



## Population Genetics

The University of Toledo  
Department of Environmental Sciences, College of Natural Sciences & Mathematics  
4980-21/ 6980-21/ 8980-21

---

<b>Instructor:</b> Dr. Carol Stepien (with assistance from her postdoctoral researchers Dr. Katy Klymus & Dr. Cecilia Hennessey)	<b>Term:</b> Fall 2015
<b>Email:</b> carol.stepien@utoledo.edu	<b>Class Location:</b> Lake Erie Center
<b>Office Hours:</b> Tuesdays 1-3:00	<b>Class Day/Time:</b> Mondays 11:45-1:35
<b>Office Location:</b> Lake Erie Center	<b>Lab Location:</b> N/A
<b>Office Phone:</b> 419 530 8362	<b>Lab Day/Time:</b> N/A
	<b>Credit Hours:</b> 2

---

### COURSE/CATALOG DESCRIPTION

#### EEES4980/ 6980/ 8980 Advanced Topics In Ecology

Course covering some aspect of ecology not covered in the formal undergraduate or graduate curriculum. Students may repeat the course for different topics. This course is on Population Genetics.

### COURSE OVERVIEW

This course explores the theory and practice of population genetics, to understand how populations change in genetic composition and diversity over time and space. Students will learn how to critically analyze scientific papers, and engage in stimulating discussions with their peers and professors. Each student will give original presentations to the class that summarize subjects in the textbook, critique an original research study, and encourage group participation. The student thus will lead the class on that day. Depending on enrollment, it is projected that Ph.D. students will give 3 original presentations, M.S. students two, and undergraduate students once (with help from the instructor).

### STUDENT LEARNING OUTCOMES

Achieve fundamental understanding of Population Genetics. Analyze and critique key recent scientific literature. Develop individual presentation skills and the ability to answer questions and engage in scientific discussion.

### TEACHING STRATEGIES

Students will learn to present their own lectures on key concepts of population genetics, select a recent key scientific paper for group discussion on a topic for one of the discussions they lead, and learn to develop discussion and critical analysis skills. The professor (Dr. Carol Stepien) will be assisted by her postdoctoral researchers to aid in providing a variety of perspectives (Dr. Katy Klymus and Dr. Cecilia Hennessey).

### PREREQUISITES AND COREQUISITES

Any Evolution course or approval of instructor

### REQUIRED TEXTS AND ANCILLARY MATERIALS

Genetics of Populations by Philip W. Hedrick, 2011. 4<sup>th</sup> Edition. Jones and Bartlett Publishers, LLC.  
IBSN-13: 978-0-7637-5736-3

### TECHNOLOGY REQUIREMENTS

None



## UNIVERSITY POLICIES

*The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.*)

## ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.)

## ACADEMIC POLICIES

Students need to mark sources of materials used in their powerpoints on their slides. Students are allowed one missed class, with prior notice, without penalty. Absences also will be excused if students are presenting their research at a conference approved by their advisor and the course instructor. All students must be prepared for class, and have read the chapter and paper thoroughly before coming to class.

## COURSE EXPECTATIONS

The class will begin promptly. Points will be deducted for late-comers. No late assignments will be accepted. Students must email their evaluations of the presentations by other students to the professor by the next day by 5 pm. Students must present on their scheduled date and turn in all assignments on time and attend class, unless there is a very unfortunate and serious issue (hospitalization, death in immediate family, car accident, etc., with prompt notice of the professor). Ph.D. graduate students are expected to give lead presentations 3 times in the course (depending on enrollment, one may be doubled up with another student), M.S. students 2 times, and undergraduates once. No cell phones or gum-chewing (you can't be speaking clearly while chewing gum).

## GRADING

30%	Attendance & Participation & Weekly Contributions
50%	Presentations & Discussion Leading
20%	Class Feedback (evaluation forms of others, including their completeness, in on time)

## FINAL GRADING:

A 93-100%	B+ 88-89%	C+ 78-79%
A- 90-92%	B 83-87%	C 73-77%
	B- 80-82%	C- 70-72%

If you are going to miss a class or miss a class, please contact Dr. Stepien immediately by e-mail (carol.stepien@utoledo.edu). To get the full points, you are expected to attend all classes and to be on time and well-prepared (have thoroughly read the book chapter and papers, taken notes or underlined, etc.), pay attention, and actively participate.

## PRESENTATION AND DISCUSSION LEADING:

- Give a well-organized discussion-oriented presentation, with at least 50% input from the group, and be thoroughly conversant and knowledgeable about your subject.
- Present the highlights from the chapter and paper, including primary figures and tables.
- Lead discussion on chapter.
- Look up background material and key terms, papers, etc.
- Bring up interesting and controversial points.



