

Syllabus, Molecular Basis of Human Disease, BIMM 110, Winter 2010.

Room - Center Hall 101. Time - 8:00 PM to 8:50 PM Monday, Wednesday, Friday.

Instructor: Professor William McGinnis, email: wmcginnis@ucsd.edu

website for the course: <http://www.biology.ucsd.edu/classes/bimm110.WI10/> Last updated, Jan. 10, 2010

There is no required course textbook. Lecture presentations will be posted for download below (prior to class), and helpful websites or pdfs with background material for course subjects will also be posted below. The course is not podcasted

The textbook *Molecular Biology of the Cell*, 5th Edition, by Bruce Alberts et al. provides very useful background information for many subjects in this course. A searchable online edition of the 4th edition of this textbook can be found at :<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=mboc4.TOC&depth=10>

Wikipedia is a searchable reference website with explanations for nearly all of the specialized terminology used in the course. Course goals. It is expected that students who take BIMM 110 already have a good background in molecular biology, metabolism, and genetics.

The lectures and discussions in BIMM 110 will largely focus on how molecular defects in genes, proteins and biological systems lead to human disease. The molecular biology of defense systems against diseases will also be covered. Recent advances in human genomics, stem cells, and human evolution are likely to revolutionize the diagnosis and treatment of disease (if we can afford to use them), and the molecular basis of these advances will be covered. A very important part of this upper division course is to learn how to clearly distinguish between conceptual models for disease states, and the quality of the evidence that supports the models.

Week 1. January 4, 6, and 8.

The recent evolutionary and ecological history of humans has had a dramatic influence on the types of disease that afflict humankind. Therefore in the first week, we review some basics of evolution, human genetics and molecular biology, as well as the position of humans on the evolutionary tree of life. We review the concepts of natural selection and genetic drift. We look at some models and evidence that some human diseases are due to very recent ecological adaptations of humans.

Basic background material can be found at

<http://tolweb.org/tree/> <http://anthropology.si.edu/humanorigins/faq/Encarta/encarta.htm>

<http://www.bradshawfoundation.com/journey/> <http://en.wikipedia.org/wiki/Domestication>

And in the pdfs:

[Human mortality 1900-1998 myopia Inuit](#)

You might also be interested in the following books. *The great human diaspora*, by Luca Cavalli-Sforza, and *Why we get sick*, by George C. Williams. The *Origin of Species* by Charles Darwin is a great book, perhaps the greatest in the history of Biological Science. You can download audio files of *The Origin of Species* at <http://librivox.org/the-origin-of-species-by-charles-darwin/>

Download Lecture presentations for Week 1.

Week 2. January 11, 13 and 15.

The conservation of animal regulatory pathways at the molecular level, and the relevance of this conservation for the molecular understanding of human diseases. Useful basic background material at this site, a chapter on animal development from the "Molecular Biology of the Cell" by Alberts et al.

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mboc4.chapter.3790> [Hox gene review.pdf](#) For a (very) specialized and detailed review on this material you can download [Model organisms and genetic disease.pdf](#)

Download Lecture presentations for Week 2.

Week 3. January 20 and 22. (no class on Jan. 18, Martin Luther King day)

The clinical perspective on human birth defects of chromosomal and other origins, the Molecular biology of human genetic diseases, particularly diseases of development.

background material for genetic imprinting and uniparental disomy at:

<http://www.medgen.ubc.ca/wrobinson/osaic/clinical/prenatal/upd.htm> karyotyping.

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hmg.section.188>

Download Lecture presentations for Week 3

Week 4. January 25, 27 and 29. Test #1 on Friday, Jan. 29 Signaling pathways, and genetic/environmental influences on human birth defects. Useful background material. hedgehog signaling

http://en.wikipedia.org/wiki/Hedgehog_signaling_pathway chromosome abnormalities.

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?highlight=xy&rid=hmg.section.196#207>. X inactivation

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?highlight=xy&rid=hmg.section.144#152> Human twins

<http://en.wikipedia.org/wiki/Twin> and twin studies and disease http://en.wikipedia.org/wiki/Twin_study_bouchard_et_al.pdf Download Lecture presentations for Week 4. Download instructions on how to write an analytical report on a health research paper.

