

The Genomics Evolution and Revolution: Scientists, Discoveries, and Societal Impact (V50.0304; call # 74685)

SYLLABUS

Class	Themes	* Refs. & Credits	* Assignments	* [Related Events]
1 Sep. 3 √	• Introduction. The Genomic Revolution, Science in the 21st century: Historical perspective, connections between the sciences and the arts, need for public to appreciate scientific concepts.			
	CREDITS:			
		<ul style="list-style-type: none">• J. and I. Herskowitz, <i>Double Talking Helix Blues</i>, text and song, Cold Spring Harbor Lab Press, 1993.• J. Rine, Obituary: Ira Herskowitz, <i>Current Biology</i> 13 R581–R582, 2003.• L. Thomas, <i>The Medusa and the Snail</i>, Bantam, 1980.• D. R. Hofstadter, <i>Gödel, Escher, Bach: An Eternal Golden Braid</i>, Vintage, 1979.• M. C. Escher, Möbius Strip II, woodcut, 1963.• W. Thiebaud, Reservoir Study, 2001, Allan Stone Gallery, New York.• Joseph Wright of Derby, An Experiment on a Bird in the Air Pump, 1768.• Cosmic Cabaret, Hi Tek Girl (http://www.scientainment.com/songs.html).• N. D. Kristof, Where Is Thy Sting? <i>The New York Times</i> Op-Ed, Tuesday, August 12, 2003.• www.dnalounge.com, www.dnainland.com, www.dnapublications.com, www.dnasyndromedist.com, www.dnahelix.com.		
	ASSIGNMENTS:			
		<ul style="list-style-type: none">• Read T. Schlick, <i>Molecular Modeling: An Interdisciplinary Guide</i>, Springer, 2002, Chapters 1 & 2.• Read <i>Nature</i> 421, Jan. 23, 2003 issue: The Double Helix – 50 Years, pages 396–422:<ul style="list-style-type: none">– The Eternal Molecule, C. Dennis and P. Campell;– Quiet Debut for the Double Helix, R. Olby;– Discovering Genes Are Made of DNA, M. McCarty;– The Double Helix and The ‘Wronged Heroine’, B. Maddox;– The Mosaic That Is Our Genome, S. Pääbo;– Nature, Nurture and Human Disease, A. Chakravarti & P. Little;– The Double Helix in Clinical Practice, J. I. Bell;– The <i>Mona Lisa</i> of Modern Science, M. Kemp.		
2 Sep. 10 √	• Continue lecture on the Genomics Revolution and the application of DNA technology. Open discussion on the societal ramifications of advanced genomics science and technology. Showing of protein video.			

Syllabus (continued)

ASSIGNMENT:

- Read O. Sacks text.
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- 3**
Sep. 17
✓
- Read Parnell's QED on Feynman's life and work. Discuss the special allure of scientists like Feynman, Feynman as typical or atypical scientist, relation between the scientist and the man, the tragic dimension of an artist/scientist's life, and science versus religious truths.

ASSIGNMENT:

- Read P. Hoffman text on the life of mathematician Paul Erdős.
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- 4**
Sep. 24
✓
- Discuss Sacks text on the life and work of chemist-turned-neurologist Oliver Sacks. Discuss the sources for Sacks' scientific inspiration, relation between his inner and outer worlds, multifaceted aspects of his life, nature of his scientific world and life as scientist, and his personal and professional transformation.
 - Begin discussions of Hoffman text on the life and work of mathematician Paul Erdős, the eccentric number theorist. What are the unique aspects of science and why can science have extreme effects on a scientist's life? Compare the work of a chemist to that of a mathematician. Is science a truth to be found or discovered? Is mathematics different than other sciences? If so, in what ways?

ASSIGNMENTS:

- Read Nasar text on life of mathematician John Nash.
 - Read R. M. Henig text.
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- 5**
Oct. 1
✓
- Continue discussions on mathematician Erdős, and blend in a discussion of the work and life of John Nash, 1994 Nobel Prize winner in economics (with John Harsanyi and Reinhard Selten) for pioneering mathematical analysis of equilibria in non-cooperative game theory (i.e., when binding agreements are excluded). Nash's equilibrium concept has numerous practical applications in market competition and strategic interactions.
 - Begin to discuss Henig's text on the quiet life and monumental work of the father of genetics Gregor Mendel.

ASSIGNMENTS:

- Read articles from *Science* **300**, Building on the DNA Revolution, pages 277–293:
 - A Hothouse of Molecular Biology, E. Pennisi;
 - DNA's Cast of Thousands, E. Pennisi;
 - The Human Genome Project: Lessons from Large-Scale Biology, F. S. Collins, M. Morgan, and A. Patrinos;
 - Realizing the Potential of the Genome Revolution: The Genomes to Life Program, M. E. Frazier, G. M. Johnson, D. G. Thomassen, C. E. Oliver, and A. Patrinos.

Syllabus (continued)

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- Visit the New York Public Science, Industry, and Business Library's exhibition "*Honest Jim: James D. Watson the Writer*", 188 Madison Avenue at 34th Street (212-592-7000; www.nypl.org/research/sibl).

EVENT:

- Oct. 2, 5:30pm, **Watson and DNA: Making of a Scientific Revolution**. Author Victor McElheny discusses his book about Watson and the development of modern molecular biology (www.nypl.org/research/sibl).

6
Oct. 8
✓

- View BBC film: *Double Helix*. "This fast-paced dramatization starring well-known actor Jeff Goldblum is about the race to solve one of the greatest mysteries of 20th century science — the structure of DNA. It is the story of the diligent research, creative analysis, and perseverance of James Watson and Francis Crick that led to the discovery." (1 hour, 48 minutes).

