# Syllabus: History and Philosophy of Biology

**Course Title:** History and Philosophy of Biology

**Dates/Times:** Sundays (7) 5 – 7 PM EST, Oct. 2 – Nov. 13, 2022

**Format:** Online via Zoom

**Credits:** Two (2) credits

**Course Code:**

**Instructors:** Joseph Madison,
Institute for Social Ecology,
NSF Research Fellow,University of Massachusetts Boston,
Visiting Scientist, University of California San Diego

(605) 670-2577
josephdmadison7@gmail.com

**Description**

> This course will provide an overview of the historical development of various strands of philosophical thought in the biological sciences, with an emphasis on ecology and evolution. This overview will range from ancient proto-naturalistic thinking to contemporary philosophy of biology, to include ongoing debates with broad societal implications. The course will draw on student discussion and critical thinking as a means for analysis of the emergence, intermixing, and fading of these philosophies. By the end of the course students will be able to understand and analyze the historical development of the dominant philosophical paradigms in the biological sciences. Students will also have practice in contextualizing and critiquing the historical and philosophical bases of related social issues such as neo-eugenics and the biodiversity crisis.

Each segment will generally focus on advancing periods of history in the biological sciences, while also taking into account material from previous historical periods/discussions. This approach will aid in understanding the development and motivation of the underlying philosophical paradigms, to include the present day. Our weekly sessions will include interviews and presentations by biologists and philosophers as well as supplemental readings and other audio-visual resources.

**Audience:** Anyone eligible

**Course Goals:**
This course aims to use an interrelated analysis of both history and philosophy so that students can critically engage trends in contemporary biological thought, research, and related sociopolitical issues. We will learn from biologists, philosophers, historians, and activists in their

historiographies, analysis, and critiques of philosophies of biology. Towards the end of the course, we will also explore the potential role of social ecology in informing critique and analysis of philosophical bases in contemporary biological issues.

**Course Objectives for Students:**

- Understand the rational/logical structure and diversity of philosophies of biology and how they overlap and relate historically.
- Understand both the empirical and sociopolitical reasons for why these philosophies emerge, fade, or persist.
- Critically engage with the sociopolitical implications of varying biological philosophies. This will include critique of contemporary philosophical paradigms dominant in social debate such as neo-eugenics and the biodiversity crisis.
- Write a historical or philosophical paper with a two-step instructor-involved editing process. This process will aid the student in editing/responding to constructive feedback on an initial paper draft, and more broadly in developing student writing skills.

**Assignments:**

The course entails an average of 15 hours of weekly engagement, consisting of the following elements: (1) attending a weekly 2-hour online lecture/webinar/discussion over the course of seven weeks, (2) participating actively in weekly online discussion forums, and (3) submitting a final paper. In addition to these requirements, students will be expected to conduct all assigned readings and view multimedia content where necessary. Engagement with course content will be demonstrated through weekly participation in class discussions and online forums.

**Final Paper:**

Following consultation with the instructor, students will choose an appropriate subject from the covered course content for a final paper that integrates material from the course with contemporary real-world issues in the biological sciences. As writing a paper is a process, the student will have at least one first draft that is submitted (at least two weeks prior to the final paper due date) to be edited/commented on by the course instructor and ISE faculty. Using this constructive feedback, the student will complete a final 12-15 page paper. Examples of paper topics include a critique of current neo-eugenic trends in biological research, an analysis of mass extinctions and associated normative claims to action, or a descriptive-historical paper on a given philosophical paradigm in biology (e.g. vitalism, gene reductionism). Any chosen paper subject should have relevance to contemporary issues in the biological sciences. and should

critically reflect on the historical and philosophical basis of these issues. This assignment aims to foster your ability to use critique and analysis as a lens for discussion on biological issues, and their social and political contexts.

Completion of this paper includes the final draft that is due 2 weeks following the end of the course. As noted above. There will also be one draft revision process involving the instructor and ISE faculty. The paper should be accurately referenced (using any accepted and consistent format), using a mix of materials from our class readings and your own research materials. This final paper will be evaluated by the course instructor and given careful feedback.

**Evaluation:**

Evaluation is carried out by the instructor according to the parameters set out in the "Grading" section which follows.

**Grading:**

Students will be assessed according to their class participation, paper, and participation in the paper drafting process. This assessment will be based on the following evaluation guidelines: the ability to think analytically, express ideas effectively through written communication, exchange ideas effectively through oral communication, bring innovation to their work, envisage and work independently on a paper, and to accept and act on criticism. Good papers take time and come in drafts, so starting this process early and asking friends or colleagues for edits and comments is recommended. Utilizing resources such at the writing center is recommended. Don't plagiarize; it's counterproductive and you'll get caught. Here are some tips on how to avoid it: https://www1.chapman.edu/~babbie/plag00.html.

