PHIL*2000 Philosophy of Biology

Winter 2019
Section(s): C01

Department of Philosophy
Credit Weight: 0.50
Version 1.00 - January 07, 2019

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1 Course Details

1.1 Calendar Description

This course focuses on philosophical issues that arise within biology, such as the explanation of altruism, the question of whether species are real, and the challenge of how to identify adaptations. The course also examines philosophical issues that arise at the interface between biology and society, such as the implications of evolutionary theory for traditional views about human nature, or the proper role for scientists in advocating for environmental policies.

Pre-Requisite(s):	2.00 credits including 0.50 credits in BIOL
Restriction(s):	This is a Priority Access Course. Some restrictions may apply during some time periods.

1.2 Course Description

Over the span of an undergraduate degree a typical biology student encounters various philosophical questions which are only touched upon (if discussed at all) in their lectures and textbooks. Students often get the impression that these issues are uncontroversial or settled, only to encounter them later as pivotal questions in their professional lives or in graduate school. This course on the philosophy of biology provides students with an opportunity to stop and explore some of those issues in more detail. At the same time, this exercise of questioning and examining controversial ideas will sharpen student's skills in reasoning and communication. Many of the questions we will explore do not have clear cut answers. This is because they are still not resolved even at the highest levels of biological theorizing. However, in philosophy you can expect to attain a deeper understanding of an issue --comprehending how and why it arises -- even if this sometimes generates new questions.

The first topic is whether evolution and natural selection should be understood as a process that occurs exclusively at the level of the gene, as opposed to higher-levels such as whole organisms, groups, or species. The "selfish gene" perspective became popular in the 1980s because it appeared to resolve the nagging puzzle of altruism: how could selection favour any behaviour that tends to increase the fitness of another organism? Over the years, a number of

problems with selfish gene theory have emerged and it is now challenged by multi-level selectionist. We will review the arguments originally presented in favour of selfish gene theory by its most famous advocate (Richard Dawkins) and consider how others have responded. We will also consider some general philosophical issues that arise along the way, such as the implications of selfish gene theory for our understanding of humans as independent decision makers.

The second topic concerns the tendency to adopt an adaptationist perspective towards organisms. This perspective tends to assume by default that any given trait is functional, in the sense of making some contribution to the organism's fitness. However, many researches see adaptationism as a deeply flawed perspective which leads people to overlook historical or developmental constraints on biological form. We will consider arguments on both sides of this debate.

A third topic concerns the appropriate role(s) for values in science. We will focus in particular on the discipline of conservation biology, which emerged in the 1980s as an explicitly value-driven branch of science. Proponents argue that values either ought to be a part of how we do science, or, they sometimes cliam that value-driven science is inevitable. Critics object that an adherence to specific moral or political values threatens to undermine the credibility of science. Students are encouraged to develop and defend their own position on this debate.

1.3 Timetable

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Dr. Stefan Linquist (PhD)
Email:	linquist@uoguelph.ca
Telephone:	+1-519-824-4120 x56672
Office:	MCKN 358
Office Hours:	Tuesday: 5:00-6:00 or by appointment

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3 Learning Resources

3.1 Readings

All of the readings for this course are available in a printed coursepack that is available through the bookstore. However, students also have access to electronic versions of the same readings on the course website. It is therefore possible to independently print out the readings on your own. Students are encouraged to obtain print copies of the readings and not to rely entirely on digital copies, unless necessity dictates.

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4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Logically reconstruct and analyze the underlying argument(s) in any piece of communication (written or verbal) that is designed to convince an audience of some claim. This includes identifying the logical structure of an argument, as well as revealing hidden assumptions, and raising cogent objections to specific premises.
2. Write a clear, critical essay that evaluates abstract theoretical concepts.
3. Understand the motivations and arguments that gave rise to selfish gene theory, as well as the core commitments of that theory, and the main criticisms that have been levelled against it.
4. Identify a variety of different forms of adaptationist reasoning and understand the advantages and drawbacks of each.
5. Develop and defend an informed position about the appropriate role(s) for values in science.

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5 Teaching and Learning Activities

5.1 Lecture

Week 1

Topic(s): **Basic concepts in evolutiomnary theory.**

This week, we begin to develop a shared vocabulary that will carry us through the course. Students will attempt to define such key terms as "evolution," "adaptive," "adaptation," and "gene." We will also discuss some of the ideas in this week's reading (below).

Reference(s): Gregory, R. (2009), "Understanding natural selection: Essential concepts and common misconceptions."

Week 2

Topic(s): **Darwin on instinct**

Charles Darwin saw the existence of sterile insects as a major challenge to his principle of evolution by natural selection. This week, we first consider how Darwin attempted to solve that problem. We then explore his debate with Alfred Russel Wallace over human instincts, especially the "moral instinct," and whether they too are shaped by natural selection.

Reference(s): Darwin, C. (1859), "Instinct", excerpt from The Origin of Species.

Goss, C. (2010), "Alfred Russel Wallace and the evolution of the human mind."

Week 3

Topic(s): **Naive group selection theory**

From roughly 1930-1960, evolutionary biologists often interpreted animal behaviour and other traits as being good for the group or even good for the entire species. This week, we look at Wynne-Edwards's arguments for this view.

Reference(s): V.C. Wynne-Edwards, (1965), "Self regulating systems in populations of animals."

