

Biology 575 (Spring 2020, Credits: 2)

Interdisciplinary Seminar in Genetics (Landscape Genetics)

Course Description:

This is a Distributed Graduate Seminar that uses materials and lectures from an international collaboration and is offered on weekly basis at the Science and Technology campus.

The Landscape Genetics Distributed Graduate Seminar (DGS) provides a unique opportunity for interdisciplinary graduate training. The course draws on experts from around the world to deliver an in-depth introduction and overview of the field of landscape genetics. The course caters to students in both basic and applied ecology, conservation/population genetics, landscape ecology and conservation biology. Every other year, several hundred students, post-docs and faculty from around the world participate in this course.

The course caters to students in basic and applied ecology, conservation and population genetics, landscape ecology, evolutionary biology and conservation biology. A key objective of landscape genetics is to study how landscape modification and habitat fragmentation affect organism dispersal and gene flow across the landscape. Landscape genetics requires highly interdisciplinary specialized skills making intensive use of technical population genetic skills and spatial analysis tools (spatial statistics, GIS tools and remote sensing). Even when students receive disciplinary training in these areas, educational programs often lack the necessary linkage and synthesis among disciplines. This linkage can only be accomplished after experts from each discipline work together to develop guiding principles for this new research area.

The course will be concurrently offered at multiple universities across the globe, giving students the opportunity to learn from international experts and work with peers from outside institutions. For students who are not members of the participating institutions, we are offering a web-based online course to reach a broader audience. Each course meeting will start with a live web-cast lecture (no special software required) by an expert on the topic that introduces foundations and methods and highlights points for discussion in local seminar groups. After breaking out into local course group discussion (including a discussion group for online course students), a web-based discussion across campuses will wrap up the weekly topic. Students who are unable to make it to livecast of lectures can view taped lectures.

Students will be graded based on participation in local group discussions and assigned work. Participation in R-based computer labs and a term group project are optional, and they are not part of the assessment of this class. *Special note: this class is an elective. Other electives are available. Students take this class by their choice.

Lectures and group discussions:

Jan 15 – May 6, 2020. Wed 11:30 – 13:30 ET.

Science and Technology Campus: Colgan Hall Room TBD.

Instructors:

Haw Chuan (HC) Lim, Asst. Professor of Biostatistics and Bioinformatics

Office: Colgan Hall, Rm 409 Email: hlim22@gmu.edu Phone: (703) 993-2344

Office hours: see Blackboard or by appointment

Blackboard:

I will use the learning management system Blackboard in this class. Announcements, assignments, etc will be posted to this site. Log in at <http://mymason.gmu.edu>.

Text:

Landscape genetics: Concepts, methods, applications. 2015. Balkenhol, Cushman, Storfer, Waits, eds, Blackwell.

| Graded Work: | Percent |
|---------------------|----------------|
| Group Discussions | 40% |
| Weekly Assignments | 60% |

Class Schedule

Overview section

Jan 15 – Introductions and overview of landscape genetics (Spear)

Theoretical Background section

Jan 22 - Landscape ecology (Zeller)

Jan 29 – Population genetics (Waits)

Feb 5 – Metapopulation dynamics (Keyghobadi)

Feb 12 – Study design (Fortin)

Feb 19 - Adaptation and quantitative genetics (Charpantier)

Feb 29 – Basics of spatial data analysis (Wagner)

Students read one background paper (generally book chapter) and watch tutorials if needed

Advanced Topics Section

March 4 – Simulation modeling (Balkenhol/Landguth)

March 11 – Resistance surface modeling (Bowman)

March 18 – Assignment and clustering methods (Schoville)

March 25 – Adaptive landscape genetics (Manel)

April 1 – Model selection (Goldberg)

April 8 – Graph theory and network models (Murphy)

Students read one background paper and one empirical paper

Empirical Applications Section

April 15 – Plant Studies in landscape genetics (Rico)

April 22 – Aquatic systems – Seascape/Riverscape (TBA)

April 29 – Group project presentations

May 6 – Bringing it all together (Spear)

Grading and late work policy:

Unless you have received prior permission, you should not expect to be allowed to turn in assignments after the due date for full credit. Late work will not be accepted except in the case of a documented personal emergency or excused absence. It is your responsibility to provide written documentation from a third party of your emergency or university-excused absence. I do not consider work-related absences, work in other classes, oversleeping, or meetings with other professors a personal emergency. I do not add points at the end of a semester to “bump up” your letter grade.

Grading schema

Your final grade will be based on your percent out of 100. See below for grading scale. All inquiries about partial credits or potential grading mistakes need to be addressed soon after the graded work is returned, not toward the end of semester.

| | | | |
|----|--------|---|------------|
| A+ | 97-100 | B | 80-86 |
| A | 93-96 | C | 60-79 |
| A- | 90-92 | F | 59 or less |
| B+ | 87-89 | | |

Academic integrity

If you are caught cheating, you will be taken to the honor committee. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification.

Disability Accommodations

If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to the Office of Disability Services. If you qualify for accommodation, the ODS staff will give you a form detailing appropriate accommodations for your instructor. In addition to providing your professors with the appropriate form, please take the initiative to discuss accommodation with them at the beginning of the semester and as needed during the term. Because of the range of learning differences, faculty members need to learn from you the most effective ways to assist you. If you have contacted the Office of Disability Services and are waiting to hear from a counselor, please let your instructor know.

Diversity

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and

sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.