

# PHIL 317 – Philosophy of Biology

Winter Term 2011

**Tue, Thu 2:00–3:20pm, CEB 251**

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Website at <http://www.arts.ualberta.ca/~twelz/moodle/course/view.php?id=140>

## A. Course overview and aims

This course is an introduction to philosophy of biology, suitable for philosophy students and for biology students, among others. Philosophy of biology addresses and contributes to a variety of conceptual and methodological questions that often arise from within biological science. Examples of such question are: What is the unit of natural selection—the organism, the group, the gene? What is the nature of species, and can there be different species concepts that classify organisms differently? Can biology be reduced to molecular biology? How does intelligent design differ from real scientific theories?

This class will address issues pertaining to evolutionary, developmental, and molecular biology, focusing in particular on the role of genes in development and evolution and different kinds of explanations bearing on evolutionary biology. The strategy is to develop these issues based on comparing and contrasting two popular science books: *The Selfish Gene* deals with the evolutionary explanation of behaviour and presents a neo-Darwinian approach as it was prevalent a few decades ago, emphasizing the centrality of genes. *The Plausibility of Life* approaches evolution from the point of view of evolutionary developmental biology (‘evo-devo’)—a recent field and one of the most thrilling approaches in current biology. This second book accords to genes a less dominant role in the explanation of evolution, and our task will be to understand how the neo-Darwinian and evo-devo explanations differ from and relate to each other.

The discussion of these books in class will be complemented by lectures that cover relevant topics and notions from philosophy of biology (so as to give an overview of some main ideas of the field) or that fill in some necessary background in biology and its history. Topics to be covered include species concepts, adaptationism, the units of selection debate, altruism and selfishness, sociobiology and evolutionary psychology, gene-centered explanations in evolution, genetic information, explanations of development which are less focused on genes, evolutionary developmental biology, and intelligent design.

Students who successfully complete this class will

- have gained acquaintance with some current issues in the philosophy of biology,
- have gained knowledge about some core biological concepts and about the role of genes in development and evolution,
- be able to identify different kinds of explanations used in biology,
- have developed skills that will enable them to think more clearly and critically about (popular) biological texts, and
- have (hopefully) acquired interest in pursuing philosophical issues about biology.

## B. Prerequisites

There are no formal prerequisites for this class. The class is organized such that background knowledge in philosophy or biology is not required, though interests in either field are desirable.

## C. Required texts

Richard Dawkins, *The Selfish Gene*. 3<sup>rd</sup> edition. Oxford University Press, 2006. (Available at the UofA bookstore in the SUB.)

Marc Kirschner and John Gerhart, *The Plausibility of Life: Resolving Darwin's Dilemma*. Yale University Press, 2005. (Available at the UofA bookstore. We do not need this book until the second half of the term.)

## D. Course requirements and grading

- Midterm                    20%
- Final                        30%
- Book report                10%
- Essay                        20%
- Oral presentation        10%
- Participation              10%

**Midterm exam** (20%): The midterm on **Feb. 17** will consist of short answer questions (requiring you to explain in a few sentences a philosophical or biological concept), and long answer questions (requiring you to write a paragraph showing you have understood a philosophical issue).

**Final exam** (30%): The final on **Apr. 18** will consist of short answer questions and long answer questions. While emphasis will be placed on material covered in the second half of the course, the final will be cumulative.

**Book report** (10%): On **Feb. 10**, you have to hand in a 2 page (double spaced) report on one of the books listed below in section H. The point of this task is to give you an idea of what some of the basic books in the field are and to make you take a look at (at least) one of them apart from the material we read in class. Among the books listed in section H, take a look at some of them in the library. Choose one of them that interests you in some way and read the introduction and at least one of the chapters. Write a report on what you found of interest in that book. In evaluating the book report I am not looking for any deep thoughts, but merely evidence that you have thought about your own interests in the class and that you have taken a look at a relevant book in addition to the required texts.

**Essay** (20%): On **Apr. 12**, you have to hand in an essay (5–6 pages double spaced). In the essay, you have to choose and critically discuss one issue from the required readings or the books listed in section H if you wish, making use of the philosophical notions you have learned in class. Guidelines and suggestions on possible topics will be distributed after reading week.

**Oral presentation** (10%): Each student has to give one oral presentation (about 10 minutes). You have a fair amount of leeway in what you choose to present on. The most straightforward option is to give a summary of this meeting's readings and offer some questions that the material raises. Alternatively, you may choose to present on other material that is relevant to our topic. The main function of the presentation is to trigger subsequent discussion, which the presenter is to lead. You may give your presentation using PowerPoint or otherwise distribute

a brief handout, making sure that discussion questions are included. In any case, I ask you consult with me about your topic and to send me a draft of your presentation in advance.

**Participation (10%):** Attendance and active participation is important for this class. Each class will normally intersperse lecture with general discussion of the readings. It is the responsibility of each student to come to class prepared to actively engage in discussion. Each of you will probably have picked up different points from the readings or have questions or objections, so please share them! You can also obtain participation credit by contributing to the discussion forum on our website.