Week 4

Topic(s): **Selfish Gene theory (Part 1)**

The 1960s saw a paradigm shift in evolutionary biology. Organisms and their traits were no longer

seen as the focal unit of selection. Instead, the gene became the new unit on which selection is thought to exclusively act. This led to an extremely reductionist view of evolution that regected the possibility of "altruistic" adaptations that benefit other members of the group at the cost of the individual organism. This week, we will explore the basic arguments in defense of selfish gene theory.

Reference(s):

Dawkins, R. (1978), "Replicator selection and the extended phenotype."

Wade, M.J. (1978), "Review of The Selfish Gene."

P.J. Greene (1978), "From genes to memes?"

Week 5

Topic(s):

Selfish Gene theory (Part 2)

This week, we continue our investigation of selfish gene theory focusing on Dawkins' definition of the gene and his "oarsmen" argument against group selection.

Week 6

Topic(s):

Multilevel Selection theory

Critics of selfish gene theory argue that it failed to present convincing arguments against the possibility that selection can act at the level of the group, in addition to the level of the gene. This week, we will consider arguments in defense of multilevel selection theory as an alternative to selfish gene theory.

Reference(s):

Wilson, D.S. (1983), "The group selection controversy: History and current status."

Week 7

Topic(s): Reading week - no lectures

Week 8

Topic(s): **Adaptationism and the Panglossian Paradigm**

A popular way of thinking about organisms is to interpret each and every trait as having some kind of function that was favoured by natural selection. Many evolutionary biologists criticize this approach as misguided, because this framework tends to ignore historical and developmental constraints, and because adaptationist hypotheses are "too easy to generate and too difficult to test." This week, we investigate arguments against the "Panglossian" approach.

Reference(s): Gould, S.J. & Lewontin, R.C. (1979), "The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme."

Week 9

Topic(s): **Varieties of adaptationism**

The famous critique by Gould and Lewontin (1979) has inspired a more nuanced understanding of how to apply selectionist thinking in biology. This week, we explore three different types of adaptationism, and consider whether they are all equally subject to the objections raised by Gould and Lewontin.

Reference(s): Godfrey-Smith, P. (2001), "Three kinds of adaptationism."

Lloyd, E.A. (2015), "Adaptationism and the logic of research questions: How to think clearly about evolutionary causes."

Week 10

Topic(s):

Junk DNA and debate over how much of the human genome is functional

The majority of DNA in eukarytoic genomes consists of transposable elements (TEs). Some argue that TEs are selfish parasites, whose only function is to replicate themselves. Others argue that they probabloy play some subtle role in regulating gene expression or in making organisms more "evolvable." This debate raises issues in multi-level selection theory as well as adaptationism, and is thus a good case study for applying the concepts developed so far in this course.

Reference(s):

W.F. Doolittle & C. Sapienza (1980), “Selfish genes, the phenotype paradigm, and genome evolution. *Nature* 284: 601-3.

L.E. Orgel & F.H. Crick (1980), “Selfish DNA: the ultimate parasite. *Nature* 284: 604-7.

Graur et al. (2013) “On the immortality of television sets: “Function” in the human genome according to the evolution-free gospel of ENCODE. Genome Biology and Evolution 5: 578-590.

Week 11

Topic(s):

Conservation biology as a "crisis" discipline

The field of conservation biology emerged in the mid 1980s as a value-driven discipline, that explicitly adopted certain ethical and political values as a part of its ideology. This week, we consider both the moral and the scientific agenda of conservation biology.

Reference(s):

Soule, M. (1985), "What is conservation biology?"

Week 12

Topic(s):

"Stealth policy advocacy" and the critique of value-laden science

How can a scientific discipline manage to retain credibility and public trust if it endorses a specific moral or political agenda? Some critics of conservation biology argue that this is impossible. They further object that conservation biologists rely on morally-loaded concepts (e.g. "invasive" species or "healthy" ecosystems) that are thinly disguised as legitimate scientific terms. This week we consider objections to conservation biology as a value-laden science.

Reference(s): Lackey, R.Y. (2016), "Keep science and scientists credible: avoid stealth policy advocacy."

Week 13

Topic(s): **Rethinking the motives for conservation**

Recent evidence suggests that human impact and development actually increases regional biodiversity. This challenges the traditional idea of biodiversity as flourishing only in pristine nature, and of humans as an inherent threat to biodiversity. This week, we consider whether this evidence forces us to reconsider our traditional approach to conservation.

Reference(s): Vellend, M. (2017), "The biodiversity conservation paradox."

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6 Assessments

6.1 Assessment Details

Participation (10%)

Date: Seminar

This is a seminar-based course. Students are expected to attend class and participate in discussions. Please bring your coursepack or other reading materials to class, we will regularly be consulting those texts as a part of our discussion.

First essay on selfish gene theory (15%)

Due: Sun, Feb 10, 11:59 PM, To be submitted electronically via courselink

Second essay on adaptationism (20%)

Due: Sun, Mar 17, 11:59 PM, To be submitted electronically via courselink

Final essay on conservation biology (30%)
Due: Week 14, to be submitted electronically via courselink

Argument comprehension and analysis quizzes (25%)
Date: In class
Roughly every second week, students will do a short quiz in class requiring them to apply their skills in argument comprehension and analysis.

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7 University Statements

7.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for course registration are available in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

7.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website
https://www.uoguelph.ca/sas

7.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless

further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
