

Syllabus for Cell Biology (G23.1051), 2001

Class coordinator: Eric Chang (959 Brown, 998-3732, eric.chang@nyu.edu)

Office Hours: Wed, 1:30-2:30. Please call to make an appointment first.

Textbooks -

1. *Molecular Cell Biology*. 2000. 4th ed., Lodish et al. (Primary textbook used through out the entire course)
2. *Molecular Biology of the Cell*, 1994, 3rd ed., Alberts et al.
3. *Biotechnology-An Introduction*. 1998 Susan Barnum Wadsworth Publishing. This is useful for those who have no or very little experience in Molecular Biology.

Overview -

This course contains the following six major sections:

1. Introduction -
Scientific methods and the concept that genes are the elements in the biological "periodic table."
2. Signal Transduction.
3. Regulation of Cell Cycle.
4. Cytoskeleton.
5. Cell Biology of the neural system.
6. Cell-Cell and Cell-Matrix Interaction.

Schedule -

September -

6: Introduction: Scientific Inquiry and the methods used in modern cell biology.

11: No class ...

18: Elements in the Periodic Table of Biology - Exons.

Literature Discussion: "How Big is the Universe of Exons." *Science* 250: 1377-1382, 1990.

20: Signal Transduction – the Receptors.

Additional reading: "G proteins and Regulation of Adenylyl cyclase"
Gilman, A. G. *Bioscience Rep.* 15: 65-96. 1994.

- 25: The Transducer - G proteins and the regulation of adenylyl cyclase (I).
27: Receptor Tyrosine Kinase - Ras G proteins signaling pathways.

Additional reading: “ A biochemical function for Ras—At last” Hall, A. 1994 264: 1413-1414 and “Requirement for Ras in Raf activation is overcome by targeting Raf to the plasma membrane” Leever, et al., *Nature* 369: 411-414.

October –

- 2: a. Additional 2nd messengers (Ca²⁺, IP₃, & DAG).
b. Signal transduction and gene expression.

- 4: Literature study on signal transduction:

“Ras-dependent activation of MAP kinase pathway mediated by G-protein βγ subunits.” *Nature* 369: 418-420, 1994.

- 9: G2 to M phase transition - Discovery of Cyclin B and Cdc2 (the MPF).

- 11: G1 to S phase transition in budding yeast and humans.

- 16: Literature Study on Cell Cycle:

“cdc25⁺ functions as an inducer in the mitotic control of fission yeast.” *Cell* 45:145-153, 1986.

- 18: Actin and Myosin interaction

23: Midterm

- 25: Microtubules and Mitosis.

Additional reading: “How cells get the right chromosomes.” Nicholas, B. *Science* 275: 632-637. 1997.

- 30: Microtubules and neurons (Dr. Azmitia)*.

November -

- 1: Proteolysis and cell regulation.

Additional reading:

“The lore of the rings—substrate recognition and catalysis by the ubiquitin ligases” Jackson et al. *Trend in Cell Biol* 10: 429-439. 2000.

“Regulatory subunit interactions of the 26S proteasome, a complex problem.” Ferrell et al. *Trends Biochem. Sci.* 25, 83-88. 2000.

- 6: Literature studies on cytoskeleton:

Paper for discussion: “An ESP1/PDS1 Complex Regulates Loss of Sister Chromatid Cohesion at the Metaphase to Anaphase Transition in Yeast.” *Cell* 93: 1067-1076. 1998.

Additional reading: “Degradation of a cohesin subunit by the N-end rule pathway is essential for chromosome stability.” *Nature*: 410(6831):882-883. 2001. and “Together until separation do us part.” *Nat Cell Biol.* 3:12-14. 2001. Review.

- 8: Development of the visual system in Flies (Dr. Desplan).
- 13: Video Presentation - *Death by Design* (Programmed cell death).
- 15: Circadian rhythms in flies (Dr. Blau).
- 20: Transgenic regulation of cellular electrical properties (Dr. Holmes).
- 22: THANKSGIVING.
- 27: Regulation of Intercellular communication through gap junctions (Dr. Tan).

Additional reading:

1. “Cell Migration—Movin’ on.” Horwitz and Parson. *Science* 286: 1102-1103. 1999.
2. “Extracellular matrix remodeling and cellular differentiation” Streuli, C. *Curr. Op. Cell Biol.* 11: 634-640. 1999.
3. “Gap Junctions: “Getting the message through” Nicholson and Bruzzone. *Curr Biol.* 7: R340-344. 1997.

- 29: Signaling through the Adhesion molecules (Dr. Sap; NYU Med).

“A supramolecular basis for CD45 tyrosine phosphatase regulation in sustained T cell activation” *PNAS* 97: 10138-10143, 2000

December -

4: Group Discussion – Stem cells

6: Review

11: ?

18: 10-11:50 am Final.

Lecturers & TAs:

Dr. Efrain Azmitia: 953 Brown; x88235; efrain.azmitia@nyu.edu.

Dr. Todd Holmes: 654 Brown; x88275; todd.holmes@nyu.edu.

Dr. Claude Desplan: x88218; claude.desplan@nyu.edu

Dr. Justin Blau: x88262; justin.blau@nyu.edu

Dr. Ignatius Tan: 852 Brown; x88295; ignatius.tan@nyu.edu.

Dr. Jan Sap: 263-7120; sapj01@MCRCR6.MED.NYU.EDU.

TA: Joanna Chiu, jcc204@nyu.edu.

Notes:

1. Please read these in Lodish et al. throughout the entire semester:

Chapter 7. DNA tech

- The concept of a “library,” pp216-223*.
- Bioinformatics, pp235-239*.

Chapter 9. The Molecular Structure of Genes and Chromosomes*.

Chapter 3. Protein Purification (pp83-97).

Chapter 6. Manipulating cells in culture.

Chapter 5. Microscopy (pp138-157).

Chapter 8. Genetic analysis.

*Reading for Sep 12.

2. Grading policy -

There will be two exams, mid-term and final, and your final score = 40% Midterm*+ 60% Final*.

(*Average of home work/quiz (15 points each) + 85% of the written test)

A = ≥ 80 ; B+ = 79–68; B = 67–55; B- = 54-45; C+ = 44-33; F= < 32.

FAQ:

1. I have taken bla bla bla as an undergrad and I got an A. Do you think I will do well in your class?

Ans: As long as you meet either the pre or the co-requisite, you are qualified to be in this class. However, there is no way that I can predict whether or not you would do well in this class based on your background. Your decision on whether or not to stay in the class ought to be based solely on whether you like the contents of the lectures/discussion.

As a general rule of thumb, however, if your homework and quiz averaged less than 10 points (out of 15) after a month in the class, it would be very unlikely that you will get a B.

Real questions from students' e mails:

1. > Professor Chang, I have a question as to how well we should know the papers you assigned to us, or if we could rely on the book.

Ans: Read'em all. Papers assigned for “literature study” will be in the Exam.

2. >percentage of the final is from the earlier half of the semester.

Ans: 20%.

3. >Dr. Chang, quick question please: is Dr. Azmitia's lecture on neuronal MT on the final.

Ans: Yes.

4. >Also which one should I concentrate studying on. MT , Actin, or Cell matrix section?

Ans: All of the above. My questions spread out pretty evenly over everything that we discussed in class.