When assigning final grades at the end of the term based on your performance on the above requirements, I will ensure that the grade distribution of this class does not deviate too much from the overall university distribution, taking into account the overall workload of this course and the difficulty of the material.

## **E. Course website**

The course has a website at <http://www.arts.ualberta.ca/~twelz/moodle/course/view.php?id=140> . I use the site to post lecture notes, handouts, study guides, and your grades. The site also contains a discussion board.

Create an account at <http://www.arts.ualberta.ca/~twelz/moodle/login/signup.php> (Arts Moodle). When accessing our course for the first time, use the enrolment key [undisclosed]

## **F. Academic integrity and plagiarism**

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards and to uphold the policies of the university in this respect. Students are urged to familiarize themselves with the Code of Student Behaviour (online at <http://www.uofaweb.ualberta.ca/governance/StudentAppeals.cfm>) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the university. For a summary please see <http://www.uofaweb.ualberta.ca/governance/StudentAppealsCheatsheet.cfm>

The Code of Student Behaviour defines plagiarism as follows:

No Student shall submit the words, ideas, images or data of another person as the Student's own in any academic writing, essay, thesis, project, assignment, presentation or poster in a course or program of study.

The library has a general website on plagiarism: <http://www.library.ualberta.ca/guides/plagiarism>. See in particular the section on "Avoiding Plagiarism" (sidebar on the left, among "Resources for Students").

## G. Schedule of classes

<b>Tue, Jan 11</b>	Introduction
<b>Thu, Jan 13</b>	Dawkins: Preface to 1 <sup>st</sup> ed; Chapters 1 and 2
<b>Tue, Jan 18</b>	Dawkins: Ch 3 (skip pp 40-44)
<b>Thu, Jan 20</b>	Dawkins: Ch 4
<b>Tue, Jan 25</b>	Dawkins: Ch 5 (skip pp 78-81)
<b>Thu, Jan 27</b>	Dawkins: Ch 6
<b>Tue, Feb 1</b>	Dawkins: Ch 7
<b>Thu, Feb 3</b>	Dawkins: Ch 8 (skip pp 136-138)
<b>Tue, Feb 8</b>	Dawkins: Ch 9
<b>Thu, Feb 10</b>	Dawkins: Ch 10. <b>BOOK REPORT DUE in class</b>
<b>Tue, Feb 15</b>	Dawkins: Ch 11. Review for the midterm
<b>Thu, Feb 17</b>	<b>MIDTERM EXAM</b>

Reading week

<b>Tue, Mar 1</b>	Kirschner&Gerhart: Preface; Introduction; Ch 1, pp 10-18
<b>Thu, Mar 3</b>	Kirschner&Gerhart: Ch 1, pp 19-37
<b>Tue, Mar 8</b>	Kirschner&Gerhart: Ch 2
<b>Thu, Mar 10</b>	Kirschner&Gerhart: Ch 3, pp 71-90
<b>Tue, Mar 15</b>	Kirschner&Gerhart: Ch 3, pp 91-108
<b>Thu, Mar 17</b>	Kirschner&Gerhart: Ch 4, pp 109-127
<b>Tue, Mar 22</b>	Kirschner&Gerhart: Ch 4, pp 128-142; Ch 5, pp 143-152
<b>Thu, Mar 24</b>	Kirschner&Gerhart: Ch 5, 153-176
<b>Tue, Mar 29</b>	Kirschner&Gerhart: Ch 6, pp 177-198
<b>Thu, Mar 31</b>	Kirschner&Gerhart: Ch 6, pp 199-218
<b>Tue, Apr 5</b>	Kirschner&Gerhart: Ch 7
<b>Thu, Apr 7</b>	Kirschner&Gerhart: Ch 8
<b>Tue, Apr 12</b>	Review for the final. <b>ESSAY DUE in class</b>

<b>Mon Apr 18</b>	<b>FINAL EXAM 2:00–4:00 pm</b>
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## H. Books for writing reports on

