

GENERAL INFORMATION

PROFESSOR INFORMATION



Instructor: Kevin McElfresh
Phone: (305) 348-8403
Office: OE237 (MMC)
Office Hours: Immediately after class or by appointment
E-mail: Please use Blackboard course messages
Class Meeting MWF 8am GC 283A

COURSE DESCRIPTION AND PURPOSE

General Population Genetics is an advanced undergraduate course covering the core topics of population genetics. The understanding of genetic diversity and its application to the evolutionary development of a species and its effect on the current environmental status is the fundamental principle of population genetics. Specifically, population genetics examines the frequencies and distribution of alleles, genotypes and haplotypes in natural, artificial, and simulated populations in order to understand the forces that produce, maintain, and eliminate genetic variation across the globe and how it changes through time. Population genetics is a core discipline necessary for an ability to develop reasoned approaches to evolutionary biology, conservation biology, and in forensic science.

COURSE OBJECTIVES

After this course, students should be able to:

- Define and describe theoretical and historical foundations of population genetics;
- Identify, describe, distinguish, compare and analyze mechanisms and fundamental factors (mutation, genetic drift, selection, migration, and mating systems) and their interactions that create diversification within and between populations and affect the genetic structure of populations;
- Use empirical methods and tools to describe levels and patterns of genetic diversity and differentiation in populations and to infer and assess population genetic structure;
- Apply population genetic principles in DNA forensics, conservation genetics (including human impacts on genetics of natural populations), molecular ecology, genetic improvement programs, and evolutionary studies; and
- Critically engage in debates about the roles of genetics in human society.

In addition, this course has global learning objectives. Specifically:

Global Learning Outcomes:

- **Awareness:** Students will be able to articulate how broad, interrelated patterns of human global genetic variation affect how we use DNA variation for identification of individuals, for the prediction of susceptibility to disease, and for the breeding of crops and livestock.
- **Perspective:** Students will be able to compare and contrast how different DNA technologies can affect identification of individuals based on forensic evidence, and how well these technologies work in medicine and breeding.
- **Engagement:** Students will be able to reflect before and after the course about how it impacts their future practice in terms of their ability to practice biology (be in the medical, environmental, or other avenue, to give expert testimony and do research in population genetics. Students are also expected to be aware of some of the challenges new technologies can pose for cultural traditions and social institutions.

IMPORTANT INFORMATION

MAJOR & CURRICULUM OBJECTIVES TARGETED

Approaches and information from Population Genetics are increasingly used across biology, from medicine to agriculture to conservation. This course develops the tool set needed to read population genetic primary literature, and apply it to contemporary problems across biology.

TEACHING METHODOLOGY

This is a lecture course with some online material. Course communication will primarily be in class lectures. Blackboard will be used as necessary but *will not* be considered the primary communication method. Should you have any questions, please contact the professor.

POLICIES

Please review the [FIU's Policies](#) webpage. The policies webpage contains essential information regarding guidelines relevant to all courses at FIU, as well as additional information. In particular, please review the FIU honor code. There will be no tolerance for cheating on exams or plagiarism on written assignments.

TECHNICAL REQUIREMENTS & SKILLS

While this is not an on-line course, the materials associated with the class will be on-line. There is no text book for the course. Rather, the student will be expected to read the primary scientific literature, blogs, and other forum materials that will be found on line. This class will require reasonable skills with google and finding supplementary scientific information.

This course utilizes the following tools:

1. Library search
2. In depth information searching
3. Videos

Please visit our [Technical Requirements](#) webpage for additional information.

ACCESSIBILITY AND ACCOMMODATION

The Disability Resource Center collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The DRC provides FIU students with disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact the Center at 305-348-3532 or visit them at the Graham Center GC 190.

This course utilizes the following tools:

1. Weekly lectures and discussions
2. Web lectures and resources
3. Problem sets
4. Discussion topics
5. Literature review

Web Lectures: Web lectures will be posted as needed and will supplement the class lectures on specific topics. The purpose will be to introduce leaders or thought provoking opinions that contradict other opinions.

Preparatory assignments and Problem Sets: As this is a senior/graduate student level course, each student is expected to keep up with the lectures and outside lectures and reading as well as understand the problems. During the course assignments related to different topics will be given. A question set on the topic and/or a problem set will be assigned with a due date. Specifics will be given when the assignments are made.

Literature Review: Students will write a literature review on a topic related to population genetics and its application to a scientific issue or subject. This provides a large breadth of possible topics but the topic must have instructor approval. The expectation is that the literature review is modeled on review papers in the primary population genetics scientific literature. Literature reviews should have an abstract, introduction, several sections on particular topics, and a conclusion. The abstract should be on a separate page, while the main document (Introduction through conclusion, excluding abstract and citations) should be at least 10 pages in length (Times New Roman, 12 pt font, 1.5 spacing, and default word margins (1" top and bottom, 1.25" left and right). The review MUST properly cite *primary* scientific literature, with at least 50 peer reviewed journal articles being cited. Citations should be inline, following the guidelines for the

journal *Trends in Genetics*, as well as at the end of the paper. Citations at the end of the review do NOT count towards the page total. Citations of websites, Wikipedia, and other non-peer reviewed sources are highly DISCOURAGED: this is a science course.

