

BIO 118 Concepts of Biology: Genes, Genomics, and Society
Untwisting the Double Helix
Fall 2008

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In this course we will consider the impact of genetic information on both individuals and various aspects of society, with a particular focus on human health and disease. The course will begin with an introduction to human genetics, which will serve as background to allow us to discuss many conditions that have a genetic basis as well as consider applications of genetics and genome sequence information.

This course, which carries the (S) perspective designation, is intended for non-science majors who have an interest in the human condition. It is designed to help you explore the biology and technology surrounding DNA, our genetic material (in other words, to consider topics in genetics and molecular biology, two sub-fields with the life sciences). A second primary goal of the course is to help you increase your knowledge of how advances in scientific understanding are made and utilized. More broadly, I hope to encourage you to view science as a process that all can engage in and to recognize the role of science in your lives and in society. In addition to learning the underlying biology, emphasis will be placed on discussion of related societal, ethical, and policy topics.

Class will meet from 12:30- 1:20 pm on Monday, Wednesday, and Friday in Trumbower 140. A tentative schedule of lecture topics is included in this syllabus. Your **attendance** and **participation** in class will account for a significant percentage of your final grade (please see attached sheet regarding expectations for participation). Tardiness and absenteeism will not be well tolerated. If you must miss class for a legitimate reason, please let me know ahead of time (only a limited number of excused absences will be permitted).

Texts and reference materials: In this course, we will make use of **Blackboard**, the on-line course utility supported by Muhlenberg College. The URL is <http://blackboard2.muhlenberg.edu/>. You will need to log on to the system to view course updates and other postings. If you need more information, please contact OIT for assistance.

The reference textbook is *Human Heredity*, 8th edition by Michael R. Cummings. The text provides an introduction to various aspects of human genetics. It also contains many sections and several full chapters dealing with human diseases or disorders, as well as related case studies. On the lecture schedule, chapters corresponding to topics we will cover throughout the course are listed. This text is best used to reinforce and clarify material discussed in class.

Lectures will typically be accompanied by Powerpoint slides, which will be posted on Blackboard for your review after class.

A second text for this course is *Genome* (1999) by Matt Ridley. The subtitle of this book is "The autobiography of a species in 23 chapters" and in it, Ridley considers various aspects of the human

condition, each linked in some way to a gene on one of the 23 human chromosomes. For class, we will read selected chapters related to topics we are covering in lecture. Additional supplemental readings will also be assigned and provided as handouts or posted on Blackboard.

Discussion will be an integral part of this course. In addition to informal class conversations, more structured discussions will also take place as a part of many Friday classes. These conversations may occur in small groups or may be incorporated into lecture. You will be assigned a reading, either a chapter in *Genome* or an excerpt from another popular or secondary source that will serve as a basis for discussion. To help prepare for our in-class conversations, a **discussion worksheet** should be filled out before the start of the class period. The template provided (available on Blackboard) allows space noting for definitions and points for discussion, but a brief essay (approximately one page, typed) reflecting your thoughts about the topic should also be written. Any specific details for each week will be provided in class or posted on Blackboard.

As part of this course, you will be encouraged to **engage in the college-wide programming** this Fall entitled "Politics, Ethics, and Citizenship", sponsored by the Center for Ethics. Please see <http://www.muhlenberg.edu/cultural/ethics/current/politics/schedule.html> for a complete schedule of events. Each student will be required to attend two events and develop two short (~2-3 pages typed) reflection or response pieces. The suggested programs that relate to the intersection of science and society are: (1) "Hope for a Heated Planet: How We Can Stop Global Climate Change", a lecture by Dr. Robert Musil on Tuesday, September 9, and (2) in October, "Fireside Chats" about *Player Piano*, a novel by Kurt Vonnegut [You will all receive a copy of this book, described by the publisher as "a chilling tale of engineer Paul Proteus, who must find a way to live in a world dominated by a super computer and run completely by machines", at no cost]. While I would like as many people as possible to participate in the above two programs, if your schedule does not permit this, another event may be substituted; we will discuss possibilities in class.

An **independent project** that may stem from participation in these Center for Ethics events will also be required as a part of this course. More details on this course component will be provided during the first few weeks of class.

Three in-class **exams** will be given on the dates indicated on the lecture schedule. Each test will focus on the block of material immediately preceding the exam. Students should be aware, however, that basic concepts examined early in the course will serve as a foundation on which to build knowledge throughout the semester (i.e. course content is to some degree inherently cumulative). Makeup examinations will only be given in the event of severe illness or family emergency; documentation from an appropriate College official will be required. More information on the specific format of exams will be discussed in class.

Weekly **office hours** will be held Monday and Thursday afternoons from 2:30-4pm. You may feel free to simply drop-in during these times; meetings will be held on a first-come, first-served basis. To meet with me at any other time, please call or email me to schedule an appointment. I would be happy to talk with you and encourage you to come see me if you have any questions, concerns, or difficulties with the course.

