

**GENETICS 110 EXPERIMENTAL SYSTEMS IN GENETICS**  
**Fall 2008**                      **Thursday 10:20-11:35**    **O'Donnell Hall 233**  
**Instructor:**                **Dr. Jennifer Randall**  
**Office:**                      **Skeen Hall 208**  
**Office hours:**            **By appointment**  
**Contact:**                  **646-5453; 646-2920; [jrandall@nmsu.edu](mailto:jrandall@nmsu.edu)**

**GENETICS 110:** A survey of molecular, biochemical, organismal, and computer science based approaches to investigate how genes determine important traits. Historical development and topics of current interest will be discussed.

**CLASS STRUCTURE:** This class will be a lecture and discussion class. We will have several guest lectures from **EXCEPTIONAL** researchers. They will discuss their own research programs that utilize genetics and genetic systems. Following their presentations we will continue with the topics listed in the syllabus. Attendance is necessary so that you do not miss your opportunity to hear/see their research. If you do need to miss class please let me know in advance.

**CLASS ASSIGNMENTS:** Assignments for each week are listed on the syllabus. You will need access to the internet. Suggested books are listed below. Journal articles and other handouts will be given throughout the semester. **Students need to come prepared to discuss the readings.**

**The students will be required to keep a journal.** These journals will serve as a reference to the students as they continue in their academic career. All entries for the journal should be typed and organized by date. The journal will be turned in four times during the semester.

**Research Paper** Students will choose one topic in genetics and write a 3-8 page research paper on this topic. The paper will include techniques, and ethical issues involved with this topic. The paper will be double spaced with 1 inch margins and include references.

**Final Exam** A final exam will be given December 10<sup>th</sup> (note time difference on syllabus). You may use your books/notes/journals for this exam.

## IMPORTANT DATES and ASSIGNMENTS

(50 pts)	Journal 1	September 3
(50 pts)	Journal 2	September 24
(50 pts)	Journal 3	October 22
(150 pts)	Research paper	November 3 <sup>rd</sup>
(50 pts)	Journal 4	November 19 <sup>th</sup>
(100 pts)	Final Exam	December 10 <sup>th</sup>
( 50 pts)	Participation/Attendance (Based on student attendance and contribution to class discussions)	

## GRADING SCALE:

A	450-500 pts
B	400-449 pts
C	350-399 pts
D	300-349 pts
F	<300 pts

S (Satisfactory) requires a C

**\*Note:** The grade scale may be curved at the end of the semester at the discretion of the instructor.

**LATE ASSIGNMENTS:** 10% of the total points for an assignment will be deducted for each week an assignment is late.

**Withdrawals:** It is your responsibility to withdraw from the course. You will NOT be automatically dropped from a course for failure to attend class or submit assignments.

**REQUIRED BOOKS:** There are no required books for this class. The readings and information will be given as handouts.

**SUGGESTED BOOKS:** The following are suggested books for the course that you may like in your personal library but are not necessary for you to purchase for the class.

Genetics Analysis and Principles by Robert Brooker, 3<sup>rd</sup> edition.

Discovering Molecular Genetics by Jeffery Miller

Genome-The autobiography of a species in 23 chapters by Matt Ridley

Genetics-Science, Ethics, and Public policy Thomas Shannon

Bioethics an introduction to the biosciences by Ben Mephem

Abraham Lincoln's DNA and other adventures in Genetics, Philip Reilly 2000

**Syllabus** The syllabus will be altered as needed and you will be informed by email of the changes.

**Student Information:**

Academic Misconduct

Please refer to the NMSU Student Handbook. Pay particular attention to the sections on Academic misconduct and plagiarism.

<http://www.nmsu.edu/~vpsa/handbook.html>

The penalty for plagiarism and other forms of academic misconduct will result in FAILURE of the course.

Students with disabilities <http://www.nmsu.edu/~ssd/>

- If you have or believe you have a disability and would benefit from any accommodations, you may wish to self-identify by contacting the Services for Students with Disabilities (SSD) Office located at Corbett Center (phone: 646-6840).
- If you have already registered, please make sure that your instructor receives a copy of the accommodation memorandum from SSD within the first two weeks of classes. It is your responsibility to inform either your instructor or SSD representative in a timely manner if services/accommodations provided are not meeting your needs.
- If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss any concerns with the instructor and/or the SSD Coordinator.
- Feel free to call Michael Armendariz, Coordinator of Services for Students with Disabilities, at 505-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.

**EQUITY:** Feel free to call Jerry Nevarez, Director of Institutional Equity, at 505-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.