- Griffiths, P.E. and Sterelny, K. (1999) *Sex and Death: An Introduction to Philosophy of Biology*. University of Chicago Press. [The most recent textbook in philosophy of biology. Highly recommended.] QH 331 S82 1999
- Garvey, B. (2007) *Philosophy of Biology*. Acumen Press. [The most recent introductory textbook.] QH 331 G27 2007
- Sober, E. (2000) *Philosophy of Biology*. 2<sup>nd</sup> ed. Westview Press. [Good textbook in philosophy of biology. More mathematical and not as up-to-date as Griffiths&Sterelny, though, as it differs hardly from its first, 1993 edition.] QH 371 S677 2000
- Hull, D. and M. Ruse (Eds.) (2007) *The Cambridge Companion to the Philosophy of Biology*. Cambridge University Press. [Very good collection of recent essays surveying some main issues in philosophy of biology.] QH 331 C285 2007
- Ayala, F. and R. Arp (Eds) (2010) *Contemporary Debates in Philosophy of Biology*. Wiley-Blackwell. [On several topics, there is each one essay arguing for and one essay arguing against a thesis.] QH 331 C8465 2010
- Hull, D. and Ruse, M. (eds) (1998) *The Philosophy of Biology*. Oxford University Press. [Collection of many classical, original articles by biologists and philosophers of biology.] QH 331 P468 1998
- Sober, E. (ed) (2005) *Conceptual Issues in Evolutionary Biology*. 3<sup>rd</sup> ed. MIT Press. [Another collection of many classical, original articles by biologists and philosophers of biology.] QH 366.2 C74 2006
- Keller, E.F. (2000) *The Century of the Gene*. Harvard University Press. [Popular discussion of the gene concept in contemporary molecular biology. Good account of the complexity of genetic processes and why the term 'gene' has partially ceded to many other genetic terms.] QH 428 K448 2000
- Morange, M. (2001) *The Misunderstood Gene*. Harvard University Press. [Popular discussion explaining many common misunderstandings of what genes are and how they work.] QH 447 M672 2001
- Dawkins, R. (1999) *The Extended Phenotype: The Long Reach of the Gene*. 2<sup>nd</sup> ed. Oxford University Press. [A development of many of the ideas in *The Selfish Gene*, written primarily for biologists but still quite accessible.] QH 375 D38 1999
- Roughgarden, J. (2009) *The Genial Gene: Deconstructing Darwinian Selfishness*. University of California Press. [An evolutionary biologist proposes social selection theory in opposition to sexual selection and the selfish gene theory.] QL 761 R68 2009
- Sober, E. and Wilson, D.S. (1998) *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Harvard University Press. [Much-debated discussion of altruism and defense of group selection.] BF 637 H4 S65 1998
- Buller, D.J. (2005) *Adapting Minds: Evolutionary Psychology and the Persistent Quest for Human Nature*. MIT Press. [A critique of evolutionary psychology. Also as an ebook at <https://login.ezproxy.library.ualberta.ca/login?url=http://www.netLibrary.com/urlapi.asp?action=summary&v=1&bookid=138452> ] BF 701 B85 2005
- Richardson, R. C. (2007) *Evolutionary Psychology as Maladapted Psychology*. MIT Press. [Another philosophical critique of evolutionary psychology. Also as an ebook at <http://cognet.mit.edu.login.ezproxy.library.ualberta.ca/library/books/view?isbn=0262182602> ] BF 698.95 R44 2007

- Behe, M. (1996) *Darwin's Black Box: The Biochemical Challenge to Evolution*. Free Press. [Classical defense of intelligent design by a biochemist.] QH 325 B365 1996
- Behe, M. (2007) *The Edge of Evolution: The Search for the Limits of Darwinism*. Free Press. [Behe's latest defense of intelligent design.] QH 367 B44 2007
- Pennock, R.T. (1999) *Tower of Babel: The Evidence against the New Creationism*. MIT Press. [Critique of intelligent design, evidence for evolution.] QH 366.2 P428 1999
- Amundson, R. (2005) *The Changing Role of the Embryo in Evolutionary Thought: Roots of Evo-Devo*. Cambridge University Press. [While neo-Darwinists told a biased account of the history of biology, Amundson offers an evo-devo perspective that recovers useful features especially of pre-Darwinian biology.] QH 360.5 A48 2005
- Robert, J. (2004) *Embryology, Epigenesis and Evolution: Taking Development Seriously*. Cambridge University Press. [Recent book on the philosophy of developmental biology. Also as an ebook at <http://site.ebrary.com/login.ezproxy.library.ualberta.ca/lib/albertaac/Doc?id=10124681> ] QH 491 R63 2004
- Weber, M. (2005) *The Philosophy of Experimental Biology*. Cambridge University Press. [Good and recent book on the philosophy of molecular biology. Also available as an ebook at <http://site.ebrary.com/login.ezproxy.library.ualberta.ca/lib/albertaac/Doc?id=10131669> ] QH 324 W43 2005
- Beurton, P., Falk, R. and Rheinberger, H.-J. (eds) (2000) *The Concept of the Gene in Development and Evolution: Historical and Epistemological Perspectives*. Cambridge University Press. [A collection of recent essays by biologists and historians and philosophers of biology on the gene concept.] QH 447 C662 2000

## **I. Books on reserve**

### **For reference. On reserve at Rutherford Library**

- Ridley, M. (2004) *Evolution*. 3<sup>rd</sup> ed. Blackwell. [Widely used textbook in evolutionary biology. Good reference.] QH 366.2 R524 2004
- Griffiths, P. E. and K. Sterelny (1999) *Sex and Death: An Introduction to Philosophy of Biology*. University of Chicago Press. [Recent textbook in philosophy of biology. Highly recommended.] QH 331 S82 1999
- Garvey, B. (2007) *Philosophy of Biology*. Acumen Press. [The most recent introductory textbook.] QH 331 G27 2007
- Sober, E. (2000) *Philosophy of Biology*. 2<sup>nd</sup> ed. Westview Press. [Good textbook in philosophy of biology. More mathematical and not as up-to-date as Griffiths&Sterelny, though, as it differs hardly from its first, 1993 edition.] QH 371 S677 2000