9)

For Class 14:
Graded assignment 10: Prepare presentation for participatory medicine project

Class 14. Wed Dec 11:
Participatory medicine projects: Final presentations

Graded assignment 11: Final paper: Whose responsibility is health?

* indicates technical reading