

**Syllabus<sub>revised</sub>****Required Texts:**

- Watson, J.D. with Berry, A. *DNA: the Secret of Life*, 1st ed. Alfred A. Knopf (2003)
  - Olson, S. *Mapping human history: genes, race, and our common origins*, Houghton Mifflin (2003)
  - Additional required articles and excerpts are provided in paper copy or as an electronic class reserve
- For each class meeting you are expected to have completed all listed required readings

**Part I: History and Scientific Basis of Genomics (Meetings 1–7)****Meeting 1 (Thursday, September 10)****Topic: Welcome, organization, motivation****Meeting 2 (Tuesday, September 15)****Topic: Setting the stage**

- Hawthorne, N. (1804-1864), "The Birth-mark" (short story)
- Watson, pp. 1–14

**Meeting 3 (Thursday, September 17)****Topic: Eugenics***Assignment Due: Response Paper #1*

- Watson, pp. 15–33
- Holt, J. "Measure for measure: The strange science of Francis Galton," In *The New Yorker* (1/24/05)

**Meeting 4 (Tuesday, September 22)****Topic: DNA***In Class Writing Workshop from Writing Center*

- Watson, Chapters 2 and 3

**Meeting 5 (Thursday, September 24)****Topic: The Central Dogma**

- Watson, Chapters 2 and 3

**Meeting 6 (Tuesday, September 29)****Topic: Recombinant DNA, Cloning***Assignment Due: Paper #1*

- Watson, Chapter 4
- Science for the People, "Biological, social, and political issues in genetic engineering." In *The Recombinant DNA Debate* (Jackson, D.A. and Stich, S.P., editors), Prentice-Hall (1979), pp. 99
- Wald, G. "The case against genetic engineering." In *The Recombinant DNA Debate* (Jackson, D.A. and Stich, S.P., editors), Prentice-Hall (1979), pp. 127–133

**Meeting 7 (Thursday, October 1)****Topic: Heredity and Genomics**

- Watson, Chapter 7 and 8

**Part II: The Human Genome: Evolution and Diversity (Meetings 8–12)****Meeting 8 (Tuesday, October 6)****Topic: What makes us human?***Exercise: BLAST analysis*

- Enard, W. *et al.* "Molecular evolution of FOXP2, a gene involved in speech and language." *Nature* **418**, pp. 869–872 (2002)
- Wade, N. "A Gene Changes How Mice Squeak" May 29, 2009 New York Times

Additional optional online links:

- "A brief history of chimps." *Nature* **437**, pp. 48–49 (2005)
- Li, W.-H. and Saunders, M.A. "The chimpanzee and us." *Nature* **437**, pp. 50–51 (2005)
- Enard, *et al.*, "A Humanized Version of Foxp2 Affects Cortico-Basal Ganglia Circuits in Mice" *Cell* **137**, 961-971 (2009)

**Meeting 9 (Thursday, October 8)**Assignment Due: **Response Paper #2**

- Watson, Chapter 9
- Olson, Chapters 1–3

**Topic: Human Evolution****Meeting 10 (Tuesday, October 13)**

- Olson, Chapters 4–5 and start group presentations on evolution of human populations

**Topic: Human Evolution, cont.****Meeting 11 (Thursday, October 15)****Topic: Group presentations, cont.****Meeting 12 (Tuesday, October 20)****Topic: Group Presentations, cont.****Part III: DNA: Current Technologies and Policy Controversies (Meetings 13–16)****Meeting 13 (Thursday, October 22)****Topic: Genetically Modified Organisms in Agriculture**

- Watson, Chapter 6
- Losey, J.E. *et al.* “Transgenic pollen harms monarch larvae.” *Nature* **399**, p. 214 (1999)
- Minorsky “The Monarch Butterfly Controversy” *Plant Physiology* **127**, p709-710 (2001)

**Meeting 14 (Tuesday, October 27)****Topic: Genetically Modified Organisms in Agriculture**Assignment Due: **Response Paper #3**

- Schubert, D.R. “Perspective- “The Problem with Nutritionally Enhanced Plants” *J. Medicinal Food* **11**, p.601-5 (2008)
- Raney, T. and Pingali, P. “Sowing a gene revolution.” *Scientific American* p. 104-11 (Sep. 2007)
- “Genetically engineered food labeling legislation.” Resolution adopted by Amherst, Massachusetts Town Meeting (May 8, 2006)

