

Population Genetics (BISC 514)

Instructor: Dr. Ryan Garrick, office: Room 508 Shoemaker Hall, e-mail: rgarrick@olemiss.edu

Class time & location: **Mon, Wed, Fri: 1:00–1:50pm, Shoemaker Room 408.** Regular attendance is expected. Use of **cell phones** not permitted, including taking photos and sending text messages. Please turn them off during class. Use of **laptop computers** for note-taking is fine, but it is not appropriate to be facebookering, twitting, or sending emails, etc.

Required text: *Conservation and the Genetics of Populations 2nd edition.* Authors: Fred W. Allendorf, Gordon H. Luikart & Sally N. Aitken. ISBN-13: 978-0470671450. Publisher: Wiley-Blackwell.

Office hours: **Mon 10:30-11:30am; Wed: 2:30–3:30pm (no appointment necessary).** If you cannot see me during the scheduled office hours, an appointment will need to be made by email. Please include the following: (1) BISC 514 in the subject line, (2) what you would like some help with in the main text of the email (that way I can be better prepared), and (3) your first and last name at the end of the message. You should receive a response from me within 24 hours.

Description: Basic principles of the factors that influence the genetic composition of natural and artificial populations. Topics covered will include selection, migration, mutation, genetic drift, mating systems, and quantitative genetics.

Prerequisites: Grade of C or better in MAT 121 and BISC 336.

Blackboard: Log on at www.olemiss.edu. This is the first place to look for any information regarding the course during the semester, including syllabus, announcements, grades, etc. You will be notified of modifications to the syllabus, classroom locations etc. through your registered email address on Blackboard, and in class.

Grading: Exams (3, including the final): 20% each. For all exams, the following standard grading scheme applies: 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, < 60 = F. However, I *may* adjust these thresholds slightly downwards (i.e., only to your benefit), depending on overall performance of the class. **In-class participation** (on-going): 12%. **Computer lab sessions** (7): 4% each for undergraduate students, 2% each for graduate students. **Research project** (graduate students only): 14%. The +/- grading scheme will not be used.

Exams: Bring your **student ID, #2 pencil, a calculator, and one Scantron form # F-289** to every exam (I will not provide these). The Scantron form # F-289 (1/2 page, red print) can be purchased at the Bookstore in the Student Union. **Other than calculators, no electronic devices are allowed to be turned on during exams.** This includes cell phones, computers, i-pads, etc. Exam grades will be posted as soon as possible. If you suspect that a question was graded improperly, you have one week (from the date of test return) to contact me about it. **Exam dates are non-negotiable;** make-up exams are not given except (1) in the event of *serious illness*, in which case a medical doctor's letter is required, or (2) if you have a documented school function (marching band, game), in which case you will need to provide documentation *before* the day of

the exam. Make-up exams must be taken at a date and time chosen by me, generally within 2–3 days of the original exam date.

Cheating: An amazingly bad idea. Cheaters will be assigned a zero for the exam in question.

Computer sessions: These will be take place in the Shoemaker Room 225 Computer Lab.

Students with disabilities: University policy provides for reasonable accommodations to be made for students with verified disabilities on an individualized and flexible basis. It is the responsibility of any student with a disability to contact the Office of Student Disability Services (662-915-7128). SDS will then contact the instructor through the student by means of an Instructor Notification of Classroom Accommodations form.

<i>Date</i>	<i>Topic(s)</i>	<i>Chapter or section(s)*</i>
Week 1. Jan 22	<i>What is a population?</i>	16.5 (p.336-346)
Jan 24	<i>Ploidy, sex determination & mating systems</i>	3.1.2 & .3 (p.37-39); Box14 (p.293-295)
Week 2. Jan 27	<i>Nuclear & cytoplasmic genomes</i>	4.1 (p.56-57); 4.2.4 (p.66-68); 14.6 (p.289)
Jan 29	<i>Genetic variation I</i>	3.1.7-8 (41-45); 12.1 (p.231-235)
Jan 31	<i>Genetic variation II</i>	Ch8 (p.137-155); 12.3-4 (p.239-240)
Week 3. Feb 03	<i>Variation within & among populations</i>	Ch2 up to 2.6 (p.15-33)
Feb 05	<i>Evolutionary potential</i>	11.3-6 (p.217-229); 14.4-5 (286-289); 21.4-6 (p.446-451)
Feb 07	<i>Assays for screening genetic polymorphisms</i>	3.1.1 (p.36-37); 3.1.4 (39-40); 3.2 (p.45-48); Ch4 (55-76)
Week 4. Feb 10	<i>Classes of genetic data (DISCUSSION)</i>	Sunnucks 2000 <i>TREE</i>
Feb 12	EXAM 1. Bring Scantron form F-289	
Feb 14	<i>Case studies: Pathogens (DISCUSSION)</i>	Patterson et al (2009) <i>J. Med. Ent.</i> ; Morgan et al. 2007 <i>PNAS</i>
Week 5. Feb 17	<i>Data analyses I: individuals</i>	9.2 (p.161-163); 16.4.2 (p.332-335); 22.1-.5.1 (p.456-474)
Feb 19	<i>Data analyses I: individuals cont'd</i>	22.5.2-.6 (p.474-483)
Feb 21	Computer lab 01: STRUCTURE	Shoemaker Hall, Rm 225

