I. Required Texts:

*Readings in the Philosophy of Science*, edited by Theodore Schick (Mayfield, 1999)

*Introduction to the Philosophy of Science*, by Robert Klee (Oxford, 1997)

II. Course Description:

This course satisfies the "Arts and Humanities" (S2) section of the General Education Program. All courses in this section are designed to promote systematic reflection on questions concerning the structure and meaning of existence and knowledge. Achieving this goal involves developing an appreciation for and assessments of alternative world views and rival conceptual systems that have played central roles in human culture— influencing art, science, government, literature, and other important aspects of civilization.

Philosophy of Science is the discipline that aims to understand the goals, methodology and structure of scientific knowledge. The main topics of this course include: scientific methodology, induction and deduction, unification of scientific knowledge, the boundary between science and pseudo-science, scientific progress, the relation between theory and observation, and relativism vs. absolutism. Philosophers studied include: A. J. Ayer, Rudolf Carnap, Karl Popper, Thomas Kuhn, Nicholas Maxwell, David Hume and W. V. Quine.

**Student Learning Outcomes (SLOs) for Phil 330**

Students will:

1. Explain and reflect critically upon the human search for meaning, values, discourse and expression in one or more eras/stylistic periods or cultures;
2. Analyze, interpret, and reflect critically upon ideas of value, meaning, discourse and expression from a variety of perspectives from the arts and/or humanities;
3. Use appropriate critical vocabulary to describe and analyze works of artistic
expression, literature, philosophy, or religion and a comprehension of the historical context within which a body of work was created or a tradition emerged.

**Course objectives (COs) for Phil 330**

Students will:
1. Become familiar with the vocabulary used for analysis and evaluation of arguments.
2. Identity and reflect critically upon central concerns and arguments in the philosophy of science in works they read by major figures in the discipline.
3. Articulate the arguments authors present for their claims.
4. Explain important objections to the central claims made in the works they read by major figures in the philosophy of science.
5. Engage in discussion of the issues, positions, and arguments in the works they read by major figures in the philosophy of science.
6. Develop their own evaluation of the strengths and weaknesses of the arguments advanced in the works they read.

Alignment of COs and SLOs.

<table>
<thead>
<tr>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>COs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>1,2,3,4,5,6</td>
<td>1,4,5,6</td>
</tr>
</tbody>
</table>

**Writing Intensive (WI) SLOs addressed in Phil 330**

Students will:
1. Write brief expository pieces explaining a philosophical issue or question, and concepts and terminology central to discussion of that issue.
2. Write thesis defense essays articulating and arguing for a stance on a philosophical issue.
3. Write essays explaining and responding to objections to their philosophical positions.
4. Write drafts of papers on philosophical issues, receive comments on those drafts, and revise their work in light of constructive comments.
5. Write research papers integrating philosophical resources from a variety of sources, and acknowledging their sources in accordance with recognized bibliographic standards (such as MLA or Chicago).

Alignment of COs and SLOs

<table>
<thead>
<tr>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
<th>SLO 4</th>
<th>SLO 5</th>
<th>SLO 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>COs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2,3,4</td>
<td>5</td>
<td>4</td>
<td>1,2,3,4</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**III. Course Requirements:**
1. Two Exams @ 60%. Exam I -- tentative date -- March 16; Exam II -- tentative date-- May 11. Exams include multiple choice questions, short answers and essays. They will cover material from readings, class lectures and discussion. Study questions will be given to students in advance of the two exams. (Note that the last exam is not given during Final Exams week, but rather the last day of scheduled class.)

3. Class participation/attendance/punctuality @ 10%. Students are required to participate in class discussions and evaluate critically the material presented. Since the success of the class depends in part on the willingness of students to become actively involved in the subject, a significant portion of the final grade is determined by participation. Students who raise questions during lectures and participate in class discussions and group dynamics will be rewarded with a participation grade proportional to their contribution to the class. Failure attend class or arrive on time will result in penalties to this portion of your grade.

4. Weekly quizzes @ 30%. Quizzes cover readings and lectures. One quiz grade, the lowest of your quizzes, will be dropped. The remainder will be averaged for this portion of your grade.

