MATHEMATICAL GENETICS

Washington State University MATH 563/BIOLOGY 566
University of Idaho Math 563/Bio 563

Instructors:
Richard Gomulkiewicz (391 Eastlick Hall; 509-335-2527; gomulki@wsu.edu)
Stephen Krone (421 Brink Hall; 208-885-6317; krone@uidaho.edu)

Lectures:
Mondays 5:10-6:25 PM, 219 Center for Undergraduate Education, WSU
Wednesdays, 5:10-6:25 PM, 051 Teaching & Learning Center, UI

Office Hours: By appointment (please email)

Learning Outcomes:
(1) Gain exposure to, and experience with, major topics and methods in mathematical genetics;
(2) Survey classical and contemporary literature in mathematical genetics.

Course Prerequisites:
Multivariate calculus, genetics, statistics; or instructor's permission

Required Text:
Population Genetics: A Concise Guide, 2\textsuperscript{nd} Edition by John H. Gillespie

Course Blackboard Site: learn.wsu.edu

Course Format:
We plan to achieve the goals of the course through a series of instructor led "workshops" and lectures on topics in mathematical genetics most of the course and student led final presentations during the last few weeks. One or two readings will usually be assigned per topic: one for background and a second for discussion.

For workshops, an instructor will briefly motivate the topic, outline the analyses, and summarize the main results. The class will then work through the reading(s) as a group, stopping to clarify steps, methods, or concepts that are ambiguous. Ideally, students who understand a step/method/concept will do the clarifying. Of course, the instructors will help regulate the flow of discussion and contribute lucid explanations as necessary! The instructors will also suggest homework exercises that all students are expected to attempt. For this workshop format to succeed, it is critical that every student works to understand the readings prior to class. If, in the course of reading the material, you don’t understand something (e.g., a term, concept,
manipulation, or technique) make a note of it and go through the remaining material as best you can. Be sure to bring your notes to class.

Student-led final presentations will cover topics chosen by students (topics—which may involve original research—must be pre-approved by the instructors). Presenters should prepare handouts and readings that their fellow students will read prior to the discussion.

**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>35%</td>
</tr>
<tr>
<td>Final presentation</td>
<td>35%</td>
</tr>
<tr>
<td>Class participation</td>
<td>20%</td>
</tr>
<tr>
<td>Presentation reviews</td>
<td>10%</td>
</tr>
</tbody>
</table>

35% of the grade in this course will be based on the quality of a student planned and executed solo or group final presentation during the second part of the course. 35% of the grade will be based on attempting and solving assigned homework problems. 20% of the grade will be based on attendance and contributions made during class discussion (including asking and answering questions, and making thoughtful comments). 10% of the grade will be based on brief reviews of the other students’ final presentations given on days other than the day you present.

**Reading Assignments:**

Readings will be assigned from the course text and other literature. You are expected to have read the assigned reading and participate in discussing the material. You will be assigned four or five questions about the reading and are required to answer each.

**Schedule of Course Content:**

- **Weeks 1-2:** Hardy Weinberg & Genetic Drift
- **Weeks 2-3:** Natural Selection
- **Weeks 4-5:** Two Locus Selection & Nonrandom Mating
- **Weeks 6-7:** Quantitative Genetics
- **Weeks 8–9:** The Coalescent I: Basic Theory
- **Weeks 10-11:** The Coalescent II: Statistical Inference
- **Weeks 12-13:** Effects of Structure & Effective Population Size & MCMC
- **Weeks 14-15:** Student-led group discussions

**Student Code of Conduct:**

Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Students who violate WSU's Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(3) and -
404) will fail the course, will not have the option to withdraw from the course pending an appeal, and will be reported to the Office of Student Conduct.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating. If you have any questions about what is and is not allowed in this course, you should ask the course instructor before proceeding.

Cheating on an exam or a writing assignment (including plagiarism) can result in a final grade of F for the entire course, will be reported to the Office of Student Affairs, and will result in additional disciplinary action by the University.

If you wish to appeal a faculty member's decision relating to academic integrity, please use the form available at conduct.wsu.edu.

**Students with Disabilities:**
Reasonable accommodations are available for students with documented disabilities or chronic medical conditions. If you have a disability and need accommodations to fully participate in this class, please visit the Access Center website to follow published procedures to request accommodations: http://www.accesscenter.wsu.edu. Students may also either call or visit the Access Center in person to schedule an appointment with an Access Advisor. Location: Washington Building 217; Phone: 509-335-3417. All disability related accommodations must be approved through the Access Center. Students with approved accommodations are strongly encouraged to visit with instructors early in the semester during office hours to discuss logistics.

Pullman or WSU Online: 509-335-3417, http://accesscenter.wsu.edu, Access.Center@wsu.edu

**Campus Safety/Emergency Information:**
Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the “Alert, Assess, Act,” protocol for all types of emergencies and the “Run, Hide, Fight” response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's Run, Hide, Fight video and visit the WSU safety portal.