This course serves as the portal for first-year students in the doctoral Program in Ecology (PiE), although graduate students (MS and PhD) in other programs are welcome. Students and faculty in PiE range widely in their backgrounds and research interests, and this course is aimed at providing students with knowledge of the full range of ecological phenomena, questions, processes, scales, and research approaches, all embedded in the context of the history and philosophy of science in general and of ecology in particular. It is one of the few courses shared by all PiE students. Although this course will focus on any number of ecological particulars, its primary aim is to convey a sense of the “big picture” of ecology – its diversity, the interconnections among its subdisciplines, the advantages and shortcomings of its various research approaches, and its connections with other sciences (life, earth, environmental, computational, social) and disciplines (philosophy, history).

The fundamental concept underlying the course is that deep knowledge of ecology (or any discipline) must be grounded in an understanding of the historical development of its key concepts and research methods, and its philosophical underpinnings. In a complex discipline like ecology, it is essential to know the major axes – conceptual, philosophical, methodological - along which past and ongoing controversies have occurred. The course will provide exposure to these issues, foster development of skills in critical analysis and synthesis, and prepare you to respond productively to change and controversy in ecology through your career.

The overall aim of the course is to make you a better scientist. With philosophical and historical context, you’ll gain a much deeper appreciation of the intellectual venture itself. Furthermore, you’ll be equipped with conceptual and scholarly tools that will provide you with unique insights and allow you to cut through unproductive controversies and avoid unpromising avenues of inquiry. It’s certainly possible to become a technically competent and productive ecologist without understanding the history and philosophy of the field. But your career is more likely to be fruitful and satisfying with the deeper perspectives provided by the broader intellectual context.

RECOMMENDED TEXTBOOKS: (purchase not required, but highly recommended for your bookshelf. We will be reading extensively from all of these books). All books are available for purchase at the Second Story Bookstore in downtown Laramie.


**CLASS FORMAT:** The class will meet once a week. The meetings will consist of a combination of lecture presentations from the instructors and other faculty (PiE and elsewhere) and structured discussions based on the readings in context of the lecture material.

**GRADING:** Regular attendance is expected, as is reading of all assigned materials.

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<th>Component</th>
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<tr>
<td>Integration notes on readings</td>
<td>30%</td>
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<tr>
<td>Class attendance &amp; participation</td>
<td>30%</td>
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<tr>
<td>Presentation</td>
<td>15%</td>
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<tr>
<td>Synthesis paper (topic of your choice)</td>
<td>25%</td>
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**Integration notes on readings:** Each week we will read several papers or excerpts. You will be expected to prepare some notes in which you integrate the readings, tying them in with previous readings, lectures, course themes, and other knowledge (i.e. from outside the class). *These writings do not have to be polished, nor exhaustive, nor particularly long!* We expect complete and coherent sentences, but they do not have to be perfectly written. You will be expected to *add value* to each reading – by this we mean provide some serious thinking and integration of the reading that you can bring to the discussion. **You should try hard to put each reading in both the broader context of scientific pursuit and the specific context of your research and experience.** The integration notes can be done separately for each reading, or as a single body covering all the readings for the section. Length is up to you; minimum should be approximately one short paragraph (e.g., 3-4 key sentences) per reading. Many of you may choose to do more, particularly for readings that are provocative in light of your interests and experiences. The total length should be on the order of 1-2 pages. In addition to the notes, you should either: 1) highlight 1-5 key sentences within the notes that you believe are particularly provocative or compelling or 2) write a 1-5 sentence block of text which summarizes the most important of your original insights.

These integration notes are aimed at provoking synthesis. In fact, you can look at them as trial balloons for the Synthesis Paper (see below). What elements of the readings are contradictory? What elements are complementary? What do you gain by looking at the issue or controversy from an historical perspective? What do you gain by applying philosophical perspectives to the issue? How do history and philosophy complement each other (or do they)? What issues discussed in previous class meetings arise? These questions would be useful contexts for selecting your 1-5 key sentences (see above).

These notes are intended to get you thinking hard about the readings and to provide material for discussion. **They are due (as MS Word documents) sent by email to the instructors and your fellow students at 0800 the morning of the discussion.** The instructors may single out particular notes for elaboration or specific attention during the discussions.