Course grades will be determined on the basis of several components described above. Contributions to the final course grade will be as follows:

Exams (3@150 points each)	450 points
Class participation (5 points/day)	200 points
Discussion worksheets (10@15 points each)	150 points
Center for Ethics reflection assignments (2@25 points each)	50 points
Independent project	<u>150 points</u>
	1000 points total

The grading scale for the determination of final letter grades is listed below; in addition, pluses (+) and minuses (-) may be used to denote the higher and lower end of each range.

A	900-1000 points	D	600-699 points
B	800-899 points	F	599 points and below
C	700-799 points		

All course requirements are to be performed under the bounds of the Academic Behavior Code. Please familiarize yourself with this document and understand that a student who violates the Code may receive a failing grade for the course.

Any student with documented disabilities or special needs who requires accommodations in this course should let me know as soon as possible. Students with disabilities requesting classroom or course accommodations must complete a multi-faceted application process through the Office of Disability Services prior to the development and implementation of an Accommodation Plan. Please contact this office for more information.

BIO 118 Genes, Genomics, and Society
Lecture schedule

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Week	Date	Topic	Readings in: <i>Human Heredity</i> (reference only)	<i>Genome</i> (or other additional readings)
1	M 8/25 W 8/27 F 8/29	Introduction; The nature of heredity Chromosomes and cell division Chromosome movements and human disorders	Chapter 1 Chapter 2 Chapter 6	Forward/Introduction Ch. 21 "Eugenics"; DW
2	M 9/1 W 9/3 F 9/5	Transmission of genes I Transmission of genes II Effects of multiple genes	Chapter 3 Chapter 4 Chapter 5	Ch. 9 "Disease"; DW
3	M 9/8 T 9/9 W 9/10 F 9/12	Lunch with Musil or project development <i>Evening lecture by Musil</i> Genetic and environmental effects I Genetic and environmental effects II	Chapter 5	Ch. 6 "Intelligence"; DW
4	M 9/15 W 9/17 F 9/19	Introduction to DNA DNA as the genetic material Gene expression	Chapter 8 Chapters 8, 9 Chapters 9, 10	RF1 due Ch. 20 "Politics"; DW
5	M 9/22 W 9/24 F 9/26	Variation and mutation Review Exam I	Chapter 11	
6	M 9/29 W 10/1 F 10/3	Recombinant DNA Biotechnology I (GMOs) Biotechnology II (gene therapy)	Chapters 13, 14 Chapter 14 Chapter 16	Ch. 18 "Cures"; DW
7	M 10/6 W 10/8 F 10/10	Biotechnology III (DNA fingerprinting) Genomics No class – Fall Break	Chapters 13, 14 Chapter 15	Ch. 8 "Self-Interest" (ref)
8	M 10/13 W 10/15 F 10/17	Genetic testing Project workday or discussion of <i>Player Piano</i> Stem cells I	Chapter 14 Chapters 14, 16	Ch. 4 "Fate"; DW
		<i>Fireside chats held during Weeks 8 & 9</i>		
9	M 10/20 W 10/22 F 10/24	Stem cells II Reproductive technologies Genetic testing re-visited	Chapter 16 Chapters 14, 16	Handout(s); DW
10	M 10/27 W 10/29 F 10/31	Review Exam II Genes and cancer	Chapter 12	RF2 due Ch. 17 "Death" (reference)
11	M 11/3 W 11/5 F 11/7	Cancer II Cancer III HIV/AIDS	Chapter 17	Project reports due

BIO 118 lecture schedule, *continued***Fall 2008**

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Readings in: <i>Human Heredity</i> (reference only)</u>	<u><i>Genome</i> (or other additional readings)</u>
12	M 11/10 W 11/12 F 11/14	Genes and the immune system Genes and behavior I Genes and behavior II	Chapter 17 Chapter 18	Ch. 5 “Environment” (ref) Ch. X/Y “Conflict” (ref) Ch. 11 “Personality”; DW
13	M 11/17 W 11/19 F 11/21	Genes and behavior III Genes and stress Genes, genomics, and privacy		Ch. 10 “Stress” (reference) Ch. 19 “Prevention”; DW
14	M 11/24 W 11/26 F 11/28	Film: GATTACA Film: GATTACA, continued No class – Thanksgiving recess		
15	M 12/1 W 12/3 F 12/5	Review Exam III Course wrap up		Excerpt from Chapter 6, <i>Boys from Brazil</i> , I. Levin; DW

Final independent project due by 8:30am on Tuesday, December 9.**DW** indicates that a discussion worksheet is due in that class period.**RF** indicates that a reflection paper (response to a Center for Ethics event) is due at the beginning of that class period.

Please note that this schedule represents an outline of topics to be covered and is subject to change.

Additional readings may also be assigned throughout the semester.

Please check Blackboard for assignment updates and general course information.