

Evolution

BIO 480 - Fall 2009 (3 credit hours)

Location: Kettering 131

Time: 10-10:50 MWF

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| Instructors: | Soren Brauner Kettering 322 | E-mail: sbrauner@ashland.edu Phone #: (419) 289-5275 |
| | Dr. Mason Posner Kettering 320 | E-mail: mposner@ashland.edu Text: (330) 421-9552 Phone #: (419) 289-5691 |
| | Dr. Andrew Greene Kettering | E-mail: agreene3@ashland.edu Phone #: (419)-289-5259 |

Office Hours: TBA by each instructor

Pre/Corequisites: Bio 303

Course Description: Evolution is considered to be the central unifying theory of biology. This course will address several questions: What is the classical and modern evidence for evolution, what are the mechanisms for evolutionary change, and how do evolutionary biologists pose questions and study evolutionary processes? Topics will include biogeography, comparative anatomy and physiology, evolutionary development, comparative genomics, pathogen evolution, the origins of multicellularity, and the use of cladistics to make phylogenetic inferences.

Course Objectives:

- To convey a basic understanding of the process of evolution and the history of evolutionary biology
- To allow for more detailed discussion of select topics in evolutionary biology
- To develop critical thinking skills through the reading, analysis and discussion of the scientific literature
- To develop both written and oral presentation skills through the analysis and presentation of primary literature

Approach: Two lectures and one two-hour lab per week.

Grading: Your grade will depend on the following work:

Three 1-hour exams. Each exam will cover the material from one of the three faculty members participating in the course. Format for each exam may vary between instructors, but will rely primarily on written responses.

Thought questions. Each of three course segments will include several articles to be read and discussed in class. You will be required to write responses to thought questions related to these readings, and bring these responses to class.

Presentation. Each of you will present a paper to the class for discussion. This will involve becoming the “class expert” on that paper and preparing a powerpoint presentation that helps lead the class in the discussion of that paper. You will receive more details about this project soon after class begins. These presentations will be done in groups of 2 or 3 students.

Discretionary points. Each of the course’s three instructors will have discretionary points that can be allotted for quizzes, group projects, additional thought questions or other course activities. Each instructor will provide details of how these points will be distributed.

Point summary:

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| 3 exams @ 100 points/each | 300 |
| Thought Questions (9 @ 10 pts/each) | 90 |
| Presentation | 75 |
| <u>Discretionary points</u> | <u>90</u> |
| Total | 555 |

Your final grade will be based on the percentage of the total possible points you obtain in class as follows:

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| 90% - 100% | = | A- or better |
| 80% - 89% | = | B- or better |
| 70% - 79% | = | C- or better |
| 60% - 69% | = | D- or better |
| 0% - 59% | = | F or better |

Resources: Jerry A. Coyne. 2009. Why Evolution is True. Viking Press.
Angel: <http://www.ashland.edu/distancelearning/home.htm>

Attendance: Attendance is not mandatory, but is critical to your success in this course. Most of the questions on exams will be based on material presented and discussed in class, so it is critical that you attend class regularly. Also, if you miss class on a day in which a written assignment is due, you will receive a zero on that assignment (unless you have a verifiable, excused absence). Exams are an important part of your course grade, and it is your responsibility to be in attendance on the scheduled exam days. If you are ill, or have another valid excuse, you must notify us prior to the scheduled exam to make alternate arrangements. Otherwise, you will receive a zero for that exam. Make-up exams are given for verifiable excused absences only.

Excused Absences: An absence will only be excused if: 1. You have a letter from university health services or a private physician stating that you were unable to attend class for health reasons. 2. You will be travelling for a university sponsored event. This must be brought to my attention before the absence so that alternate arrangements can be made.

