

Epigenetics and Evolution. 1 credit. Tuesdays 2:30 to 3:50 on Tuesdays.

GOAL: The purpose of this seminar is to review the state of an emerging field of biology, Evolutionary Epigenetics. Evolutionary Epigenetics should be viewed as an extension of modern evolutionary biology as conceived within the framework of Darwin and Mendel. This framework is often referred to as The Modern Synthesis.

In this survey, we seek answers to the following questions:

To what degree do epigenetic mechanisms contribute to natural variation?

What relevance does epigenetic inheritance have to evolution?

Do epigenetic mechanisms force a fundamental revision of evolutionary biology?

This is a seminar course, meaning the primary focus is to discuss primary scientific literature. If this is your first introduction to reading the scientific literature, it might seem confusing at first. Don't worry about this. The purpose of taking a seminar is to be introduced to science as it is done at the cutting edge. As a result, it is very different than a standard lecture/textbook based course. When reading papers, remember: Google and Wikipedia are your friends.

FORMAT: The first half of the course will be led by me. I will start by providing a foundation. The last half will be discussions presented by groups of two. Led discussions will be assigned a couple weeks into the semester.

REQUIREMENTS/GRADES: Class discussions are central to this course. Thus, if you attend and participate you will do well. The only requirement for material to be handed in is that you will need to submit one question about the reading at the beginning of each class. These submitted questions may guide discussion if such guidance is needed.

READINGS: Readings are provided on Blackboard. This list is subject to change but all changes will be done well in advance. If you would like to do an alternate reading, clear it with me first.

SCHEDULE:

- 1/19 Lecture . Dr. Blumenstiel**
- 1/26 Review Discussion. Dr. Blumenstiel**
Soft Inheritance: Challenging the Modern Synthesis.
- 2/2 Review Discussion. Dr. Blumenstiel**
Weismann Rules! OK? Epigenetics and the Lamarkian Temptation.
- 2/9 Primary Paper. Dr. Blumenstiel**
An epigenetic mutation for natural variation in floral symmetry.

- 2/16 Primary Paper. Dr. Blumenstiel
Germline epimutation of MLH1 in individuals with multiple cancers.
- 2/23 Primary Paper. Dr. Blumenstiel
Epigenetic programming by maternal behavior.
- 3/2 Primary Paper. Dr. Blumenstiel
Epigenetic Inheritance and the Missing Heritability Problem.
- 3/9 Primary Paper. Group 1.
Epigenetic transgenerational actions of endocrine disruptors and male fertility.
- 3/23 Primary Paper. Group 2.
Persistent Epigenetic differences associated with prenatal exposure to famine in humans.
- 3/30 No Class.
- 4/6 Primary Paper. Group 3.
Epigenetic natural variation in *Arabidopsis thaliana* .
- 4/13 Primary Paper. Group 4.
Assessing the impact of transgenerational epigenetic variation on complex traits.
- 4/20 Primary Paper. Group 5.
Adaptive epigenetic memory of ancestral temperature regime in *Arabidopsis thaliana*.
- 4/27 Primary Paper. Group 6.
Within and among generation phenotypic plasticity in trichome density in *Mimulus guttatus*.
- 5/4 Primary Paper. Group 7.
Energy use efficiency is characterized by an epigenetic component that can be directed through artificial selection to increase yield.