Week 6. Feb 24	<i>Data analyses II: populations</i>	5.1-.4 (p.80-90); 5.6 (p.92-93); 10.1-.4 (p.188-196)
Feb 26	<i>Data analyses II: populations cont'd</i>	Box5 (p.93-95); 9.1 (p.158-161), 9.8 (p.174-178); 9.9.1-.3 (p.179-181); 10.4 (p.196)
Feb 28	Computer lab 02: GENEPOP	Shoemaker Hall, Rm 225
Week 7. Mar 03	<i>Populations in space and time</i>	9.3-.5 (p.163-169); 15.1-.2 (p.297-301); 15.4 (p.303-304)
Mar 05	<i>How alleles move through space</i>	9.6-.7 (p.169-177); 9.9 (p.179-183); 15.6 (p.306-311)
Mar 07	Computer lab 03: STRUCTURE	Shoemaker Hall, Rm 225
Week 8. Mar10-14	SPRING BREAK (no class)	
Week 9. Mar 17	<i>How allele frequencies change over time</i>	Excoffier & Ray (2009) <i>TREE</i>
Mar 19	<i>Effective population size</i>	Ch7 (p. 118-135)
Mar 21	Computer lab 04: GENEPOP	Shoemaker Hall, Rm 225
Week 10. Mar 24	<i>Review of material for Exam 2</i>	
Mar 26	EXAM 2. Bring Scantron form F-289	
Mar 28	<i>Genetically 'large' pops (DISCUSSION)</i>	Ross et al (2013) <i>Evol.</i>
Week 11. Mar 31	<i>Genetically 'small' pops (DISCUSSION)</i>	Andersen et al. (2011) <i>Biol. J. Linn. Soc.</i>
Apr 02	Research project presentations	
Apr 04	Computer lab 05: GENEPOP	Shoemaker Hall, Rm 225
Week 12. Apr 07	<i>Phylogeography & Coalescence I</i>	16.2-.3 (p. 319-332) Emerson & Hewitt (2005) <i>Curr. Biol.</i>
Apr 09	<i>Phylogeography & Coalescence II</i>	Beheregaray et al. (2003) <i>Science</i>
Apr 11	<i>Phylogeography & Coalescence III</i>	Hewitt (2003) <i>Nature</i>
Week 13. Apr 14	Computer lab 06: MESQUITE	Shoemaker Hall, Rm 225
Apr 16	<i>Hybridization & Conservation genetics I</i>	Ch17 (p. 353-376); Garrick et al. (2012)
Apr 18	GOOD FRIDAY (no class)	
Week 14. Apr 21	<i>Hybridization & Conservation genetics II</i>	still on Ch17 (p. 353-376)
Apr 23	<i>Case studies: Endangered & extinct species</i>	
Apr 25	Computer lab 07: HYBRIDLAB & STRUCTURE	Shoemaker Hall, Rm 225

Week 15. Apr 28	<i>Population genomics (DISCUSSION)</i>	Lowry (2009) <i>Biol. Lett.</i> , Funk et al (2012) <i>TREE</i>
Apr 30	<i>Population genomics</i>	4.4 (p. 69-72), GB4 (p. 74-76), 15.6.3 (p.309-311)
May 02	<i>In-class review session (optional, recommended)</i>	
May 07	FINAL, 12:00–3:00pm. Bring Scantron form F-289	

* From Allendorf et al. (2013) – check Blackboard for additional reading material (i.e., peer-reviewed papers) that I will upload as PDF files, and flag via ‘announcements’