ASSIGNMENT:

- Read Watson and Berry text on DNA (6 selected chapters).
- Homework Assignment on Watson and DNA. Due Monday Oct. 13 at 3pm (1021 Silver).

6*
Oct. 10
✓

- **Special Extra Class:** 3:30 to 5:50pm, 414 Silver Center. Viewing of Ron Howard's *A Beautiful Mind* starring Russel Crowe and Jennifer Connelly, Winner of 4 Academy Awards for Best Picture, Best Director, Best Supporting Actress, and Best Screenplay (2 hours, 16 minutes).

7
Oct. 15
✓

- Lecture on science and art by Adrienne Klein, artist, teacher, curator (<http://aklein.homestead.com>) and organizer of The Graduate Center of The City University of New York's Science and the Arts innovative program.
- Begin to discuss Watson and Berry's text on the DNA structure and 'secret of life' (Chapters 4 and 5).

ASSIGNMENT:

- Read L. O. Elkin, Rosalind Franklin and the Double Helix, *Phys. Today* **56**, 42–48 (2003).
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Syllabus (continued)

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- 8**
Oct. 22
✓
- Discuss Franklin's role in the DNA double helix structure discovery, science conduct, and aspects of collaborative versus competitive research.
 - Library Resource Presentation: *Beyond Google*, Paula Feid and Suzanne Fedunok, Electronic Resource Center PC Classroom (B Level, one flight down from street level) of Bobst Library. (1:30 to 3pm).

ASSIGNMENTS:

- Read K. Mullis and/or B. Werth text.
- Review class work to date.

EVENTS:

- Oct. 24, 5:00pm, **The Search for Life: Are We Alone?** narrated by Harrison Ford. Class planetarium outing. Hayden Planetarium: West 81st Street entrance of the Rose Center for Earth and Space, American Museum of Natural History, between Central Park West and Columbus Avenue, on Manhattan's Upper West Side (www.amnh.org, http://www.amnh.org/rose/dome/?src=h_h).
- Oct. 27, 6pm, **Feynman Lives!** solo theater performance by film and television actor Norman Parker with bongos accompaniment by Tom Rutishauer as a tribute to physicist Richard Feynman. (See <http://web.gc.cuny.edu/sciart> for this and other science and arts events listed below.)

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- 9**
Oct. 29
✓
- Continue discussion of the Watson and Berry text on the DNA structure and 'secret of life' (Chapters 10–13).
 - Discuss Mullis text on PCR.
 - **Take Home Midterm** – essay questions on themes explored in class to date. Due Monday November 3 at 3pm (1021 Silver)

ASSIGNMENTS:

- Read the B. Werth text.

EVENT:

- Nov. 3, 7pm, **promises.com**, a reading of Israel Horovitz' play on bioethics (one biologist's choice between altruism and financial success), followed by a discussion with author and cast.

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- 10**
Nov. 5
✓
- Discuss Werth text on the lucrative race involved in drug discovery.
 - **Term Project assigned.**

Syllabus (continued)

ASSIGNMENTS:

- Read Reilly text.
- Read *Nature* **422**, Apr. 24, 2003 issue: A Vision for the Future of Genomics Research, pages 835–847, F. S. Collins, E. D. Green, A. E. Guttmacher, and M. S. Guyer on behalf of the US National Human Genome Research Institute.
- Begin work on term project.

10*
Nov. 7

- **Special Extra Class:** 12:30 to 3:00pm, 410 Silver Center. Viewing of *GATTACA* by Columbia Pictures, with Ethan Hawke and Uma Thurman, a sci-fi thriller about a man who dares to defy a world obsessed with genetic perfection! (1 hour, 46 minutes).

11
Nov. 12
✓

- Discuss Reilly text on implications of the genomic revolution.

ASSIGNMENTS:

- Read Sulston and Ferry text (and Tolin's play).
- Continue work on term project.

12
Nov. 19 ✓

- View film *The Twilight of the Golds* based on the Tolins play, with Jennifer Beals, Faye Dunaway, Brendan Fraser, Garry Marshall, Jon Tenney, and Rosie O'Donnell, a humorous account of a New York family facing a genetics dilemma. (1 hour, 30 minutes).
- Discuss such personal effects of modern science on our lives.

ASSIGNMENT:

- Complete work on term project.

12*
Nov. 25

- **Special Substitute Class:** 4:45 to 6:30pm, 403 Silver Center.
- Presentations of student term projects.

13
Nov. 26

- No Class. Happy Thanksgiving!

Syllabus (continued)

EVENT:

- Dec. 1, 6pm, **Look Up! “Chaos” Comes to New York**, mixed media production (including talk, music, and images) on pattern formation, designed for planetariums by physicist James Crutchfield and composer David Dunn.

14
Dec. 3

- Guest Lecture and Discussion on Genetics and the Future of The Human Race, **Charles Cantor**, Chief Scientific Officer, Sequenom, Inc. Sequenom is a pioneer in the development and application of human genetics technology to identify disease genes with the ultimate goal of developing targeted therapeutics. See www.sequenom.com/.

EVENT:

- Dec. 8, 6pm, **Pierre and Marie: Love and Chemistry**, comedy performance by Break A Leg Production on the science (radium and uranium discovery), history, and romance of the Curies in a small Paris laboratory in the 1890s.

No additional classes scheduled during exam week.

Happy Holidays!