

# Individual & Individuality in Biology

Winter Term 2016 – University of Oregon

Instructor: Nicolae Morar

## Syllabus

### 1. Course Description

Recent findings emerging in microbial biology highlight numerous microbial interactions that affect biological organisms and thus, offer us new ways for understanding the living world. Are the functions of an organism the unique outcome of its own genetics? Are its physiological capacities the single product of its evolution? Are its psychological states nothing else than the expression of its organic properties? Ultimately, are biological organisms *truly* individuals?

Today, microbial biology calls into question the most traditional understandings of biological organisms as the paradigm of individuality. This course examines the evolutionary explanations for the emergence of multicellular individuals, the notion of organism and agent of selection, and, finally, asks whether a symbiotic conception of life dismantles this central unit of biology in order to make possible new conceptions about living organisms as collective entities – superorganism, holobiont, or ecosystems.

### 2. Class Meetings

Class will meet **Monday** and **Wednesday** from **12:00 - 1:50 pm** in **122 MCK**.

### 3. Office Hours and Contact Information

Office: 250B Susan Campbell Hall

Email: nmorar@uoregon.edu

Office Hours: TH 3:00-3:50 pm & any time, by appointment.

### 4. Course Requirements and Grading

Grades on papers and exams will be given on the standard 0-100 point grading scale:

100-93:	A
92-90:	A-
89-87:	B+
86-83:	B
82-80:	B-
79-77:	C+
76-73:	C
72-70:	C-
69-60:	D
59-0:	F

Final grades will be determined by in class participation/attendance, short reading responses (10), a prospectus & annotated bibliography, and a final paper or final project. They will be weighted as follows:

1. Participation and Attendance	20%
2. Short Reading Responses (10)	20%
3. Prospectus and Annotated Bibliography	20%
4. Final Term Paper/ Final Project	40%

**1. Participation/attendance:** You are expected to participate actively in this course, which includes attending every class, reading all assigned material prior to class, and participating productively and professionally in class discussions. Missing three classes for any reason will result in a full grade reduction. An additional full grade reduction will be made for each additional missed class after the third. Three late arrivals for class will count as one absence. The quality and quantity of your participation in the class discussion will be evaluated in assigning 20% of your final grade.

**2. Short Reading Responses:** Each week, either on Sunday or Tuesday, you will have the opportunity to submit via email (before midnight) a summary of the next day's assigned readings. Summaries should be limited to one single-spaced page (~600 words) for each assigned article and you should aim to be as clear, concise, and comprehensive as possible within that space. It is very important that in the last paragraph of the summary (last 1/3), you raise a critical concern/question with respect to the argument you've just summarized. You may submit a summary of the readings for either Monday or Wednesday during a particular week, but not on both days. Your summaries will be graded as either DUCK+ (especially insightful summary and sharp question) or DUCK- (completeness of summary and quality of question needs improvement). Reading summaries will count as 20% of your final grade.

Extra or late summaries cannot be accepted in order to make up for delinquency in completing these assignments at the proper time.

**3. Term paper prospectus:** You will submit in the **8<sup>th</sup> week (by Feb 26<sup>th</sup>)** a prospectus of your final paper with two components: (1) a 2-3 page detailed description of the topic and outline of your proposed argument or project; and (2) an annotated bibliography of at least five primary or peer-reviewed secondary texts that you intend to consult (in addition to texts assigned for the course). Each annotation should be around one double-spaced page and include a summary of the book or article as well as an indication of its relevance for your project. Your prospectus must receive my approval in order for your final term paper or final project to be accepted. The prospectus will be worth 20% of your final course grade.

**6. Final Term Paper or Final Project:** Final papers should explore in detail an independently chosen topic or theme related to the course **or** to your (graduate) research projects. It must include (a) examination of at least five scholarly sources in addition to course texts, and (b) – especially for graduate students - the development of your own original position or critical response. Term papers should be around – for undergraduate students 8 & for graduate students 10-12 double-spaced pages. Final papers must be stapled, proof-read, and use a standard system of citation (e.g., APA or Chicago). Papers are due **on the date scheduled for the final exam (TBA)**, and extensions will be granted only in the case of genuine, documented emergencies.

Late papers will lose one letter grade for each calendar day that they are late.

***Failure to complete the final exam will result in an automatic failure in the course (grade F).***

Grading rubric for exam essays (final):

A = Excellent. No mistakes, well-written, and distinctive in some way or other.

