Population Genetics, BIOL 4395 (or 5301)
Fall Semester, 2020
Lecture/Lab: Asynchronous & Online

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Recommended textbooks for the course:

Halliburton, Richard. 2004. Introduction to Population Genetics. Pearson Prentice Hall.

Gillespie, John H. Population Genetics: A Concise Guide. Johns Hopkins University Press.

Falconer, Douglas S. & Mackay, Trudy F.C. Introduction to Quantitative Genetics. Pearson Education Limited.

** A computer and calculator will also be needed.

Course Description:
Broadly defined as the study of the genetic composition of populations, population genetics attempts to quantify the distribution of genetic variation and changes in the frequencies of alleles. Specifically, we will examine how the four evolutionary processes (mutation, genetic drift, natural selection, and gene flow) affect the genetic composition of natural populations. Population genetics has a large theoretical component and is rich in empirical data that we will be exploring through lectures and labs, respectively. Students will get hands-on experience analyzing Sanger and Next-Generation Sequencing data that will include humans, model organisms (e.g., Drosophila), and non-model organisms; although, students are encouraged to bring their own data as well.

Lab Component:
There are a total of 8 labs that focus on methods of analyzing genetic data. We will analyze real data sets using a variety of computer programs. Each lab is designed to correspond with the lecture topic for that week, which will reinforce those concepts. **Many computer programs require PC only, and so please make sure you have access to a PC for the weeks where labs are due (see below).**

Grading (undergraduate / graduate % of grades are provided)**:**

Quizzes (5 total)	50 pts (10% / 8.3%)
Midterm	100 pts (20% / 17%)
Paper Evaluation	50 pts (10% / 8.3%)
Final	100 pts (20% / 17%)
*Graduate Student Paper	100 pts (- / 17%)
In-class Participation/Homework	200 pts (40% / 33%)
Total for students:	**500 pts / 600 pts**

*Only Graduate Students do
Grades will be assigned as: 90+% = A, 80-89% = B, 70-79% = C, 60-69% = D, <60% = F.

Quizzes (10%/8.3%):
There will be 5 10-pt quizzes. Each quiz will be based on 2-3 weeks of material. *Although each quiz will largely focus on material from those 2-3 weeks of material, questions will incorporate information across weeks, and thus students will need to maintain a building foundation.* Quizzes will each consist of approximately 5-10 questions evenly divided into conceptual & computational components. The conceptual component will focus on the concepts covered in lecture, whereas the computational components will focus on applying concepts to solve mathematical problems in population genetics. You are permitted to use a calculator and a list of relevant formulae will be provided. **Quizzes can consistent of multiple choice, problem solving, and short & long-answer questions. You need to know the lecture material to complete this exam in the allotted time.**

Paper Evaluation (10% / 8.3%):
All students will complete an evaluation of a peer reviewed article with topics broadly focusing on population genetics. The papers must include original empirical data collected from at least two different populations.

Graduate Student Paper (Graduate Students only = 17%):
          Each Graduate student will be required to research new methods within the field of population genetics/genomics, and evaluate their capabilities based on peer reviewed information.

Lecture Exam & Final (40% / 33%):
There will be two 100-pt exams. Exams will be online and you will need to use the **Respondus Lockdown Browser** on Black Board. Exams will be open for a week, however, you will only have one opportunity to take each exam and with inability to start and stop them. You will have **90 minutes** to take each exam. **Exams will each consist of true/false, multiple choice, and short answer. You need to know the lecture material to complete this exam in the allotted time.**

Labs (40% / 33%):
You will have a total of 8 labs (2 per week) worth 20 points each (total = 160 pts). Students are expected to follow and complete computational lab protocols. There will be 2 labs per week (except for the last week) with a due date of midnight for that week's Friday. **5 points will be deducted for each day late.**

Missed Due Date(s) Policy:
If you miss quizzes or assignments due to illness or death of a family member or close friend, you must (1) notify me prior to the exam (in exceptional cases, I will wave this requirement) and (2) provide an official record of a visit to the doctor or an obituary. Otherwise, you will earn zero points for the missed quizzes/assignments.

