

# Philosophy of biology

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Introduction to the philosophy of biology  
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Tuesdays and Thursdays, 1:30–4 PM

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## Course description

This undergraduate course introduces philosophy of biology to a non-philosophical audience (biology majors). We explore classic topics in the philosophy of biology (e.g., the species problem, biological altruism), and look in more detail at more recent discussions in philosophy of race and philosophy of gender.

## Target audience

This course is for second year biology undergraduates, who have no former background in philosophy.

## Course goals, format and preparation

The aim of this course is to help students reflect critically on scientific practice and the place of science in a broader context. At the end of this course, students will have learned how to read and interpret a philosophical text, specifically how to identify the view the philosopher is defending, and the arguments s/he provides in defense of this position. Students are also able to apply the philosophical concepts they learned in their other work, becoming aware of philosophical assumptions in biological theory.

## Grading

- 40% of total score for a paper, about 2000 words (references included) on one of the topics of the course (see below for description)
- 35% of total score for in-class written and verbal exercises
- 25% of total score for summaries of papers (250–500 words) to be read in advance of each class

## Overview of the course

### Topic 1 Science and philosophy of science

Introduces students to science, including a brief overview of the history of science, and the philosophy of science. We will examine what distinguishes the scientific method from other ways of knowing, and look at the roots of science in natural philosophy and practical skills.

**In-class exercise:** In order to get a sense of how the philosophical study of science works, we will read Edouard Machery's *A plea for human nature*, using Concepción's method. Students will identify the thesis statement, subject matter, and distinguish the views of the author from those he is interacting with.

Readings:

- Concepción, D.W. (2004). Reading philosophy with background knowledge and metacognition. *Teaching Philosophy*, 27, 351–368.
- (in class reading exercise) Machery, E. (2008). A plea for human nature. *Philosophical Psychology*, 21, 321–329.

### Topic 2 Ethical dimensions of scientific practice

What, if any, responsibilities do scientists have? Are scientists responsible for the consequences of their discoveries? Why is scientific misconduct, such as plagiarism, wrong and how can we prevent such instances?

**In-class exercise:** Students will examine the problem of inductive risk and distinguish between epistemic and other dimensions of scientific responsibility. As a case study, we look at Andrew Wakefield's scientific misconduct in his alleged linking of the MMR vaccine to autism.

Readings:

- Douglas, H.E. (2000). Inductive risk and values in science. *Philosophy of Science*, 67, 559–579.
- Douglas, H.E. (2003). The moral responsibilities of scientists (tensions between autonomy and responsibility). *American Philosophical Quarterly*, 40, 59-68.
- Ioannidis, J.P. (2005). Why most published research findings are false. *PLoS Medicine*, 2, e124.

Topic for the paper: Are scientists responsible for the consequences of their work? How far, if at all, does this responsibility reach?

### Topic 3 Explanations and laws in biology

We examine whether biology has laws, and how biologists make causal inferences, looking at counterfactual and mechanistic approaches.

**In-class exercise:** Students are given two short papers in biology (e.g., *Nature*, *Cell*) and examine what kinds of causal explanations biologists provide in these papers.

Readings:

- Woodward, J. (2002). What is a mechanism? A counterfactual account. *Philosophy of Science*, 69, S366–S377.

- Glennan, S.S. (1996). Mechanisms and the nature of causation. *Erkenntnis*, 44, 49-71.
- Mitchell, S.D. (2000). Dimensions of scientific law. *Philosophy of Science*, 67, 242–265.

Topic for the paper: Are there laws in biology?

**Topic 4** The explanatory scope of evolutionary theory and its application to evolutionary ethics

We look at the standard views of evolutionary theory, and at niche construction as an alternative model. We examine evolutionary explanations of altruism, and look at the implications for evolutionary ethics.

**In-class exercise:** Discussion of Darwin's (1871) musing that if we were eusocial insects, "our unmarried females would, like the worker-bees, think it a sacred duty to kill their brothers, and mothers would strive to kill their fertile daughters; and no one would think of interfering". What are the implications of this statement for ethical realism/antirealism?

Readings:

- Day, R., K.N. Laland, & J. Odling-Smee. (2003). Rethinking adaptation: The niche-construction perspective. *Perspectives in Biology and medicine*, 46, 80–95.
- Street, S. (2006). A Darwinian dilemma for realist theories of value. *Philosophical Studies*, 127, 109–166.
- Sterelny, K. & Griffiths, P. (1999). Chapter 2 of *Sex and Death*. Chicago: University of Chicago Press.

Topic for the paper: Use niche construction theory to explain the cultural evolution of human moral views.

**Topic 5** The ontology of biology

We commonly talk about biological entities such as individuals, species or human races as if they exist. We will look at philosophical debates about these three kinds of entities.

**In-class exercise:** Using the criteria outlined in Clarke's Problem of biological individuality and apply these to argue whether or not a beehive is a biological individual.

Readings:

- Clarke, E. (2011). The problem of biological individuality. *Biological Theory*, 5, 312–325.
- Haslanger, S. (2000). Gender and race: (What) are they? (What) do we want them to be? *Noûs*, 34, 31-55.
- Spencer, Q. (2012). What "biological racial realism" should mean. *Philosophical Studies*, 159, 181–204.

Topic for the paper: Do biological races exist?

**Topic 6** Biological function

Teleological explanations used to be prominent in biology. We will look at philosophical views that aim to re-establish teleological explanations.

**In-class exercise:** Students read an excerpt from Paley's (1802) *Natural theology* and translate the passage in contemporary neo-teleological terms.

Readings:

- Neander, K. (1991). The teleological notion of "function". *Australasian Journal of Philosophy*, 69, 454–468.
- Cummins, R. (2002). Neo-teleology. In A. Ariew, R. Cummins, & M. Perlman (Eds.), *Functions: New essays in the philosophy of psychology and biology* (pp. 157–172). New York: Oxford University Press.

Topic for the paper: "An eye is for seeing": Evaluate this in the light of the neo-teleology debate.

**Topic 7** Evolutionary psychology and its critics

A philosophical look at evolutionary psychology and its assumptions, especially as it is applied to gender.

**In-class exercise:** Students read Alexander and Hines (2002) Sex differences in response to children's toys in nonhuman primates (*Cercopithecus aethiops sabaenus*). *Evolution and Human Behavior*, 23, 467–479, and engage in small group discussions about the assumptions that underlie this research. They argue whether or not the conclusions of the paper are supported by the data.

Readings:

- Cosmides, L., & Tooby, J. (1994). Origins of domain specificity: The evolution of functional organization. In L. Hirschfeld & S.A. Gelman (Eds), *Mapping the mind: Domain specificity in cognition and culture* (pp. 85–116). Cambridge: Cambridge University Press.
- Frankenhuis, W. & Ploeger, A. (2007). Evolutionary psychology versus Fodor: Arguments for and against the massive modularity hypothesis. *Philosophical Psychology*, 20, 687–710.
- Fine, C. (2014). Neuroscience, gender, and "development to" and "from": The example of toy preferences. In: J. Clausen & N. Levy (Eds.), *Handbook of Neuroethics* (pp. 1737–1755). Dordrecht: Springer.

Topic for the paper: Why do evolutionary psychologists think that the mind is massively modular? Examine the plausibility of this claim