<b>CLASS DATE</b>	<b>TOPICS/GUEST SPEAKERS</b>	<b>ASSIGNMENTS</b>
<b>August 20</b>	<b>INTRODUCTION</b> Classical genetics	<ol style="list-style-type: none"> <li>1. Read and Print History of Genetics (Landmarks) include this in your journal <a href="http://www.dorak.info/genetics/notes01.html">http://www.dorak.info/genetics/notes01.html</a></li> <li>2. Read Mendel's paper <a href="http://www.mendelweb.org/Mendel.html">http://www.mendelweb.org/Mendel.html</a></li> <li>3. Read Watson and Crick paper (handout)</li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. What is your interest and view of genetics?</li> <li>2. What traits did Mendel observe in his experiments? (List 5 of the 7) Why is Mendel considered the "Father of Genetics"?</li> </ol>
<b>August 27</b>	Molecular genetics Cell Chromosomes DNA Transcription Translation Gene Regulation Genome Sequencing Genetic Markers  Population genetics Hardy-Weinberg Principle	<ol style="list-style-type: none"> <li>1. Human genome project <a href="http://www.genome.gov/Pages/Education/AllAbouttheHumanGenomeProject/GuidetoYourGenome07.pdf">http://www.genome.gov/Pages/Education/AllAbouttheHumanGenomeProject/GuidetoYourGenome07.pdf</a> (large file-basic intro to human genome)</li> <li>2. Explore the human genome data <a href="http://www.sanger.ac.uk/HGP/">http://www.sanger.ac.uk/HGP/</a>.</li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. How did Watson and Crick's description of DNA change the field of Genetics? After reading the paper whose work did they depend on to make their description?</li> <li>2. Using the human genome data website "click" on chromosomes 5 and 12 and find how many genes are coded for in these genomes and how many SNPs are recorded.</li> </ol>
<b>September 3</b>	Gene Testing Lab/FORENSICS  Techniques used in	<ol style="list-style-type: none"> <li>1. Forensics websites <a href="http://www.exploreforensics.co.uk/">http://www.exploreforensics.co.uk/</a> <a href="http://www.ornl.gov/sci/techresources/Human_Genome/elsi/forensics.shtml">http://www.ornl.gov/sci/techresources/Human_Genome/elsi/forensics.shtml</a></li> </ol>

	forensic testing: RFLP PCR STR analysis Mitochondrial	<ol style="list-style-type: none"> <li>2. <a href="http://www.gtldna.com/outreach.html">http://www.gtldna.com/outreach.html</a></li> <li>3. Play the iDNAfication. Print out the mystery and your solution when you finish! Place these in your Journal.</li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Why is DNA evidence more effective than simple blood typing?</li> <li>2. How many DNA regions do forensic scientists use for identification?</li> <li>3. What is Katie's bill and how has it changed police investigations? Do you have any ethical issues with Katie's bill (explain your answer)?</li> </ol> <p><b>JOURNAL 1 DUE BY 5:00PM!! (Aug. 20-27<sup>th</sup>)</b></p>
<b>September 10</b>	Dr. Shuster/Cell cycle  Techniques continued Mutations Cancer Genetic Testing	<ol style="list-style-type: none"> <li>1. Read Dr. Shuster's lab web site <a href="http://biology-web.nmsu.edu/shuster-lab/cbshuster.html">http://biology-web.nmsu.edu/shuster-lab/cbshuster.html</a></li> <li>2. Read and explore this website on Cancer Genetics <a href="http://www.cancer.gov/cancertopics/prevention-genetics-causes/genetics">http://www.cancer.gov/cancertopics/prevention-genetics-causes/genetics</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Write a brief description of Dr. Shuster's research.</li> <li>2. What specific types of cancers are listed on the cancer genetics website? List three resources available from at this website.</li> </ol>
<b>September 17</b>	Genetic testing continued Gene Therapy	<ol style="list-style-type: none"> <li>2. Explore this website on Genetic Testing <a href="http://ghr.nlm.nih.gov/">http://ghr.nlm.nih.gov/</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. List and describe a few methods used for genetic testing.</li> <li>2. List some genetic diseases found on the website above.</li> <li>3. What ethical issues and social</li> </ol>

		<p>issues are involved with genetic testing? Should insurance companies be privy to one's genome information? Why or why not?</p>
<b>September 24</b>	<p>Dr. Curtiss/Drosophila</p> <p>Gene Therapy continued</p>	<ol style="list-style-type: none"> <li>1. Dr. Curtiss's website <a href="http://biology-web.nmsu.edu/curtiss/">http://biology-web.nmsu.edu/curtiss/</a></li> <li>2. Gene Therapy <a href="http://www.ucl.ac.uk/media/library/Genetherapyblind">http://www.ucl.ac.uk/media/library/Genetherapyblind</a> <a href="http://www.ornl.gov/sci/techresources/Human_Genome/medicine/genetherapy.shtml">http://www.ornl.gov/sci/techresources/Human_Genome/medicine/genetherapy.shtml</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Write a short description of Dr. Curtiss's research. How has the study of Drosophila advanced the field of genetics?</li> <li>2. From the websites listed above what gene therapies are available?</li> <li>3. What reasons are listed for gene therapy not an effective treatment commonly used?</li> </ol> <p><b>JOURNAL 2 DUE BY 5:00 PM TODAY!! (SEPT.3-SEPT. 17<sup>TH</sup>)</b></p>
<b>October 1</b>	<p>Kasey DeAtley</p> <p>Livestock Genetics</p>	<ol style="list-style-type: none"> <li>1. Write a short summary of Kasey DeAtley's research.</li> </ol> <p>Assignment: Work on Research paper</p>
<b>October 8</b>	<p><b>Dr. Nishiguchi</b></p> <p>Microbial genetics</p>	<p>Assignment: Work on research paper</p> <ol style="list-style-type: none"> <li>1. Read Dr. Nishiguchi webpage: <a href="http://biology-web.nmsu.edu/nish/">http://biology-web.nmsu.edu/nish/</a></li> <li>2. Read <a href="http://health.usnews.com/articles/health/healthday/2009/01/15/fda-issues-final-regulations-for-genetically.html">http://health.usnews.com/articles/health/healthday/2009/01/15/fda-issues-final-regulations-for-genetically.html</a></li> <li>3. <a href="http://articles.latimes.com/2009/jan/26/health/he-closer26">http://articles.latimes.com/2009/jan/26/health/he-closer26</a></li> <li>4.</li> </ol> <p><b>Journal Assignment</b></p>