Academic Integrity:
Cheating or plagiarism will not be tolerated. The university gives students and faculty guidelines on how to deal with violations of academic integrity, which we expect you to follow and I will follow myself (you can read them at http://sa.utep.edu/osccr/academic-integrity/). This policy exists to level the playing field for all students and not give the few cheaters an unfair advantage over the vast majority of students, who are hard-working and honest. Copying from a peer is easy to detect and will be considered as plagiarism.

Special needs and circumstances:
If you need any special accommodations please let me know at the beginning of the class and/or register with the Center for Accommodations and Support Services. Also, if you run into personal problems beyond your control, please let me know before missing a deadline etc. I will try to be accommodating

and understanding. Letting me know about problems after you missed a deadline or failed an assignment usually suggests that you are making an excuse. For the official policies on academic integrity and scholastic dishonesty, please refer to Handbook of Operating Procedures.

Campus Carry: Persons holding a Concealed Handgun License can lawfully carry their handgun into a UTEP classroom as long as the gun remains concealed. Open carry remains prohibited on campus. In other words, none of us should see (or be able to tell that there is) a gun at UTEP. Call the University Police at 747-5611 or dial 911 if you see any individual on campus with a handgun or other type of weapon. For more information on campus carry, see [http://sa.utep.edu/campuscarry/]; for more information on overall campus safety, see [http://admin.utep.edu/emergency].

Important School Dates:

Aug 26th = Fall classes begin
Aug 26-30th = Late registration
Sept 2nd = Labor Day (**University closed**)
Sept 11th = Fall Census Day
Nov 1st = Fall Drop/Withdrawal Deadline
Nov 28-29 = Thanksgiving Holiday (**University closed**)
Dec 5th = Last Class Day

	Lecture Topic	LAB	Quiz
WEEK 1	Lectures 1 (Videos 1-2): Introduction; What is Population Genetics?	**NO LAB**	
WEEK 2	Lecture 2 (Videos 3-4): Genetic Variation, Hardy-Weinberg Principle & Linkage Disequilibrium ****Example HW-EQ Problem Solving in Video 5**	Lab 1: GenBank Lab	**Quiz 1**
WEEK 3	Lecture 3(Video 6): Pop structure & Differentiation (F stats, Phist), etc.	Lab 2: Quantifying genetic variation	
WEEK 4	Lecture 4 (Videos 7 & 8): Mutation & Genetic Drift	Lab 3: Types of Mutations	**Quiz 2**
WEEK 5	Lecture 5 (Video 9): Migration & Gene Flow	Lab 4: Recombination	
WEEK 6	Lecture 6 (Video 10): Effective Population Size	Lab 5: Constructing genealogies	**Quiz 3**
WEEK 7	Lecture 7 (Video 11): Linkage DisEq	Lab 6: Population subdivision	
WEEK 8	Lecture 8 (Video 12): Coalescent Theory	**MIDTERM**	
WEEK 9	Lecture 9 (Video 13): Neutral Theory	Lab 7: Natural selection & Recombination	**Quiz 4**
WEEK 10	Lecture 10 (Videos 14-16): Selection	**NO LAB**	
WEEK 11	Lecture 11 (Video 17): Forensic Science	Lab 8: Forensics Lab	
WEEK 12	Lecture 12 (Video 18): Quantitative Genetics	**NO LAB**	**Quiz 5**
WEEK 13	Lecture 13 (Video 19): Phylogenetics	**NO LAB** ****Paper Evaluation Due**	
WEEK 14	Lecture 14 (Video 20): Population Genomics	**NO LAB** ****Graduate Student Paper Due**	
WEEK 15	**FINAL TEST**	**FINAL TEST**	