Literature reviews will be submitted as both word documents (.txt and open office formats are also acceptable) and submitted to TURNITIN via the course blackboard site. This course will follow the FIU plagiarism policy. You are expected to write your own paper. You may cite the ideas of others, but must do so according to accepted community standards to provide proper attribution to the source of your ideas. I have many topics to suggest to students struggling to find topics for their review. Close consultation is strongly encouraged. The literature review will also be made available to the class as a wiki page.

Please visit our [ADA Compliance](#) webpage for information about accessibility involving the tools used in this course.

Please visit [Blackboard's Commitment Accessibility](#) webpage for more information.

For additional assistance please contact FIU's [Disability Resource Center](#).

COURSE PREREQUISITES

GENETICS PCB 3063

This course requires Genetics, PCB 3063. Review the [Course Catalog](#) webpage for prerequisites information.

Permission of the professor if prerequisites are not met.

PROCTORED EXAM POLICY

Exams will be in class and no electronic media or devices will be permitted unless otherwise specified.

TEXTBOOK

There is no specific textbook for this course. Material will come from the primary scientific literature and be available in the FIU library. Other on line materials and lecture supplements will be used.

EXPECTATIONS OF THIS COURSE

Students are expected to attend class lectures, read the assigned materials and participate in class discussions.

Students are expected to:

- **Attend Class**
- **Review** and follow the course calendar
- Read the literature
- Submit assignments by the corresponding deadline

The instructor will:

- Be available for office hours at least 3 to 5 hours per week. Office hours will generally be immediately after class.
- Grade assignments within **10** days of the assignment deadline

COURSE DETAIL

COURSE COMMUNICATION

Communication in this course will primarily take place in class and occasionally via **EMAIL or Blackboard**.

The Email feature is an external communication tool that allows users to send emails to users enrolled within the course. Emails are sent to the students' FIU email on record. The Email tool is located on the Course Menu, on the left side of the course webpage.

Visit our [Writing Resources webpage](#) for more information on professional writing and technical communication skills.

ASSIGNMENTS

Literature Review Assignment Expectations:

- The central assignment of the course is a 10 page literature review.
- Literature reviews are an individual project
- The assignment is broken into a topic proposal, an outline/preliminary literature list, a rough draft, peer comments, and final draft
- The schedule for the literature review segments and its final due date will be given during the first week of class.
- The proposal should follow guidelines posted from the Trends in Genetics journal website for topic proposals (details on the content folder page)
- Professor feedback on topics will come within one week of being given to the professor.

EXAMS

There will be two (2) mid-term exams and 1 final exam. These exams will be given in class, they will be essay and problem solving exams. Electronic devices of any kind will not be allowed except as discussed in class as necessary. Electronic devices means computers, phones, or any device that will allow connection to the internet or communication with others. The final exam is cumulative and will cover the content from the entire course. Students with greater than 372 points prior to the final exam will be exempt from the final exam. Again, there will be no tolerance for cheating on exams or plagiarism on written assignments.

GRADING

Course Requirements	Number of Items	Points for Each	Total Points Available	Weight
Problem Sets	2	50	100	25%
Research/Review Paper	1	100	100	25%
Exams	2	50	100	25%
Final Exam	1	100	100	25%
Total	7	N/A	400	100%

Letter	Range (%)	Letter	Range (%)	Letter	Range (%)
A	Above 93	B-	81 - 83	D+	67 – 70
A-	91 - 92	C+	77 - 80	D	64 – 66
B+	87 - 90	C	74 - 76	D-	61 – 63
B	84 - 86	C-	71 - 73	F	< 61

SPRING SEMESTER 2017

COURSE CALENDAR

WEEKLY SCHEDULE AND TENTATIVE COURSE CONTENT

Date	Topic	
Week 1: Jan. 9-13	<i>Statistics and Mendelian and Molecular Genetics Review;</i>	
Week 2: Jan. 18-20	<i>Statistics and Mendelian and Molecular Genetics Review;</i> Literature Review Topic due (20th)	
Week 3: Jan. 23-27	Hardy-Weinberg Equilibrium	
Week 4: Jan. 30 - Feb. 3	<i>Selection;</i>	
Week 5: Feb. 6	<i>Review and Discussion for Exam</i>	
Week 5: Feb. 8		Exam I
Week 5: Feb. 10	<i>Genetic Drift</i>	
Week 6: Feb. 13-17	<i>Genetic Drift and Mutation;</i>	Problem Set 1
Week 7: Feb. 20-24	<i>Neutral Theory;</i>	Problem Set 1 Due (24th)
Week 8: Feb. 27 - Mar. 3	<i>Population Subdivision;</i>	
Week 9: Mar. 6-10	<i>Inbreeding;</i>	
Week 10: Mar. 13-17		
Week 11: Mar. 20-24	<i>Linkage Disequilibrium</i>	
Week 12: Mar. 27	<i>Quantitative Genetics;</i>	Problem Set 2
Week 12: Mar. 29	<i>Quantitative Genetics;</i>	Literature Review Due
Week 13: Apr. 3-7	<i>Human Population Genetics I;</i>	Problem Set 2 Due (7th)
Week 14: Apr. 10	<i>Review and Discussion for Exam 2</i>	
Week 14: April 12		Exam 2
Week 14: April 14	<i>Current Topics in Population Genetics</i>	
Week 15: Apr. 18-22	<i>Current Topics in Population Genetics</i>	
Week 16: Apr. 24-28 TBD		FINAL EXAM