

**MOLECULAR ECOLOGY: BIOL5370/6370
SPRING 2012**

INSTRUCTOR: Dr. Scott R. Santos, Department of Biological Sciences
(844-7410, santos@auburn.edu)

OFFICE: 128 Life Sciences. **Office hours:** 8 AM-10:00 AM Fridays

LECTURES: Lectures are from 11-11:50 on M, W and F in Rouse (Life Science Building) 009.

REQUIRED TEXTS: There will be no required textbook. Instead, research and review papers from the primary literature will be assigned. These papers will either be distributed in class, provided as PDF documents via email attachments or can be checked out from the AU Library as eBooks (<http://www.lib.auburn.edu/ebooks/>). If you would like to acquire a supplementary textbook, I would suggest both John C. Avise's "Molecular Markers, Natural History, and Evolution" (Paperback) and Alan R. Templeton's "Population Genetics and Microevolutionary Theory" (Hardcover). You might want to search the used book section of Amazon.com for these titles since they run from \$55 - \$100 when new.

PREREQUISITES: A background in molecular genetics, population genetics and ecology is strongly recommended but not required.

COURSE DESCRIPTION: The field of Molecular Ecology (ME) encompasses various subdisciplines within the Biological Sciences. At its heart, ME employs molecular variation in nucleic acid and/or protein data to answer questions involving populations and communities of organisms. Given this breadth, the principles learned in ME are directly applicable to both prokaryotes and eukaryotes, and can be utilized to address questions in nearly any research area.

ADDITIONAL STUDY AIDS FOR THIS COURSE:

At times, the lectures will draw upon other fields, such as biochemistry, genetics, cell biology and microbiology. At the very least, students are encouraged to acquire textbooks on population genetics and molecular genetics in order to review concepts related to those fields. Students interested in exploring Population Genetics in more depth are encouraged to take the course (**BIOL 7170**) offered by Dr. Mike Wooten.

IMPORTANT INFORMATION OF SPECIAL NOTE:

• **Read the assigned papers prior to coming to lecture.** The lectures are meant to clarify and discuss concepts, not to serve as your first exposure to them. Each lecture is presented with the assumption that you have read the material and are at least vaguely familiar with it.

Since the lectures will tend to build upon the previously covered materials, it is highly recommended that you review your notes on a weekly basis and attend lectures on a regular basis. I encourage you to make use of my office hours for additional instruction/discussion if needed. However, last-ditch efforts late in the semester tend to be futile.

GENERAL POLICY and PROCEDURES: You should retain this schedule of lecture topics, test days, and relevant instructions for reference throughout the semester. You are responsible for learning the material that will be covered in the examinations, for preparing for lectures by reading assignments beforehand, and for being present on test dates without further notice or additional reminders.

Missing exams should be avoided at all cost. Valid reasons for absences as outlined in the Tiger Cub are: 1) **severe** illness, 2) documented personal or family emergencies, 3) official University excuses. Illness will necessitate a note from the doctor or infirmary (as will a family emergency). Official University excuses will likewise require documentation (see Tiger Cub, p. 86). Preferably, advise me beforehand regarding absences on a test day. **Additionally, if you wish to make up a missed exam, the instructor must be contacted before the next class period following the exam, and your written excuse presented and a makeup scheduled, or else no make up exam can be granted.** If it is not possible to contact the instructor by the next class meeting, but you have a valid excuse for your absence and an excuse for not contacting the instructor, you may be allowed to make-up exam only under unusual extenuating circumstances, but contact with the instructor at the earliest possible time is **MANDATORY**.

CHEATING: VIOLATION OF THE UNIVERSITY ACADEMIC HONESTY CODE WILL BE DEALT WITH AS OUTLINED IN THE SGA CODE OF LAWS, TITLE XII (TIGER CUB, pp. 125-126). All forms of academic dishonesty will be reported to the Academic Honesty Committee. This may result in failing grade, suspension, and/or expulsion from the University. These are serious situations, and any discovered attempt at academic dishonesty will be treated as extremely grave. (Note this includes turning in an excuse for an absence that cannot be verified as true).

SPECIAL ACCOMMODATIONS: Students who need special accommodations are encouraged to see me after class or in my office so we can discuss your situation, **confidentially**. Please bring your memo from The Program for Students with Disabilities (PSD) to me as soon as possible; we can discuss it during your appointment. Exam accommodations should be arranged at least one week in advance. If at any time during the semester you feel that the accommodations we have put in place are not working, please consult with me and /or the professional staff in the PSD office. If you do not have a memo from the PSD office that alerts me about your accommodations, it is recommended that you make an appointment to see them in **1232 Haley Center (844-2096)**. Without this memo no accommodations can be granted.

Special Request: Cell phones and pagers should be turned off for the duration of the lecture. Students will be asked to leave the classroom for the remainder of the lecture in the event one of these devices is activated during the lecture.

GRADING: There will be two midterms and a final exam. Approximately three quarters of the final will cover the course material up to the second midterm and the remainder will be a comprehensive review of the entire semester. Each exam will contribute 25% toward your final grade. Final grades will be assigned using a 10 point scale.

Graduate students will be **required** to complete an **additional project** in order to receive credit for 7970. This project will involve the computer analysis DNA chromatograms (*i.e.*, sequence traces) as well as mock population data sets. The resulting analyses will then be written up as a research article, including an Abstract, Introduction, Materials and Methods, Results, Discussion, references and figures/tables. Data sets will be distributed by the 3rd week of classes.

Grading is as follows:

A= 90-100%

B=80-89

C=70-79

D=60-69

F=59 and below

**LECTURE SCHEDULE BY SUBJECT MATTER
(TENTATIVE AND SUBJECT TO CHANGE)**

DNA – properties, replication and patterns/processes of sequence mutation

Extraction and manipulation of DNA; PCR & its applications

Allozymes and protein markers: the P & Cs

Population genetic analyses and computers

Uniparentally inherited markers: genomes within genomes

Nuclear markers I: ribosomal DNAs

Nuclear markers II: RAPDs and AFLPs

Nuclear markers III: microsatellites

Microevolutionary forces within and between populations

Paternity and kinship

The unseen: microbial communities

Recombinant DNA: hopeful monsters?

Wildlife conservation genetics

Genomics, GenBank and mining the databases

Phylogeography and an intro to phylogenetic reconstruction

Species and speciation

EXAM I = TBA

EXAM II= TBA

FINAL EXAM = see AU course schedule for time