If you're stuck or pressed for time contact the course instructor to ask for help or an extension. Lastly, I recommend checking out this useful short article on active reading strategies that can help you more efficiently identify the main arguments and key evidence in sometimes dense academic texts: http://blogs.swarthmore.edu/burke/permanent-features-advice-on-academia/how-to-read- in-college/.

**Grading Policy:**
Grades are indicated by letters with a designated "quality point" value assigned to each as follows:

| | |
|---|---|
| A | 4.0 |
| A- | 3.7 |
| B+ | 3.3 |
| B | 3.0 |
| B- | 2.7 |
| C+ | 2.3 |

Additional grading information can be found in the **** University Catalogue.

**Academic Honesty Policy:**
***** University is a learning institution committed to the highest standards of scholarly conduct. The students, faculty, and administration make up a scholarly community whose integrity and success necessarily stem from a mutually agreed upon code of academic standards and principles that promote trust and honesty and prohibit the attempt to gain unfair academic advantage. Membership in the ***** University community means sharing responsibility for upholding and safeguarding these academic standards and principles.
Any violation of academic honesty will be considered cheating and will be dealt with accordingly by the appropriate authorities.

**Use and Ownership of Copyrighted Materials:**
For information and guidance, faculty and students are referred to in the ***** Manual of Policy and Procedures as it relates to the use and ownership of copyrighted materials. Guidelines are set out in the policy, accessible here:

**Accommodations:**
***** University is committed to providing reasonable accommodations to qualified students with disabilities so that no such student shall, by reason of a disability, be excluded from participating in or be denied the benefits of the services, programs or activities of ***** University. For more information, please contact:

**Course Drop Policy:**
***** University offers courses to educators with the expectation that participants will complete the course. However, the University realizes circumstances arise in one's personal life that may cause disruptions. **The policy for dropping a course is that a participant will notify the instructor in writing (i.e. E-mail) of the intent to withdraw from the course. The withdrawal notice should be made within the first week of the course and should include the reason for withdrawing.** After week one, changes in class status will be considered for health, bereavement, and personal or emergency situations only. Those who withdraw without adhering to this policy may receive a failing grade on their transcript and/or be liable for associated course costs. For more Academic Policy information, check the corresponding link:

**Transcript Request:**

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**Course Outline and Readings**

**COURSE TOPICS AND DATES**

**Week 1: Course overview – The what, why, and how of history and philosophy of biology(s)?**

***The philosophy of biology has always been dependent on the phenomena of interest. What counts as phenomena falling under the domain of scientific study or biology is contested terrain. Also at issue is the role of history in informing these discussions. This first section of the course will therefore frame the interrelations of biological philosophies and their historical context.***

**Primary Reading:**

Hull, D. L. (2008). The history of the philosophy of biology. In *The Oxford handbook of philosophy of biology*.

**Supplemental Reading:**

Pradeu, T. (2017). Thirty years of Biology & Philosophy: philosophy of which biology?. *Biology & Philosophy*, *32*(2), 149-167.

**Week 2: Early Nature Philosophies and the Emergence of Scientific Naturalism**

***This section of the course will deal with early philosophies of nature and how they influenced the emergence of scientific naturalism, later to be refined and delineated as modern biology. These readings will aim to give a broad overview, but with emphasis on those philosophies of nature that most influenced later historical ideas that will be discussed in this course.***

**Primary Readings:**

Aristotle, On the Parts of Animals Book I, Parts I-IV

Descartes, R. (1637) Chapter V (explaining the heart), A Discourse on the method: correctly conducting one's reason and seeking truth in the sciences.

**Supplemental Readings:**

Islamic Philosophy of Biology/Evolution and Al-Jahiz); Malik, A.H., Ziermann, J.M. and Diogo, R., 2018. An untold story in biology: the historical continuity of evolutionary ideas of Muslim scholars from the 8th century to Darwin's time. *Journal of Biological Education*, *52*(1), pp.3-17

Bacon, F. (1626) *New Atlantis.*

Hegel's Nature Philosophy; direct (trans.) excerpts from Hegel; Stone, A. (2013). Hegel, Naturalism and the Philosophy of Nature. *Hegel Bulletin*, *34*(1), 59-78.

**Week 3: Evolutionary-Ecological Thinking as an overarching Paradigm for Biology**

***Following the privileging of the empiric-theory model as the dominant mode of inquiry into natural phenomena, focus in biology increasingly shifted to grand or unified theories. Evolution of species (kinds) emerged as a major strand in this work, largely starting with theistic theories, moving to Lamarckian inheritance, and later superseded by Darwinian Evolution by natural selection.***

**Primary Readings:**

Debate between Georges Cuvier and Geoffroy Saint-Hilaire. (2009) In The Philosophy of Zoology Before Darwin *a translated and annotated version of the original French text by Edmond Perrier*. *McBirney, A., & Cook, S.*

Excerpt from Darwin, C. (long version,1975) On the Origin of Species.

Excerpt from Kropotkin, P. (1902) Mutual Aid: a Factor of Evolution.