IV. Grading Standards:

<table>
<thead>
<tr>
<th>Final %</th>
<th>92</th>
<th>90-91.9</th>
<th>88-89.9</th>
<th>82-87.9</th>
<th>80-81.9</th>
<th>78-79.9</th>
<th>72-77.9</th>
<th>70-71.9</th>
<th>68-69.9</th>
<th>62-67.9</th>
<th>60-61.9</th>
<th>59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter Grade</td>
<td>A</td>
<td>A-</td>
<td>B+</td>
<td>B</td>
<td>B-</td>
<td>C+</td>
<td>C</td>
<td>C-</td>
<td>D+</td>
<td>D</td>
<td>D-</td>
<td>F</td>
</tr>
</tbody>
</table>

V. Class Policies and Etiquette:

There are no shortcuts to learning philosophy. The subject demands that students learn in the old-fashioned manner of time-consuming and disciplined study. This means you must spend time reading the classic texts of philosophy (and secondary sources), devote your attention to lectures and involve yourself in critical discussion of the material covered.

Violations to the course policies, especially when they result in a disruption to the class, will result in penalties to the student’s participation grade. Policies will be strictly enforced.

1. Attendance is necessary to do well in the course. If you must miss class for any reason, you are responsible for making up any work missed. Find out before coming to class what you missed and make sure you are prepared for the session. Excessive absence, defined as 6 to 8 absences, will significantly lower your grade and normally results in failure.
2. Attendance alone is not sufficient for passing the class. Prepare for each class carefully and take an active role in discussions. As a general rule, you should spend two hours preparing for each hour spent in class.

3. Punctuality is a requirement, not an option. You are expected to be seated and ready for class at the time that class begins. Once the class session begins and you arrive late, you will be considered late and points will be deducted from your participation grade.

4. Leaving class without prior permission from the instructor will not be permitted, especially after quizzes given at the beginning of the class period. Walking in and out of class on your own schedule is a disturbance to others.

5. You are required to sit the exams during the scheduled times. Do not schedule anything that conflicts with the exams. Do not assume that a make-up exam or quiz will be given if you miss class. There are no make-up quizzes or exams for unexcused absences. If an absence is excused, prior notification is required. Make-ups are rare and given only under extreme circumstances. Documentation such as a doctor’s note or police report will be required for an excused absence.

6. Eating in class is not permitted. This is the time for discussion and concentration on the subject.

7. Cell phones, pagers and any other electronic devices should be turned off prior to class sessions. This includes text-messaging. “Off” means “off,” not vibrate. Laptop computers are permitted as long as they are used for taking notes.

8. There are no extra credit assignments in lieu of failing exams or quizzes.

9. The last day to withdraw from the course is Friday, February 11. After that date, withdrawals are not permitted. See Spring 2011 Schedule of Classes.

10. The instructor is committed to upholding the university’s policy regarding academic dishonesty. See the university catalogue, Appendix C, Academic Dishonesty.

VI. Tentative Schedule of Topics

1. Introduction to the Philosophy of Science

   Reading:
   Robert Klee, Chapter 1

2. Science and Non-Science: Defining the Boundary
   Science and Pseudo-science
Standard Empiricism
Aim-Oriented Empiricism
Scientific Progress

Readings:
Karl R. Popper, “Science: Conjectures and Refutations”
Thomas S. Kuhn, “Logic of Discovery or Psychology of Research”
Imre Lakatos, “Falsification and the Methodology of Scientific Research Programs”
Nicholas Maxwell, “Popper, Kuhn, Lakatos and Aim-Oriented Empiricism,”
http://philsci-archive.pitt.edu/archive/00000251/
Leemon McHenry, “Popper and Maxwell on Scientific Progress”
http://www.csun.edu/~lmcenary/PopperandMaxwellonScientificProgress.html
Larry Laudan, “Science at the Bar—Causes for Concern”
Micheal Ruse, “Pro Judice”

Robert Klee, Chapters 2 and 3.

3. Induction and Confirmation: The Nature of Scientific Inference
   Causation, Inductive Knowledge and Confirmation,
   Underdetermination of Theory, Holism, Pragmatism

Readings:
David Hume, “The Problem of Induction”
Carl Hempel, “The Role of Induction in Scientific Inquiry”
Karl Popper, “The Problem of Induction”
Pierre Duhem, “Physical Theory and Experiment”
Leemon McHenry, “Quine’s Pragmatic Ontology”

Robert Klee, Chapter 4.