Academic Integrity Policy: Any student cheating on or plagiarizing an assignment will receive an “F” on that assignment, will be reported to the registrars office, and may be expelled from the University. Your student handbook defines plagiarism as follows:

“Plagiarism is the intentional or unintentional presentation of someone else's words, ideas or data as one's own work. In the event the faculty member deems the plagiarism is unintentional he/she shall typically require the student to rewrite the assignment. In the event the faculty member believes the plagiarism is willful, the sanctions in this document will apply. If the work of another is used, acknowledgment of the original source must be made through a recognized reference practice, and, if verbatim statements are included, through quotation marks as well. To assure proper crediting, a student will acknowledge the work of others:

1. Whenever one quotes another person's actual words.
2. Whenever one uses another person's idea, opinion or theory, even if it is completely paraphrased in one's own words.
3. Whenever one borrows facts, statistics, or other illustrative materials-unless the information is of such common knowledge so as not to be questioned.”

NO DOUBLE DIPPING: Assignments done for this course cannot be used in other courses. Likewise, you cannot use assignments from other courses to fulfill requirements of this course.

NO CELL PHONE USE IN CLASS OR LAB. This includes texting. If there is an emergency, please place or answer your call/text in the hallway.

TENTATIVE LECTURE SCHEDULE

| Day | Topic |
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| Aug 24 | Course overview |
| Aug 26 | Darwin and early influences |
| Aug 28 | Natural selection and Hardy-Weinberg |
| Aug 31 | Fossil evidence |
| Sep 2 | Biogeography- plate tectonics, and evolution |
| Sep 4 | Biogeography- continental and oceanic islands |
| Sep 7 | **Labor Day-No Class** |
| Sep 9 | Chromosome repatterning and evolution |
| Sep 11 | Student presentation- Global change and squirrel phylogeny |
| Sep 14 | Polyploidy and plant evolution |
| Sep 16 | Gene duplications and gene families |
| Sep 18 | Student presentation- Polyploidy and angiosperm diversification |
| Sep 21 | Comparative genomics |
| Sep 23 | Speciation |
| Sep 25 | **Exam 1** |
| Sep 28 | A history of trees |
| Sep 30 | What is a phylogeny and how do you make one? |
| Oct 2 | Using Mega for evolutionary analysis of DNA and protein sequences |
| Oct 5 | An introduction to biochemical adaptation and physiological evolution |
| Oct 7 | More readings in Adaptation – and an example |
| Oct 9 | Student presentation – Evolution of toxin resistance |
| Oct 12 | Changing views on the importance of the embryo in evolution |
| Oct 14 | Evolutionary Development (Evo-Devo) |
| Oct 16 | Evolutionary Development (Evo-Devo) |
| Oct 19 | Evolutionary Development (Evo-Devo) |
| Oct 21 | Student presentation – Evo-Devo |
| Oct 23 | Guest speaker – Dr. Dean Fraga, College of Wooster |
| Oct 26 | “I’m no cis-sy” – The Coyne/Carroll debate |
| Oct 28 | **Exam 2** |
| Oct 30 | Horizontal Gene Transfer |
| Nov 2 | Horizontal Gene Transfer |
| Nov 4 | Pathogenesis—Evolution of <i>Yersinia pestis</i> |
| Nov 6 | Pathogenesis—Evolution of <i>Yersinia pestis</i> |
| Nov 9 | Antibiotic Resistance: The Rise of VRSA |
| Nov 11 | Viral Evolution: SARS |
| Nov 13 | Viral Evolution: Influenza |

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| Nov 16 | Endosymbiosis |
| Nov 18 | Endosymbiosis |
| Nov 20 | Mutualism |
| Nov 23 | Mutualism |
| Nov 25 | **Thanksgiving break – no class** |
| Nov 27 | **Thanksgiving break – no class** |
| Nov 30 | Epigenetic Inheritance |
| Dec 2 | Epigenetic Inheritance |
| Dec 4 | **Exam 3** |

Final Exam Week meeting time: Wednesday, December 9th, 10:30 am-12:30 pm