**Discussion participation:** All are expected to participate actively and positively in discussions. For some discussions (mainly Weeks 6 – 9), you will be assigned specific roles – as advocates for a particular point of view, or as inquisitors and adjudicators. These roles will require varying degrees of advance preparation.

**Presentations:** Each student will present a 20-30 minute lecture that synthesizes the history, conceptual/philosophical issues, and current status of an important concept, theory, paradigm, or
research approach relevant to their chosen area of study.

**Synthesis paper:** The paper topic will be of your choice in consultation with the instructor, and can overlap heavily (or entirely) with the topic you choose for your lecture. The paper will consist of (1) a review of the historical roots and development of a “concept” (here broadly defined so as to potentially include theory, hypothesis, paradigm, research approach, etc.) relevant to your own research interests, together with (2) analysis and synthesis of philosophical controversies (major or minor) that involve that “concept” and (3) a brief summary of the current status of the “concept” and its future prospects (e.g., extinction, evolution, hybridization with other concepts, stasis, imminent revolution, etc.).

**ACADEMIC HONESTY:** Science is based upon trust; we can't check every piece of text for originality nor repeat every experiment to verify its outcome. Violation of this trust is a serious offense, and typically results in career-terminating or -crippling punishment. In this spirit, any violations of trust in this class (plagiarism, cheating, etc.) will be dealt with severely; we retain the option of giving an "F" for the entire course grade and bringing formal charges through the due process procedure of the University if such violations come to our attention. If you are in doubt about the validity of any action, ask us first.

**NOTE:** This syllabus, especially the class schedule, is subject to minor changes. Any such changes will be posted in the form of supplements or revisions to be handed out in class or e-mailed to the entire class.

**CLASS SCHEDULE**

<table>
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| 1 (29 VIII) | a) Introduction and organization  
  b) strategies for success in graduate school  
  c) Thinking about science: Evolution of perceptions on the nature and limitations of scientific knowledge (Jackson) |
| 2 (5 IX) | What is philosophy? Introduction to key philosophical concepts relevant to science (Lockwood) |
| 3 (12 IX) | What is science? Introduction to the philosophy of science (Lockwood) |
| 4 (19 IX) | Whence came ecology? Deep roots and historical development of ecology as a science. And, what is ecology, anyway? (Jackson) |
| 5 (26 IX) | Conceptual tensions in ecology (and science): reductionism vs. holism, determinism vs. stochasticism, biocentrism vs. envirocentrism, experimental vs. observational, essentialism vs. nominalism, atomism vs. universalism, scaling issues) (Jackson & Lockwood) |
| 6 (3 X) | Case studies in ecological concepts and controversies:  
  What are ecosystems? Are they real? Do they have predictable attributes and properties? (Tansley, Lindeman, Odum, modern & postmodern conceptions. Issues: holism/reductionism; scaling; ontology; experimental/modeling/observation) |
7 (10 X)  Case studies in ecological concepts and controversies:
Community structure in space and time (Clements, Gleason, & ff).
Issues: holism/reductionism; determinism/stochasticism; essentialism/nominalism;
biocentrism/envirocentrism; scaling

8 (17 X)  Case studies in ecological concepts and controversies:
What controls the distribution and abundance of organisms? (e.g., density-dependent vs.
density-independent controls, Moran effects, etc.)
Issues: determinism/stochasticism; biocentrism/envirocentrism; atomism/universalism;
experimental/modeling/observation; scaling

9 (24 X)  Case studies in ecological concepts and controversies: what controls community
structure? (The epic struggle between McArthurian and post-McArthurian ecology)
Issues: locus of explanation; determinism/stochasticism; biocentrism/envirocentrism;
scaling; experimental/modeling/observation

10 (31 X) Panel Discussion on methodological tensions in ecology:
Observational vs. experimental
Guest disputants: Buskirk, Doak, Pendall, Martinez del Rio, Weinig

11 (7 XI) Panel Discussion on methodological tensions in ecology:
Modeling approaches, assets, and liabilities
Guest disputants: Buerkle, Kaufmann, McDonald, Ogle, Rahel

12 (14 XI) Panel Discussion on methodological tensions in ecology:
Scaling in space and time
Guest disputants: Ewers, Hall, Reiners, Shuman, Ward

13 (28 XI) Student presentations

14 (5 XII) Student presentations (as needed) and ethical case studies in science (Lockwood &
Jackson) *(Student synthesis papers due!!!)*

15 (12 XII) FINALS WEEK; no class