Additional optional online links:

- Qiu, J. “Is China Ready for GM Rice?” *Nature* **455** p. 850-852 (2008)
- Al-Babili, S. and Beyer, P. Golden Rice- five years on the road – five years to go? *TRENDS in Plant Science* **10**, p. 1360-1385 (2005)
- Food and Agriculture Organization of the United Nations – “Genetically modified organisms, consumers, food safety and the environment” -Rome (2001)  
<http://www.fao.org/DOCREP/003/X9602E/x9602e02.htm#TopOfPage>

**Meeting 15 (Thursday, October 29)****Topic: DNA Fingerprinting**

- Watson, Chapter 10

**Meeting 16 (Tuesday, November 3)****Topic: DNA Databanks and Genetic Privacy**Assignment Due: **Paper #2**

- Steinhardt, B. “Privacy and forensic DNA databanks.” In *DNA and the Criminal Justice System* (Lazer, D., editor), MIT Press (2004), pp. 173–196
- Etzioni, A. “DNA tests and databases in criminal justice: Individual rights and the common good.” In *DNA and the Criminal Justice System* (Lazer, D., editor), MIT Press (2004) pp. 197–223
- Duster, T. “Selective arrests, an ever-expanding DNA forensic database, and the specter of an early-twenty-first-century equivalent of phrenology.” In *DNA and the Criminal Justice System*, (Lazer, D., editor), MIT Press (2004) pp. 315–334
- Supreme Court 5-4 Decision Regarding Convicts rights to DNA Testing (Wash. Post –June 2009)  
<http://www.washingtonpost.com/wp-dyn/content/article/2009/06/18/AR2009061801610.html>
- FBI and States Greatly Expand DNA Databases (New York Times - April 2009)

[http://www.nytimes.com/2009/04/19/us/19DNA.html?\\_r=1&scp=1&sq=FBI%20DNA%20databases&st=cse](http://www.nytimes.com/2009/04/19/us/19DNA.html?_r=1&scp=1&sq=FBI%20DNA%20databases&st=cse)

- Baseballs Use of DNA Raises Questions July 2009 (New York Times – June 2009)

<http://www.nytimes.com/2009/07/22/sports/baseball/22dna.html?scp=1&sq=baseball%20genetic&st=cse>

#### **Part IV: Genetics of Complex Human Traits (Meetings 17–20)**

##### **Meeting 17 (Thursday, November 5)                      Topic: Mapping Genes; Genetic Diseases**

##### **Presentation by Susan Kimball on Construction of a Research Bibliography**

- Watson, Chapter 11
- Reilly, P.R. Chapter 7: Huntington's Disease and Chapter 8 Deafness In *The Strongest Boy in the World*, Cold Spring Harbor Laboratory Press (2006), pp. 83-105

##### **Meeting 18 (Tuesday, November 10)                      Topic: using statistics**

##### **Joint meeting in Merrill Lecture Room 2: Guest Lecture: Prof Matt Schulkind: social statistics**

- background reading TBA

##### **Meeting 19 (Thursday, November 12)                      Topic: Complex Human Traits I: Depression**

- Caspi, A. et al, "Influence of Life Stress on Depression: Moderation by a Polymorphism in the 5-HTT Gene" *Science* **301**, p. 386-389 (2003)
- Kauffman et al "Social Supports and serotonin transporter gene moderate depression in maltreated children" *PNAS* **101**, p. 17316-17321 (2004).

Additional optional online links:

- Brody et al "Effects Moderate the Association of 5-HTTLPR and Youth Risk Behavior Initiation: Gene x Environment Hypotheses Tested via a Randomized Prevention Design." *Child Development* **80**, p. 645 (2009)

##### **Meeting 20 (Tuesday, November 17)                      Topic: Complex Human Traits II: Autism**

Assignment Due: **Rough draft of Paper #3** (research paper on a complex human trait)

- Sebat J. et al, "Strong Association of De Novo Copy Number Mutations with Autism" *Science* **316** (2007) pp. 445-449
- Wang, K. et al, "Common genetic variants on 5p14.1 associate with autism spectrum disorders" *Nature* **459**, pp. 528-532 (2009)