B = Good. No significant mistakes, well-written, but not distinctive in any way.

C = Okay. Some errors, but a basic grasp of the material.

D = Poor. Several errors. A tenuous grasp of the material.

F = Failing. Problematic on all fronts indicating either no real grasp of the material or a complete lack of effort.

## 6. Course Policies

**Incompletes and extensions** will be given *only* in the event of documented emergencies.

**Emergencies:** In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances.

**Sexual Violence:** The UO is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. If you (or someone you know) has experienced or experiences gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), know that you are not alone. UO has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that all UO employees are *required reporters*. This means that if you tell me about a situation, I may have to report the information to my supervisor or the Office of Affirmative Action and Equal Opportunity. Although I have to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can call 541-346-SAFE, UO's 24h hotline, to be connected to a confidential counselor to discuss your options. You can also visit the SAFE website at [safe.uoregon.edu](http://safe.uoregon.edu)

**Accessibility:** If you have a documented disability, please contact me in advance. If you need accommodations in this class, I will work with the Accessible Education Center to find a solution for you.

**Academic Misconduct:** With the advent of the Internet, plagiarism has become an increasingly serious problem at universities around the country, particularly in classes like this one, where papers determine a substantial part of the grade.

In order to avoid plagiarizing from a source, both direct quotations and paraphrases or summaries of material found in traditional print media or on the internet must be acknowledged. If you have any questions about how this definition will be interpreted, please do not hesitate to discuss the matter with me.

Plagiarism and cheating on exams undermines the integrity of the academic community. When undetected, it gives the perpetrator an unfair advantage over students who are graded on the basis of their own work. In this class we will do our best to detect plagiarism and cheating. Students who are aware of violations by others should bring this to my attention. This is the right thing to do. It is also in your own self-interest.

**There will be zero tolerance for plagiarism in this course.** Plagiarized papers will receive a 0, the student will automatically fail the course, and their name will be given to the university authorities. For more on the University of Oregon policy on plagiarism, see the following website:

<http://libweb.uoregon.edu/guides/plagiarism/students/>

**External Sources:** Using sources not listed on the syllabus in researching and writing your papers is fine, as long as they are both to the point, and are properly cited. And at all times, when in doubt, cite your sources! It is the best way to avoid being accused of plagiarism. This is probably the best place to make this point, too: Wikipedia can be valuable for getting a very broad grasp of positions and debates, but when it gets into details, especially on philosophic topics, it is very often horrible – sketchy, convoluted, misinformed, and often simply wrong. If you wish to consult online resources, I suggest you use some of the other, much better sites. Most prominent is the Stanford Encyclopedia of Philosophy, but others are useful as well:

Stanford Encyclopedia of Philosophy - <http://plato.stanford.edu/>  
The Internet Encyclopedia of Philosophy - <http://www.iep.utm.edu/>

## 6. Website

All the information about this course and other comments or events related to the class will be posted on Canvas (including other recommended readings).

## 7. Texts

F. Bouchard & P. Huneman, *From Groups to Individuals: Evolution and Emerging Individuality*, (MIT Press, 2013)

The chapters we are interested from this volume will be posted on Canvas (as PDF files).

8. Topics and Readings

Here is a tentative schedule of topics and readings. This list of readings is only indicative for a possible trajectory for the class. Amendments and alterations - based on students' interest also - will be considered and announced in class as we go.

