Instructor: Karen Mock, Associate Professor
NR104A, karen.mock@usu.edu, Office hours: by appointment

Teaching Assistant: Gavin Cotterill (gavin.cotterill@aggiemail.usu.edu)

Course Description: Principles of modern genetics, with applications, examples, and assignments related to ecology and management issues in plant and animal species. Emphasis will be on molecular marker systems and how they can be used in investigations of gene flow patterns among populations, population dynamics, adaptation, captive breeding programs, definition of evolutionarily significant units, and other management applications. 3 cr. hrs. Prerequisites: CHEM 1110 or 1210; BIOL 1610.

Canvas Support: The lecture slides, handouts, grades, and updated syllabi will be available on Canvas (http://learn-usu.uen.org/courses). Once you log in, support for Canvas is available under the “Support” dropdown.

Computer Requirements: You will need MS Powerpoint, MS Word, MS Excel (or Open Office versions) and a pdf reader on your computer to view and download files: it is your responsibility to get this software (or an Open Office version) on your own computer or locate a USU computer equipped with this software that you can use for this course. Additional free software will be required for homework exercises during the course.

Reading Materials:
Required Text: Conservation and the Genetics of Populations by Allendorf, Luikart and Aitken, 2nd edition (©2013). Students are required to have this text available by the first week of class.

Honors: This class is offered as an Honors Class on a contract basis. Those students wishing to take this class for Honors should contact the instructor during the FIRST week of class.

Course Objectives:
1. To gain an understanding of basic genetic concepts at the molecular, individual, population, and upper taxonomic levels.
2. To gain an understanding of how genetic information can be used to inform ecological questions and management decisions.
3. To develop the ability to read, interpret and critique scientific studies and management reports based on genetic information.

Learning Objectives: Students succeeding in the course will learn:
1. How molecular structure is related to phenotype in plants and animals.
2. The mechanism and consequences of natural selection on phenotypes and genotypes.
3. How genetic diversity is generated, maintained, lost, and subdivided over time in natural
populations.
4. The basic mechanisms of inbreeding depression and outbreeding depression.
5. How to assess whether a population is in Hardy-Weinberg equilibrium, using codominant molecular data, and how this information can be useful in management scenarios.
6. The molecular basis and practical applications underlying common molecular marker systems.
7. How phylogenetic trees and dendrograms are constructed and interpreted using molecular data.
8. How genetic structure is assessed in natural populations.
9. How genetic tools can be applied to elucidate specific features of natural population (e.g. gene flow, migration rates, parentage, effective population sizes, bottlenecks, range expansions, neutral diversity)
10. How to read and critique scientific papers addressing management issues using genetic data.
11. The difference between neutral and adaptive variation in natural populations, how each is assessed, and how data on both can be used jointly.
12. The basics of several emerging approaches and applications in genetics.

Evaluation of Student Performance:
- In-Class Exams (2) @ 100 pts. each (total of 200 pts.)
- Take-Home Exams (2) @ 100 pts. each (total of 200 pts.)
- In-Class Final Exam @ 125 pts.
- Take-home Final Exam @ 125 pts.
- Homework (4) @ 50 pts. each (total of 200 pts.)
- Weekly Quizzes (11) average of best 8 quiz scores (100 pts.)
- Class Participation 50 pts.

Total Points: 1000 pts.

Midterm Exams: Both exams will consist of short essays based on material from lectures, discussions, homework exercises and reading assignments. Exams will consist of a take-home portion and an in-class portion. All exams (in-class & take-home) should be an independent effort (i.e. no communication with other humans about the content, answers, or sources of answers). Take-home exam answers should be free of plagiarism, thoroughly referenced, and show evidence of independent critical thinking. Answers on take-home exams should not involve information simply pasted from websites, no matter how well referenced. Class notes, library resources, and web resources (those that do not involve communication with others) may be used for the take-home exams, but not for the in-class exams. Late take-home exams will be docked 10% for each calendar day late.

Final Exam: The final exam (in-class and take-home portions) will be cumulative, covering all course material but emphasizing the material covered since the second midterm exam.

Make-up Policy for Exams: Makeup exams will only be provided in the event of well-documented incapacitating illness, family bereavement, or other extreme events. Arrangements will be made on a case-by-case basis at the discretion of the instructor. Alternate exam times prior to the regularly scheduled exams (due to an officially excused absence for a reason other than those above) must be arranged with the instructor at least a week in advance.
Homework Assignments: There will be 4 homework exercises during the semester. You are encouraged to work in groups to discuss these assignments, but you must prepare and turn in your own answers, showing your own work and using your own wording. These exercises will be submitted by the dates shown on the syllabus. Late homework assignments will be docked 10% for each calendar day late.

Quizzes: There will be 11 online quizzes during the semester. The availability of these quizzes will be described in Canvas. The quizzes are designed to be an incentive to keep up on reading, so they will generally cover the reading for the coming week. There will be no make-ups for these. I will take your 8 best scores and average them.

Class Participation: This is a very subjective grade that I will give at the end of the semester based on how actively you participated during the class sessions. For full credit, I would expect that you would:
- contribute regularly and constructively to class discussions and activities,
- show evidence of having read the assignments, and
- show that you are thinking critically about the material/issues raised in class.
I do not intend to track this in detail through the semester, but feel free to talk with me about your participation level at any time.

Grading Scale:

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<th>Percentage</th>
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<tr>
<td>100-93%</td>
<td>A</td>
<td>82-80</td>
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<td>92-90</td>
<td>A-</td>
<td>79-77</td>
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<td>89-87</td>
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<td>86-83</td>
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Accommodation: Students with impairments may be eligible for special accommodations. All accommodations are coordinated through the USU Disabilities Resource Center (DRC) in University Inn Room 101 (797-2444 or 1-800-259-2966). Arrangements for accommodations should be made as early in the semester as possible.

Cheating Policy: Cheating will not be tolerated. Cheating includes:
- representing someone else’s work as your own,
- sharing information about exams or quizzes without specific instructor permission (including information on graded exams/assignments from past semesters),
- accessing information during in-class quizzes or exams without specific instructor permission,
- falsifying course records,
- facilitating someone else’s cheating,
- appearance of cheating (e.g. cell phone use or conversation during exams)
At a minimum, students turning in reports or exams that suggest cheating will be given a zero for the assignment or exam involved, and the incident will become part of the student’s record. Further information on cheating consequences, as well as definitions of cheating and plagiarism are described here: https://www.usu.edu/provost/faculty/teaching/syllabus_resources.cfm and here: https://www.usu.edu/provost/faculty/student_conduct/.