AGRI 305
Agricultural Genetics Syllabus - Fall 2015

Instructor: Dr. Cynthia Daley
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Class Schedule: MWF 8:00 – 9:00
Lecture: Plumas 201

Activities:
Sec 02: Monday 12:00 – 1:50: Plumas 315
Sec 03: Wednesday 12:00 – 1:50: Plumas 315
Sec 04: Friday 11:00 – 12:50: Plumas 315

Office Hours: MW 9:00 am – 12:00 pm
Or by appointment
F 9:00 – 11:00 am

Required Text:
Genetics: Conceptual Approach: 5th edition
Author: Benjamin A. Pierce
ISBN 978-1-4641-0946-1


Course Content:
Agricultural Genetics will introduce students to a broad range of topics in the exciting field of population and molecular genetics. Upon completion of this course, the student will be fluent in basics of Mendelian, Molecular, and Population Genetics. In addition, students will become familiar with the application of basic theory to both Plant and Animal Biotechnology. These important concepts will provide insight for all types of students involved in Agricultural Science, Biology and Environmental Science.

Laboratory activities will focus on the applications of genetics and biotechnology to agriculture. Students will learn to extract DNA from tissue and process samples for subsequent analysis using Polymerase Chain Reaction (PCR), as a method to detect a single gene in plant tissue to verify seed contamination or GMO status. In addition, students will learn how to transform cells with plasmid vectors to propagate specific gene sequences and produce mass quantities of bio-engineered proteins. These more advanced techniques are used commercially for the purposes of quality control, pathogen detection, specie verification and gene propagation. Both plant and animal application will be included to broaden the scope of the course.

Course grading:
10 quizzes (20 pts each) 200 pts
8 pop quizzes (10 pts each) 80 pts
PCR Paper (50 points each) 50 pts
Lab Report (50 points each) 50 pts
Final 100 pts
Total: 480 pts

Grading Scale:
90% = A; 80% = B; 70% = C; 60% = D; <60% = F
The instructor reserves the right to curve the class at her discretion.
Student Learner Outcomes & K-12 Content Standards

Material covered in AGRI 305 covers all of the Content Standards for California K-12 Public Schools in Biological Sciences, specifically Biology/Life Sciences, Section Genetics, No. 2.a. through 2.g.; 3.a. through 3.d.; 4.a. through 4.f.; 5.a. through 5.e. See the following website for the current Content Standards in its entirety.

http://www.cde.ca.gov/be/st/ss/

Material covered in AGRI 305 addresses the following SLO’s for the College of Agriculture degree programs in Agriculture Science and Animal Science:

- Technical competency in transmission genetics
- Technical competency in molecular genetics
- Technical competency in population genetics and plant/animal breeding
- Technical competency in biotechnology as it applies to production agriculture
- Demonstrate the application of technology to Agriculture
- Demonstrate the ability to identify the appropriate methodologies to solve analytical problems

Ground Rules

Quizzes will be given at the beginning of each lab session and will cover the previous week’s lecture and laboratory information. Punctuality is important to insure that each student has the maximum amount of time to complete the quiz. Makeup-quizzes will be at the discretion of the Professor, and under most circumstances will not be granted.

If there is evidence that you have been involved in any form of academic dishonesty, you will receive an “F” grade for the course, and a report will be provided to Student Judicial Affairs for further action.

If a student feels an error in grading has been made, the student has one week from the time of the assignment is returned to them (or the grade is posted on the web, whichever is later) to request a review of the grade. The request must be in writing – attached to the original assignment—and must include a specific statement as to what is in error, how it should be corrected, and what supporting evidence is available.

Expected Student Behavior in the Classroom

- Students are expected to turn off all pagers, cell phones and other electronic devices during class time.
- Students are expected to pay attention and participate in class meetings.
- Students may not read other materials (newspapers, magazines) during class.
- Students are to remain in class during the entire session with the exception of breaks. Students are not allowed to come and go during the class session.
- All class participants are expected to exhibit respectful behavior
- All students have the right and privilege to learn in the class, free from harassment and disruption.
- Inappropriate or disruptive behavior will not be tolerated, nor will lewd or foul language.
- The class follows the standards set in the Code of Students Rights and Responsibilities (EM 96-38) and students are subject to disciplinary action for violation of that code.
Specifics:

- There will be no makeup quizzes unless prior arrangements have been made with the Professor two weeks in advance of the scheduled absence.

- Weekly quizzes will reflect lecture, homework and reading assignments.