<p><b>Week 1</b> <b>Jan. 4<sup>th</sup></b></p> <p><b>Jan. 6<sup>th</sup></b></p>	<p><b>Session 1. <i>The Nature of Scientific (&amp; Biological) Explanation</i></b> Introduction to the course (requirements) Potochnik, “Biological Explanation” Brandon, “Does Biology Have Laws? The Experimental Evidence”</p> <p><b>Session 2. <i>The Nature of Biological Explanation</i></b> Nagel, “Mechanistic Explanation and Organismic Biology” Skillings, “Mechanistic Explanation of Biological Processes” (recommended)</p>
<p><b>Week 2</b> <b>Jan. 11<sup>th</sup></b></p> <p><b>Jan 13<sup>th</sup></b></p>	<p><b>Session 1. <i>Biological Individuality (General)</i></b> Jeuken, “The Concept ‘Individual’ in Biology” Santelices, “How Many Kinds of Individuals are there?”</p> <p>Huneman, “Individuality as a Theoretical Scheme: Formal and Material” (recommended)</p> <p><b>Session 2. <i>The Problem of Biological Individuality</i></b> Clarke, “The Problem of Biological Individuality” Clarke &amp; Okasha, “Species and Organisms: What are the Problems?”</p> <p>Clarke, “The Multiple Realizability of Biological Individuals” (recommended)</p>
<p><b>Week 3</b> <b>Jan. 18<sup>th</sup></b> <b>MLK</b> <b>Holiday</b></p> <p><b>Jan. 20<sup>th</sup></b></p>	<p><b>Session 1. <i>Biological Individuality and the Practice of Science</i></b> <b>Readings are only recommended since we have no class on Jan 18<sup>th</sup>.</b></p> <p>Kovaka, “Biological Individuality and Scientific Practice” Clarke, “Plant Individuality: A solution to the demographer’s dilemma”</p> <p><b>Session 2. <i>Distinction – Organism and Environment</i></b> Lewontin, “Organism and Environment” R. Brandon, “Environment”, in (eds) EF Keller &amp; E. Lloyd, <i>Keywords in Evolutionary Biology</i>, Harvard UP, 1992, (pp.81-87)</p>
<p><b>Week 4</b> <b>Jan. 25<sup>th</sup></b></p> <p><b>Jan. 27<sup>th</sup></b></p>	<p><b>Session 1. <i>Organism-Centered Views of Biological Individuals #1</i></b> West &amp; Kiers, “Evolution: What is an Organism?” Pepper &amp; Herron, “Does Biology Need an Organism Concept?”</p> <p><b>Session 2. <i>What is an Organism? Its Importance for Biology</i></b> Benson, “Biology’s ‘Phoenix’: Historical Perspectives on the Importance of the Organism” Ruiz-Mirazo &amp; al., “Organisms and Their place in Biology”</p>

<p><b>Week 5</b>  <b>Feb 1<sup>st</sup></b>                  (Only from                  12-1:00pm)</p> <p><b>Feb 3<sup>rd</sup></b>  <b>Class</b>  <b>Cancelled</b></p>	<p><b>Session 1. <i>A Microbial Challenge to Biological Individuals/ Organisms</i></b>  <b>Guest Lecturer: Brendan Bohanann (University of Oregon)</b></p> <p>Gilbert, Sapp, &amp; Tauber, “A Symbiotic View of Life: We have never been individuals”                  Dyer, “Symbiosis and Organismal Boundaries” (recommended)                  Janzen, “What are Dandelions and Aphids?” (recommended)                  McFall-Ngai &amp; al., “Animals in a Bacterial World, a new imperative for life sciences” (recommended)</p> <p><b>Session 2. <i>Biology’s Next Revolution</i></b>                  Goldenfeld &amp; Woese, “Biology’s next revolution”                  Goodwin &amp; Dawkins, “What is an Organism? A Discussion” (<i>recommended</i>)</p>
<p>Week 6:                  Feb 8 &amp; 10</p>	<p><b>Topic: Units and Levels of Selection (Paradigm of Individuality #2)</b></p>
<p>Week 7                  Feb 15 &amp; 17</p>	<p><b>Topic: Multi-cellularity</b></p>
<p>Week 8:                  Feb 22 &amp; 24</p>	<p><b>Topic: Holobiont</b></p>
<p>Week 9:  <b>Feb 29</b></p> <p>Mar 2</p>	<p><b>Guest Lecturer: Matt Haber (University of Utah)</b>                  “Colonies are individuals: Revisiting the Superorganism Revival” <i>or</i>                  “The Individuality Thesis and the levels of Lineage”</p> <p><b>Topic: Superorganism</b></p>
<p>Week 10:                  Mar 7 &amp; 9</p>	<p><b>Topic: The Ecosystem View &amp; the Possibility for Weak Individuality</b></p>
<p>Week 11  <b>Final Exam</b></p>	<p><b>Final Papers/ Projects are due TBA.</b></p>

9. Other useful (**recommended**) but not required resources include the following:

*Books:*

- Julian Huxley, *The Individual in the Animal Kingdom*, Ox Bow Press, (1912)/ 1995
- Leo Buss, *The Evolution of Individuality*, Princeton UP, 1987
- Jack Wilson, *Biological Individuality: The Identity and Persistence of Living Entities*, Cambridge UP, 1999
- Robert Wilson, *Genes and Agents of Life: The individual in the Fragile Sciences*, Cambridge UP, 2005
- *Individuals Across the Sciences*, (eds) A. Guay & T. Pradeau, Oxford UP, 2016