Week 5. February 1, 3 and 5. The molecular biology of disorders of physiology, especially diabetes and aging.

Research paper on vitamins and health. [Neuhouser et al.pdf](#) Research paper on vegetables and ovarian cancer.

[veggies-cancer.pdf](#) Download Lecture presentations for Week 5.

Week 6. February 8, 10 and 12. The molecular biology of passive and active defenses against infectious diseases, barriers, innate immunity and adaptive immunity. Useful background material. For innate immunity.

[http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=innate%20immunity%20AND%20mboc4\[book\]&doptcmdl=TOCView](http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=innate%20immunity%20AND%20mboc4[book]&doptcmdl=TOCView)

for adaptive immunity

[http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=antibody%20AND%20mboc4\[book\]&doptcmdl=TOCView](http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=antibody%20AND%20mboc4[book]&doptcmdl=TOCView)

Download Lecture presentations for Week 6.

Week 7. February 17 and 19. (no class on Feb. 15, President's day). Midterm Paper due on Friday, Feb. 19 The molecular biology of microbial and viral pathogens. HIV molecular biology and AIDS. Useful background material. bacterial cell walls and antibiotics

http://www.microbelibrary.org/microbelibrary/files/ccImages/Articleimages/Spencer/spencer_cellwall.html

Download Lecture presentations for Week 7.

Week 8. February 22, 24 and 26. The molecular biology of cardiovascular diseases and cancer. Useful background material. Download Lecture presentations for Week 8.

Week 9. March 1, 3 and 5. Tuesday, The molecular biology of cancer Useful background material on cancer.

[http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=cancer%20AND%20mboc4\[book\]&doptcmdl=TOCView&log%24=booksrch&bname=mboc4](http://www.ncbi.nlm.nih.gov/sites/entrez?db=books&cmd=Search&term=cancer%20AND%20mboc4[book]&doptcmdl=TOCView&log%24=booksrch&bname=mboc4)

Download Lecture presentations for Week 9

Week 10. March 10 and 12. Lectures 19 and 20. The molecular biology of degenerative diseases of the human nervous system, and human stem cells in disease therapy. Genomic medicine. Useful background material.

Download Lecture presentations for Week 10.

Final Exam: Monday, March 15, 8 AM to 11 AM.

Office Hours: Professor McGinnis will hold office hours on Mondays from 2 PM to 3 PM, in 4318 Bonner Hall, beginning on Jan. 11. Other times can be arranged by appointment, email - wmcginnis@ucsd.edu

Discussion sections and Teaching Assistants:

Discussion sections, with TAs leading the discussions, begin second week of classes. Students can attend any discussion sections. Attendance is not required, but you will learn more if you regularly attend sections.

The Discussion section times and places:

A01 Monday 11:00a - 11:50a CENTR 220,

A02 Monday 12:00p - 12:50p CENTR 220,

Monday 4:00p - 4:50p CENTR 220, Discussion Leader/TA -

Monday 5:00p - 5:50p CENTR 205, Discussion Leader/TA -

Tuesday 4:00p - 4:50a U413 1, Discussion Leader/TA -

Tuesday 5:00p - 5:50a U413 1, Discussion Leader/TA -

A07 Wednesday 11:00a - 11:50a CENTR 218, Discussion Leader/TA -

Course grading. There will be one midterm, one paper, and a final in the course. The midterm exam is on Jan. 29 and the paper is due Feb. 19. The midterm and paper will count 40 points each, and the final will count 100 points. An additional 20 points will be awarded for answering clicker questions in class. In order to get the 20 "clicker points", you must answer 80% of the questions posed in class. The type of clicker being used and instructions on how to register it are found in the Lecture Presentations for Week 1 (download above).

All quizzes and exams will be closed book/closed computer. The format of the midterm and final exam will be similar, i.e. a few multiple choice questions, and a lot of short written answers to short questions. All questions on the midterm and final exam will be derived from lecture material.

Overall course (and final and midterm) letter grades will be calculated so:

88-100% - A 76-87% - B 65-75% - C 50 -64% - D 0-50% - F