		<ol style="list-style-type: none"> <li>1. Write a summary of Dr. Nishiguchi's research.</li> <li>2. What are some benefits to genetically modified animals? What are some concerns? What is the FDA's responsibility with GMO's?</li> </ol>
<b>October 15</b>	Animal engineering, Microbial genetics, plant engineering	<p>Read PDF on bacterial strategies that you received in previous class!  <b>NOTE: WE WILL DISCUSS THIS ARTICLE IN CLASS TODAY!!!</b>  <b>Journal Entry:</b>  <b>What type of strategies do bacteria use to cause disease (based on the article above and class discussion)?</b></p> <p><b>WORK ON PAPER!!!</b></p>
<b>October 22</b>	Dr. Kathy Hanley Virus Genetics	<ol style="list-style-type: none"> <li>1. Dr. Hanley's website <a href="http://biology-web.nmsu.edu/hanley/">http://biology-web.nmsu.edu/hanley/</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Write a short summary of Dr. Hanley's research..</li> </ol> <p><b>JOURNAL 3 DUE BY 5:00 PM TODAY (SEPT. 24-OCT. 22).</b></p> <p><b>WORK ON PAPER!!</b></p>
<b>October 29:</b>	Dr. Bosland/Chile genetics	<p><b>RESEARCH PAPER DUE</b></p> <ol style="list-style-type: none"> <li>1. Dr. Bosland's website <a href="http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_1559">http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_1559</a></li> <li>2. Read: GENETICALLY MODIFIED FOOD AND ORGANISMS <a href="http://www.ornl.gov/sci/techresources/Human_Genome/elsi/gmfood.shtml">http://www.ornl.gov/sci/techresources/Human_Genome/elsi/gmfood.shtml</a></li> <li>3. Read <a href="http://www.gmo-safety.eu/en/">http://www.gmo-safety.eu/en/</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Write a short summary of Dr. Bosland's research.</li> <li>2. What genetic modified crops are grown? (Look at websites)</li> <li>3. List the benefits and concerns of</li> </ol>

		<b>GMO's?</b>
<b>November 5th</b>	Dr. Cramer	<ol style="list-style-type: none"> <li>1. Dr. Cramer's website <a href="http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_15623">http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_15623</a></li> <li>2. Read <a href="http://attra.ncat.org/attra-pub/geneticeng.html">http://attra.ncat.org/attra-pub/geneticeng.html</a></li> <li>3. <a href="http://mulch.cropsoil.uga.edu/~parrottlab/Comparison/index.htm">http://mulch.cropsoil.uga.edu/~parrottlab/Comparison/index.htm</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>1. Write a short summary of Dr. Cramer's research.</li> <li>2. After reading the website above – what is the difference between plant breeding and genetic engineering?</li> </ol>
<b>November 12<sup>th</sup>:</b>	Plant Genetic Engineering	<ol style="list-style-type: none"> <li>1. Read <a href="http://www.agbioforum.org/v8n1/v8n1a03-elbehri.htm">http://www.agbioforum.org/v8n1/v8n1a03-elbehri.htm</a></li> </ol> <p><b>JOURNAL ENTRIES:</b></p> <ol style="list-style-type: none"> <li>1. What is bio-pharming?</li> <li>2. What types of drugs can be produced in plants?</li> </ol>
<b>November 19th</b>	Dr. O'Connell/Medicinal plants	<ol style="list-style-type: none"> <li>1. Dr. O'Connell's website <a href="http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_15731">http://cahe.nmsu.edu/academics/pes/horticulture.html#anchor_15731</a></li> </ol> <p><b>Journal Entries:</b></p> <ol style="list-style-type: none"> <li>2. Write a short summary of Dr. O'Connell's research.</li> </ol> <p><b>JOURNAL 4 DUE BY 5:00 PM TODAY! (OCT. 29-NOV. 19<sup>TH</sup>)</b></p>
<b>November 26</b>	<b>THANKSGIVING</b>	NO ASSIGNMENTS
<b>December 3</b>	<b>Laboratory Tour</b>	No Assignment!
<b>December 10</b>	<b>FINAL EXAM 10:30-12:30</b>	<b>OPEN NOTE FINAL</b>