- Quizzes provide the necessary immediate feedback to assess your performance in the class. If you are not meeting your expectations, then change your strategy. It is the responsibility of the student to find the necessary help. Opportunities for help include active participation in a study group, optional tutoring and attending office hours on a regular basis will enhance class performance.

- Homework assignments need to be completed prior to attending the weekly activity.

- Each lab activity will culminate with a quiz on the lecture material, and assigned homework problems.

- Attendance is absolutely necessary and is required.
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- Plan to study more for this class than most of your other classes unless you have an exceptionally strong background in biology and chemistry. Begin by reading the assignment prior (this means before) to coming to class. The material will make more sense if you have seen it once before. Some students will need to re-read the material, then do the homework problems.

- Efficient students will require at least 8 hrs of study/week (8 hours in addition to the time spent in class).

- Use office hours.
Week of:          Lecture:
August 24th  Chapter 1: Introduction to Genetics
Activity: Assessment Activity & Assigning Study Groups and Tutoring
Sept 7th     Chapter 2: Chromosomes and Cellular Reproduction: Basic cell types (prokaryotic and eukaryotic); cellular reproduction; sexual reproduction and genetic variation; meiosis and mitosis
Activity: Quiz 1 - Chapter 1
           Homework Chapter 2: Please refer to course page in BBL
Sept 14th   Chapter 3: Basic Principles of Heredity: Mendelian laws; monohybrid crosses; multiple-loci crosses; Goodness-of-Fit chi square test; penetrance and expressivity
Activity: Quiz 2 – Chapter 2
           Homework Chapter 3: Please refer to course page in BBL
Sept 21st   Chapter 3: Basic Principles of Heredity: Mendelian laws; monohybrid crosses; multiple-loci crosses; Goodness-of-Fit chi square test; penetrance and expressivity
Activity: Work problems
           Homework Chapter 3: Please refer to course page in BBL
Sept 28th   Chapter 4: Sex Determination and Sex-Linked Characteristics: Sex determination; sex-linked characteristics
Activity: Quiz 3 - Chapter 3
           Homework Chapter 4: Please refer to course page in BBL
Oct 5th     Chapter 5: Extensions and Modifications of Basic Principles: Lethal alleles; multiple alleles; gene interaction; sex-influenced and sex-limited characteristics; interaction between genes and environment
Activity: Quiz 4 – Chapter 4
           Homework Chapter 5: Please refer to course page in BBL
Oct 12th    Chapter 5: Extensions and Modifications of Basic Principles: cont’d.
Activity: Work problems
           Homework Chapter 5: Please refer to course page in BBL
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Oct 19th  
**Chapter 8:**  
*Chromosome Variation:* Chromosome morphology; chromosome rearrangement including duplications, deletions, inversion and translocations; aneuploidy; polyploidy; chromosome mutations and cancer

**Activity:** Quiz 5 – Chapter 5  
**Homework Chapter 8:** Please refer to course page in BBL

Oct 26th  
**Chapter 10:** Sections 10.1, 10.3, 10.4  
*DNA: The Chemical Nature of the Gene:* molecular basis of heredity; structure of DNA; special structures of DNA and RNA.

**Activity Quiz 6 – Chapter 8**  
**Homework Chapter 10:** Please refer to course website

Nov 2nd  
**Chapter 12:** Sections 12.1, 12.3, 12.4  
*DNA Replication and Recombination:* Semi-conservative replication; mechanism of replication.

**Activity:** Quiz 7 – Chapter 10  
**Homework Chapter 12:** Please refer to course website

Nov 9th  
**Chapter 13:** Transcription

**Activity:** Quiz 8 – Chapter 12  
**Homework Chapter 13:** Lab Activity: Cellular Transformation - Introducing a novel gene into bacteria. Heat shock procedure. Operon discussion

Nov 16th  
**Chapter 15:** Translation

**Activity:** Quiz 9 – Chapter 13  
**Homework Chapter 15:** Activity: Lab - Cellular Transformation continued – Differential plating exercise; Calculating Transformation Efficiency

Nov 30th  
**Chapter 19:**  
*Molecular Genetic Analysis and Biotechnology.* Basics concepts of recombinant DNA technology; techniques; applications of recombinant DNA technology

**Activity:** Quiz 10 – Chapter 15: Activity: Lab - Extracting protein from transformed bacteria – calculating protein yield.

Dec 7th  
**Chapter 19:**  
*Molecular Genetic Analysis and Biotechnology.* Basics concepts of recombinant DNA technology; techniques; applications of recombinant DNA technology

**Activity:** Lab report drafts due in Lab – come and discuss your report.
Dec 14th        Finals Week - Final scheduled as posted