Philosophy of Science Lecture Course

Philosophy of science is an important part of the ETSI curriculum for two reasons. First, while the monastic students are sophisticated learners, they have had little contact with the methods of science. They need to understand how western science poses and answers its questions so that they can crucially engage science in appropriate ways. A little knowledge of the philosophy of science thus enhances their appreciation of science. Second, the relationship between science and religion is a fundamentally philosophical question, albeit one that is typically treated as a problem in the philosophy of religion, not the philosophy of science. To engage this larger question, Tibetan monastics need a sophisticated understanding of the epistemological, metaphysical and ethical presuppositions of modern science. These presuppositions are a central topic of the philosophy of science, and therefore a course in the philosophy of science facilitates a deeper appreciation of the relationship between science and Buddhism.

This lecture course aims to fulfill the above two functions by meeting the following specific goals:

1. Know the elements of scientific inquiry, including the way scientific questions are posed and theories are formulated.
2. Understand the characteristics of scientific reasoning, including sampling, experimentation, and inferences from correlations to causes.
3. Appreciate some of the philosophical questions that arise out of scientific inquiry, including the issue of reductionism, ontological commitments of scientific theory, and ethical consequences of scientific research

Lectures are coordinated with chapters from Samir Okasha's *Philosophy of Science: A Very Short Introduction* (Oxford, 2002).

Lecture Topic	Book Chapter(s)	Key questions
1. Scientific Inquiry • Theory vs observation • Unobservable entities • Theory Structure: Laws • Theory Structure: Models	1. What is Science? 3. Explanation in Science 6. Philosophical problems in Physics, Biology, and Psychology	What are the elements of scientific inquiry? What is the difference between theory and observation? How are scientific theories constructed?
2. Theory Testing • Induction and deduction • Falsification • Inference to the Best Explanation	2. Scientific Reasoning	How have western philosophers understood logical inference? How should scientists choose among alternative theories?
3. Probability and Sampling • Probability and Chance • Sampling • Normal distribution • Correlations	2. Scientific Reasoning	What is probability and how is it determined? What is a correlation? How are distributions and correlations identified, and why is this important

• Error estimates (p-values)		for scientific reasoning?
4. Causality • Philosophical theories of causality: Regularity theory (Hume), Interventionism • Causes and Mechanism • Experimentation • Internal and External Validity	3. Explanation in Science	How has causality been conceptualized in the western philosophical tradition? How should scientists go about discovering causal relationships?
5. Scientific Change • Progress through corroboration (Popper) • Paradigms (Kuhn) • Pluralism • Realism and anti-realism	4. Realism and Anti-Realism 5. Scientific Change and Scientific Revolutions	Does science make progress? Is there a single scientific method? Can science discover what the world is "really like"?
6. Reductionism • Mind and Matter • Supervenience • Inter-level modeling	3. Explanation in Science	What is the relationship among the sciences, e.g. biology and psychology? Do minds exist over and above brains, or does scientific research presuppose that minds are nothing but brains?
7. Science and Society • Science and Social Policy • Values and Risk • Objectivity	7. Science and its Critics	What are the moral consequences of doing scientific research? What influence should moral considerations have on scientific research? What does scientific objectivity require?