#### **Part V: Genetic Medicine and the Quest for "Perfection" (Meetings 21–26)**

##### **Meeting 21 (Thursday, November 19)                      Topic: Biotechnology and Gene Patents**

Assignment Due: **Response Paper #4**

- Avise, J.C. "Engineering microbes." In *The Hope, Hype, & Reality of Genetic Engineering*, Oxford University Press (2004), pp. 16-29
- Levine, C. "Should genes for human diseases be patented?" In *Taking Sides: Bioethical Issues* (Levine, C., editor), McGraw-Hill (2001), pp. 184-185; McGee, G. "Gene patents can be ethical." In *Taking Sides*, pp. 186-190; Merz, J.F. and Cho, M.K. "Disease genes are not patentable: a rebuttal of McGee." In *Taking Sides*, pp. 191-195.
- Andrews, L.B and Paradise, J. "Gene patents: the need for bioethics scrutiny and legal change." *Yale Journal of Health Policy, Law, and Ethics* **5**, pp. 403-412 (2005)

Additional optional online links: <http://www.nytimes.com/2009/05/13/health/13patent.html>

- J. Schwartz "Cancer Patients Challenge the Patenting of a Gene" *N Y Times*, 5/13/09

**Meeting 22 (Tuesday, December 1)      Topic: Disease Detection and Genetic Discrimination**

- Watson, pp. 323–347
- Levine, C. “Should information from genetic testing be available to employers and insurers?” In *Taking Sides: Bioethical Issues*, McGraw-Hill (2001), pp. 214–215; Sullivan, A. “Promotion of the fittest.” In *Taking Sides*, pp. 216–218; Murray, T.H. “Genetics and the moral mission of health insurance.” In *Taking Sides*, pp. 219–225.
- Pollack, A. “A genetic test that very few need, marketed to the masses.” In *The New York Times* (9/11/07)
- Harmon, A. “Cancer free at 33, but weighing a mastectomy.” In *The New York Times* (Sep 16, 07)

Additional optional online links:

- *GINA –Genetic Information Nondiscrimination Act signed into law May 2008*  
<http://www.genome.gov/24519851>

**Meeting 23 (Thursday, December 3)      Topic: Fetal Genetic Screening, Preimplantation Diagnosis**

Assignment Due: **Paper #3**

- Harmon, A. “In new tests for fetal defects, agonizing choices for parents.” In *The New York Times* (6/20/04)
- Reilly, P.R. “Preimplantation genetic diagnosis.” In *The Strongest Boy in the World*, Cold Spring Harbor Laboratory Press (2006), pp. 233–243
- Weil, E. “A wrongful birth?” In *The New York Times* (March 12, 2006)
- Dennis, C. “Deaf by design.” *Nature* **431**, pp. 894–896 (2004)
- Sanghavi, D. “Wanting babies like themselves, some parents choose genetic defects.” In *The New York Times* (December 5, 2006)

**Meeting 24 (Tuesday, December 8)      Topic: Gene Therapy**

Assignment Due: **Response Paper #5**

- Watson, pp. 347–359
- Reilly, P.R. “Severe combined immune deficiency.” In *The Strongest Boy in the World*, Cold Spring Harbor Laboratory Press (2006), pp. 119–129
- Avise, J.C. “Genetic tinkering with humans.” In *The Hope, Hype, & Reality of Genetic Engineering*, Oxford University Press (2004), pp. 148–158

**Tues Dec 8 and Wed Dec 9: FYS MOVIE NIGHTS! GATTACA** (come on either Tues/Wed) **Merrill 131**

**Meeting 25 (Thursday, December 10)      Topic: Germ-line Therapy and Genetic Enhancement**

Movie and Readings:

- *GATTACA*, viewed in advance
- Watson, Coda (pp. 395–405)
- Sandel, M.J. “The case against perfection.” In *The Atlantic Monthly* (April, 2004)
- Kass, L.R. “Triumph or tragedy? The moral meaning of genetic tech.” In *Commentary* (Sept, 1999)

**Meeting 26 (Tuesday, December 15)      Topic: Wrap-Up**

Assignment Due: **Rough Draft of Final Paper (Final version due by Tues, Dec. 22<sup>nd</sup> at 5pm)**

- Steven Pinker, “My Genome, My Self” In *The New York Times* (Jan 11, 2009)
- Thomas, L. “Wonderful mistake.” In *The Medusa and the Snail*, Bantam Books (1979), pp. 22–24.