- Encourage class participation and keep the class on track.
- Be involved in your subject.
- Involve and review a recent, “hot” and short 2013-15 paper, article, or review article from a high-caliber scientific journal, such as *Molecular Ecology*, *Conservation Genetics*, *BMC Evolutionary Biology*, *Evolution*, *Ecology*, *Science*, *Nature*, *TREE*, *Molecular Phylogenetics and Evolution*, *Genetics*, *PNAS*, etc. that has *high relevance and interest to all or part of the chapter, as a good example, test of a hypothesis, alternative or collaborative view, augmentation, etc.* Paper should be relatively short, 15 pages or less in length. **Must be 2013-15.**
- You must provide/email copies of your selected paper the week before to all.
- Do not read directly from your notes!
- Relate the paper to the chapter; discuss its relative strengths and any weaknesses.
- Discuss what further work could be done.
- You are welcome to meet with Dr. Stepien for 30 min to 1 hour the week before your presentation in order to go over the material.
- See grading sheet for organization and grading

#### **EVALUATIONS OF PRESENTERS:**

- Due 5 pm day after each class.
- Must be submitted electronically to Dr. Stepien. Label subject with your name, the presenter’s name, and the date of the talk. Ex: Matt on Nate’s talk Feb. 14
- You will receive points for each, and will be graded on the quality, objectiveness, and completeness of your comments.
- Will be given anonymously to the presenters.

#### **TREATS:**

Treats for the class are welcome on the day you present.

#### **COMMUNICATION GUIDELINES:**

The professor will do her best to communicate via email. All students are expected to conduct themselves professionally and to be courteous to others. No cell phones or web browsing or text messaging, or gum chewing, etc. are permitted in class.

#### **STUDENT SUPPORT SERVICES:**

*Relevant UT support services:*

University Libraries: <http://www.utoledo.edu/library/>

Learning Enhancement Center: <http://www.utoledo.edu/success/lec/>

Writing Center: <http://www.utoledo.edu/success/writingcenter/index.html>

Success Coaches: <http://www.utoledo.edu/successcoach/index.html>

Counseling Center: <http://www.utoledo.edu/studentaffairs/counseling/>



**COURSE SCHEDULE (student leaders will chose from 11 open slots )**

Wed. Aug. 26	Ch. 1 Diversity of Genetic Variation (Dr. Stepien)
Mon. Aug. 31	Ch. 2 Measures of Genetic Variation (Dr. Klymus)
Mon. Sept. 7	Labor Day, no class
Mon. Sept. 14	Ch. 3 Selection (I and II) (Dr. Hennessy)
Mon. Sept. 21	Ch. 3 Selection (III and IV)
Mon. Sept. 28	Ch. 4 Genetic Drift and Effective Population Size (I and II)
Mon. Oct. 5	No Class
Mon. Oct. 12	Ch. 4 Genetic Drift and Effective Population Size (III and IV)
Mon. Oct. 19	Ch. 5 Mutation
Mon. Oct. 26	Ch. 6 Neutral Theory and Coalescence (I and II)
Mon. Nov. 2	Ch. 6 Neutral Theory and Coalescence – Phylogenetics (III and IV) (Dr. Stepien)
Mon. Nov. 9	Ch. 7 Gene Flow and Population Structure (I and II)
Mon. Nov.16	Ch. 7 Gene Flow and Population Structure (III and IV)
Mon. Nov. 23	Ch. 8 Inbreeding and Related Topics (I)
Mon. Nov. 30	Ch. 8 Inbreeding and Related Topics (II, III and IV)
Mon. Dec. 7	Ch. 9 Linkage Disequilibrium and Recombination (I, II and III)
Mon. Dec. 14	Ch. 9 Linkage Disequilibrium and Recombination (IV, V and VI)



**PRESENTATIONS/Discussion Leading form**

**Presenter's NAME:** \_\_\_\_\_

**Chapter:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**Scale:** 98-100%= A+, 93-97%= A, 90-92%=A-, 88-89%=B+, 83-87%=B, 80-82%=B-, 78-79%=C+, 73-77%=C, 70-72%=C-

**A. (Once) Key Paper Choice** \_\_\_\_\_/100% **(just once per student; for one of the presentations)**  
*Select and Distribute (week before in class) copies of a recent short 2013-15 relevant key paper from top journal that is written at the graduate/advanced undergraduate level the week before for everyone to read as highly pertinent to the chapter or a part of it. Should be 3-12 pages.*

**Comments:** \_\_\_\_\_

**II. Presentation and Discussion leading (all student presentations)**

**B.** \_\_\_\_\_/100% *Give coherent, well-practiced, knowledgeable, and interesting overview of key points in the chapter (and paper), including figures and tables. Do not read directly from your notes. Involve class input. 30 min*

**Comments:** \_\_\_\_\_

**C.** \_\_\_\_\_/100% *Lead a focused discussion on key points of your selected chapter (and paper). Keep discussion moving, oriented, and on-track and keep participation high. Discussion should include all people as much as possible and not be dominated by 1 or 2 individuals. Discussion should be at least 50% of the class time. 30 min*

**Comments:** \_\_\_\_\_

**D.** \_\_\_\_\_/ 100% *Outside Research, relevance, and summary. Look up and present background material, example, and key terms, papers. Relate these to your chapter, paper, and to the background material presented in our class to date. Bring up interesting and controversial points. Discuss what further research work could be done. Present and defend your opinion for important points. Give a coherent and well-presented 5 minute summary of the main points and class discussion at the end.*

**Comments:** \_\_\_\_\_

**Mean % =** \_\_\_\_\_ **(mean of above, A, B, C, & D)**

-----

**Evaluator's Name:** \_\_\_\_\_ **(will be cut off)** \_\_\_\_\_/10 pts