**Supplemental Readings:**

Lamarck, (1809) *Philosophie Zoologique*

Agassiz "Essay on Classification", (the last of the "theists")

Gould, S. J. (1988). Kropotkin was no crackpot. *Natural History*, *97*(7), 12-21.

Species concepts, biological individuals (cells, organisms, groups, species, clades) see: Hull, D. L. (1980). Individuality and selection. *Annual review of ecology and systematics*, *11*, 311-332**.**

**Week 4: Diversification and Expansion**

***In the milieu of the emerging field of modern biology, with an emphasis on ecological-evolutionary concepts and grand theories, the underlying philosophies and their historical context increasingly informed general social discussion and problems. This development also coincided with a rapid diversification in concepts and socio-political claims.***

**Primary Readings:**

Galton, Francis. (1873) Hereditary Improvement. *Fraser's magazine* 7.37: 116– 130

Excerpt from Haeckel, E. (1876) The History of Creation: Or, The Development of the Earth and Its Inhabitants by the Action of Natural Causes. A Popular Exposition of the Doctrine of Evolution in General, and of that of Darwin, Goethe and Lamarck in Paticular. From the German of Ernst Haeckel (Vol. 1). HS King & Company.

Lewontin, R., & Levins, R. (1976). The problem of Lysenkoism. In *The radicalisation of science* (pp. 32-64). Palgrave, London.

**Supplemental Readings:**

Kitcher, P. (2007). Does' race' have a future? *Philosophy and Public Affairs*, 293-317.

Ceccarelli, D. (2018). Orthogenetic predictability: orderliness and symmetry in early macroevolutionary explanations. *Predictability and the unpredictable: life, evolution and behavior. CNR Edizioni, Rome*, 177-192.

Goldschmidt, R. (1982). *The material basis of evolution* (Vol. 28). Yale University Press.

Theißen, G. (2009). Saltational evolution: hopeful monsters are here to stay. *Theory in biosciences*, *128*(1), 43-51.

**Week 5: Evolutionary ("Modern") Synthesis and Gene Reductionism**

***The kinds and processes that were considered in the realm of biology in the late 19th and early 20th centuries narrowed with the rise of the molecular program. Specifically, the dominance of the gene as a reductionist "unit" combined with evolution by natural selection as the grand overarching theory of explanation.***

**Primary Readings:**

Excerpt from Griffiths, P., & Stotz, K. (2013). *Genetics and philosophy: an introduction*. Cambridge University Press.

Gould, S. J. (1983). The hardening of the modern synthesis.

**Supplemental Readings:**

"Gene". In M. Ruse and D. Hull, (eds.): *Cambridge Companion to Philosophy of Biology*, 85–102. Cambridge: Cambridge University Press.

Bohr, N. (1933). Light and life. *Nature*, *131*, 457-459.

Carnap, R. (1936) Testability and meaning. *Philosophy of science*, *3*(4), 419-471.

E. Schrödinger (1944) What Is Life? The Physical Aspect of the Living Cell

Wilson, E.O. (1975) Sociobiology: the new synthesis

Lewontin, R. C. (1979). Sociobiology as an adaptationist program. *Behavioral science*, *24*(1), 5-14

Wilson, D. S., & Wilson, E. O. (2007). Rethinking the theoretical foundation of sociobiology. *The Quarterly review of biology*, *82*(4), 327-348.

**Week 6: The social turn, contextualism, and the extended synthesis**

***Gene reductionism and evolution by organismal selection weaken as the primary philosophies and theories for the explanation of biological phenomena. The boundaries of what counts as biological phenomena also begins to be challenged, with major objections to the received paradigm following the social turn. This ongoing process has created many debates in biology proper, but also in the related areas of medicine and conservation.***

**Primary Readings:**

"Which biology?" Griffith, P.

*Pigliucci, M., & Finkelman, L. (2014). The extended (evolutionary) synthesis debate: where science meets philosophy. BioScience, 64(6), 511-516.*

**Supplemental Readings:**

The Essential Tension: Selected Studies in Scientific Tradition and Change, Kuhn (1978).

Potochnik, A. (2017). *Idealization and the Aims of Science*. University of Chicago Press.

**Week 7: Dialectical Naturalism and the Future of Biology**

***In our final week we will discuss outstanding philosophical debates in biology and components of these debates that have real-world traction. This will include clarifying the current biodiversity crisis to include mass extinctions, and also neo-eugenic reasoning in biology and medicine.***

**Primary Reading:**

Selected readings from Bookchin, M., 2022. *The philosophy of social ecology: Essays on dialectical naturalism*. AK Press.

**Supplemental Readings:**

Cowie, R. H., Bouchet, P., & Fontaine, B. (2022). The Sixth Mass Extinction: fact, fiction or speculation?. *Biological Reviews*.

Pollack, R. (2015). Eugenics lurk in the shadow of CRISPR. *Science*, *348*(6237), 871-871.

**COURSE MATERIALS**

All reading materials for this course will be provided as electronic material (e.g. PDFs), or linked to a publicly accessible location on the internet.