*Journal issues:*

- **PNAS issue -**
- Van Baalen & Huneman (editors), *Biological Theory* (Thematic Issue: Organisms as Ecosystems/ Ecosystems as Organisms), 2014, vol. 9
- Huneman & Wolfe (editors), *History and Philosophy of Life Sciences* (Thematic Issue: The Concept of Organism: Historical, Philosophical, and Scientific Perspectives), 2010, vol. 32, issue 2/3

*Encyclopedia Articles:*

- David Hull, “Individual”, ”, in (eds) EF Keller & E. Lloyd, *Keywords in Evolutionary Biology*, Harvard UP, 1992, (pp.180-187)
- Wilson & Backer, “The Biological Notion of the Individual”, *Stanford Encyclopedia of Philosophy*, URL: <http://plato.stanford.edu/entries/biology-individual/>

**Topic: *The Nature of Scientific Explanation***

- Angela Potochnik, 2010, “Levels of Explanation Reconceived”, *Philosophy of Science*, 71:59-72
- Robert Brandon, 1997, “Does Biology have Laws? The experimental evidence”, *Philosophy of Science*, 64: S444-457
- James Woodward, “Scientific Explanation”, *Stanford Encyclopedia of Philosophy*

**Topic: *Distinction – Organism and Environment***

- Perlaman, 2000, “The Concept of Organism in Physiology”, *Theory Biosciences*, 119:174-186.
- Pradeau, 2010, “The Organism in Developmental Systems Theory,” *Biological Theory*, 5(3): 216–222.
- Pradeau, 2010, “What is an Organism? An immunological answer”, *History and Philosophy of Life Sciences*, 32:247-267
- Woodger, 1930, “The ‘Concept of Organism’ and the relation between embryology and genetics. Part 1 & 2”, *The Quarterly Review of Biology*, 5:1-22, 5:438-436
- R. Brandon, “The Concept of the Environment in the Theory of Natural Selection”, in *Adaptation and Environment*, Princeton UP, 1990 (pp.45-78)

**Topic: *Units and Levels of Selection***

- E. Lloyd, 1992, “Unit of Selection”, in (eds) EF Keller & E. Lloyd, *Keywords in Evolutionary Biology*, Harvard UP, 1992, (pp.334-340)
- E. Lloyd, 2001, “Units and Levels of Selection: An Anatomy of the Units of Selection Debates”, in R.S. Singh, C. B. Krimbas, D. B. Paul, and J. Beatty (eds.) *Thinking About Evolution – Vol. 2 – Historical, Philosophical, and Political Perspectives*.

- E. Lloyd, 2012, “Units and Levels of Selection”, *Stanford Encyclopedia of Philosophy*, URL: <http://plato.stanford.edu/entries/selection-units/>
- Lewontin, 1970, “The units of selection”, *Annual Review of Ecology and Systematics*, 1: 1–18
- Okasha, 2001, “Why Won't the Group Selection Controversy Go Away?”, *British Journal for the Philosophy of Science*, 52 (1): 25–50
- Okasha, 2003, “The concept of group heritability”, *Biology and Philosophy*, 18 (3): 445–461
- Okasha, 2004, “Multi-level Selection, Covariance and Contextual Analysis”, *British Journal for the Philosophy of Science*, 55: 481–504
- Okasha, 2004, “Multi-level Selection and the Partitioning of Covariance: a Comparison of Three Approaches”, *Evolution*, 58 (3): 486–494.
- Okasha, 2004, “The ‘Averaging Fallacy’ and the Levels of Selection,” *Biology and Philosophy*, 19: 167–184.
- Okasha, 2006, *Evolution and the Levels of Selection*, Oxford UP
- Sober, 1981, “Holism, individualism, and the units of selection”, *Proceedings of the Philosophy of Science Association*, 2: 93–121
- Sober, “Organisms, Individuals, and Units of Selection”, in *Organism & the origin of the Self*, (ed.) A. Tauber, Boston Studies in the Philosophy of Science, # 129 (Springer, 1990)
- Sober & Wilson, 1994, “A Critical Review of Philosophical Work on the Units of Selection Problem”, *Philosophy of Science*, 61: 534–555.