4. The Unity of Science: Are All Sciences Reducible to Physics?
   Metaphysics and Ontology
   Grand Unification Theories and the Theory of Everything
   The Problem of Reductionism

Readings:
Paul Oppenheim and Hilary Putnam, “Unity of Science as a Working Hypothesis”
Jerry Fodor, “Special Sciences”
John Dupré, “The Disunity of Science”

Robert Klee, Chapter 5

5. Theory and Observation: Is Seeing Believing?
Readings:
Rudolf Carnap, “The Methodological Character of Theoretical Concepts”
Mary Hesse, “Is There an Independent Observation Language?”
N. R. Hanson, “Observation”
Thomas Kuhn, “The Structure of Scientific Revolutions”
Larry Laudan, “A Problem-Solving Approach to Scientific Progress,”
Robert H. Thouless, “Parapsychology during the Last Quarter of a Century”
Daisie Radner and Michael Radner, “Parapsychology: Pre-Paradigm Science”

Robert Klee, Chapter 7

6. Science and Objectivity: The Science Wars
   Rationality and Objectivity
   
   Readings:
   Stephen Cole, “Voodoo Sociology: Recent Developments in the Sociology of Science”

Robert Klee, Chapters 8 and 9

7. Realism and Antirealism: Does Science Reveal Reality?
   
   Readings:
   Grover Maxwell, “The Ontological Status of Theoretical Entities”
   Bas C. van Fraassen, “Constructive Empiricism”
   Paul M. Churchland, “The Anti-Realist Epistemology of van Fraassen’s The Scientific Image”
   Ian Hacking, “Experimentation and Scientific Realism”
   Arthur Fine, “Natural Ontological Attitude”
   James Robert Brown, “Explaining the Success of Science”

Robert Klee, Chapter 10

8. Science and Religion: Reason versus Faith
   
   Readings:
   Paul Feyerabend, “Science and Myth”
   Richard Dawkins, “Is Science a Religion?”
   Alvin Plantinga, “When Faith and Reason Clash: Evolution and the Bible”
   Ernan McMullan, “Evolution and Special Creation”
   Peter Atkins, “Purposeless People”
   Martin Gardner, “Science and the Unknowable”

9. Corruption of Science by Industry Influence
   Evidence-based Medicine vs. Spin/Marketing Based Medicine,
   Corruption of Medical Knowledge by Industry Ghostwriting
Readings:

Richard Horton, “The Dawn of McScience”
Leemon McHenry, “Ethical Issues in Psychopharmacology”
Leemon McHenry, “Biomedical Research and Corporate Interests: A Question of Academic Freedom”

Disclaimer: The instructor reserves the right the change the schedule and order of topics.

VII. Recommended Reading

Alioto, Anthony M., A History of Western Science (Prentice Hall, 1987)

Bird, Alexander, Philosophy of Science (McGill-Queen’s, 1998)


Corvi, Roberta, An Introduction to the Thought of Karl Popper (Routledge, 1993)


____________, The God Delusion (Houghton Mifflin, 2006)


Giere, Ronald N., Bickle, John, Mauldin, Robert, Understanding Scientific Reasoning (Wadsworth, 2006)

Hawking, Stephen W., A Brief History of Time: From The Big Bang to Black Holes (Bantham, 1988)


______________, *The Structure of Scientific Revolutions* (University of Chicago Press, 1970)


______________, “Has Science Established that the Universe is Comprehensible?” *Cogito*, 13/2, 1999.


______________, “Popper and Maxwell on Scientific Progress,” *From Knowledge to Wisdom: Studies in the Thought of Nicholas Maxwell* (Frankfurt: Ontos Verlag, 2009)

Popper, Karl, The Logic of Scientific Discovery (Hutchinson & Co, 1959)


__________, The Open Society and its Enemies, 2 vols. (Routledge, 1945)

Radner, Daisie and Radner, Michael, Science and Unreason (Wadsworth, 1982)

Weinberg, Steven, Dreams of a Final Theory (Pantheon, 1992)
