Philosophy 173 A01
Scientific Reasoning
Mondays, Wednesdays and Thursdays, 2:30 – 3:30pm
CLE A203

Instructor: Dr. Carrie Klatt
Office: CLE B311
Email: cklatt@uvic.ca
Office Hours: Mondays and Thursdays 11:30am – 12:30pm,
Wednesdays noon – 2pm, and by appointment.
Text: Scientific Thinking by Robert M. Martin

Course Objectives:

Scientific inquiry is heralded as an archetype of the rational study of the world. But how is it that the project of science enables us to say true things about the world around us? This course serves as an introduction to patterns of reasoning that are used in the sciences. In this course we will investigate both the methods and the philosophical underpinnings of the methods used in science. Topics covered will include:

Unit 1: The Scientific Argument
- Empiricism and Realism
- Lessons learned from Kuhn and Popper
- Deduction and Induction
- Recognizing and analyzing argument patterns

Unit 2: Statistical Reasoning
- Probabilities, statistics and Bayes’ Theorem
- Using samples
- Understanding correlations

Unit 3: Classification
- Categories, Kinds and Laws of Nature
- The Logic of Categories (translations, Venn diagrams, validity)

Unit 4: Explanations
- The Deductive-Nomological method
- Evaluating Hypotheses

Unit 5: Causes
- Identifying causes, lessons learned by Hume
- The role of experiment
- Non-experimental methods
- What is scientific truth?
Course Requirements:

Assignments (Best 10 of 12) 2% each = 20%
Tests (Jan. 21st, Feb. 5th, Mar. 9th) 3 x 15% each = 45%
Final Exam (tba, during exam period) = 35%

Tests and assignments will involve a combination of written answers and calculations. Some of the assignments will be submitted on our CourseSpaces site, others will be written. All assignment questions will be posted on our class CourseSpaces site.

Anyone who misses a test or the exam (and has a legitimate, documented excuse) must contact the instructor as soon as possible to schedule an alternate time to write the test. **Late assignments will not be graded.**

The final grade will be given as a percentage.

About the Instructor:

My first undergraduate degree was in Theoretical Physics from McMaster University. I had always been interested in the challenge that the sciences offered but my draw to physics was initiated by another desire – to know the secrets of the world around us. During my time at McMaster I was fortunate to take my electives from the philosophy department. Philosophy offered me new intellectual challenges but also provided an enriched view of the purpose and role of science. It was there that I realized that if science was telling us the “truth” of the natural world, then that “truth” had certain conditions. The act of scientific inquiry is not like opening a book of nature’s secrets that we are simply to read. It is something else entirely. If we can understand this difference, it will make for better science. In this course I would like to share the insights that philosophy has to offer the scientist and also to ensure that you have the tools needed to be able to evaluate scientific arguments given in and out of the classroom.

Course Material on CourseSpaces

The course outline, all assignments, class notes and handouts will be posted on our class CourseSpaces site. If you are unfamiliar with CourseSpaces, please come by and see me. Your grades will also be posted on CourseSpaces.

Tests and writing assignments will be returned in class as soon as they are graded. For those students who have signed a Department of Philosophy Privacy Waiver (found on our class CourseSpaces site), graded work not picked up in class will be placed in a mailbox labeled with the number of this course located next to the office of the Department of Philosophy, CLE B334. All other graded materials must be picked up from the instructor during office hours.

Office Hours

If you are unable to attend office hours, please feel free to contact me to arrange another convenient time to meet. I am on campus almost every day. If you plan to drop in
during office hours, send me a quick email beforehand so I can make sure that I am
available when you plan to arrive.

If you have any problems with the course material, please come by and see me as soon
as possible. I find that most difficulties that students have can be cleared up quite
quickly.

Other Information

For N grades and DEF status, please see Calendar.

Information regarding religious observance can be located in the UVIC Calendar, and in
posted Department of Philosophy Policies.

Final examinations are the property of the University and will not be returned. They are
available for viewing at the Records Office according to UVIC procedures and regulations.

Academic Misconduct

See the section Policy on Academic Integrity in the UVic calendar for information on
cheating and its consequences. In particular, note that:

“Cheating includes, but is not limited to:

- copying the answers or other work of another person
- sharing information or answers when doing take-home assignments, tests or
  examinations except where the instructor has authorized collaborative work
- having in an examination or test any materials or equipment other than those
  authorized by the examiners
- accessing unauthorized information when doing take-home assignments, tests or
  examinations
- impersonating a student on an examination or test, or being assigned the results
  of such impersonation
- accessing or attempting to access examinations or tests before it is permitted to do
  so

Students found communicating with one another in any way or having unauthorized
books, papers, notes or electronic devices in their possession during a test or
examination will be considered to be in violation of this policy.

Aiding Others to Cheat

It is a violation to help others or attempt to help others to engage in any of the conduct
described above.”

Cheating will not be tolerated and will result in a zero on the test or assignment or failure
in the course.
### Syllabus:

<table>
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<tr>
<th>Date</th>
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<tr>
<td>Jan. 5th</td>
<td>Introduction (no readings)</td>
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<tr>
<td>Jan. 7th</td>
<td>Empiricism and Realism - Chp 1</td>
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<td>Jan. 8th</td>
<td>Kuhn</td>
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<td>Jan. 12th</td>
<td>Scientific Arguments – Chp 2</td>
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<td>Jan. 14th</td>
<td>Popper</td>
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<td>Jan. 15th</td>
<td>Recognizing Argument Patterns, Review</td>
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<td>Jan. 26th</td>
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<td>Jan. 28th</td>
<td>Probability Calculus</td>
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<td>Jan. 29th</td>
<td>Probability Calculus cont’d</td>
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<td>Feb. 2nd</td>
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<td>Feb. 4th</td>
<td>Review</td>
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<td>Feb. 5th</td>
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<td>Feb. 9th, 11th, 12th</td>
<td>Reading Break (no classes)</td>
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<td>Categorical Logic – Categorical Forms</td>
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<td>Venn Diagrams and the Square of Opposition</td>
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<td>Categorical Syllogisms - Validity</td>
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<td>Translations</td>
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<td>Mar. 5th</td>
<td>Explanations – the Deductive-Nomological Model -- Chp 9</td>
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<td>Problems with the D-N Model - Chp 10</td>
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<td>Hypotheses - Chps 11 and 12</td>
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<td>Disconfirming Hypotheses - Chps 13 and 14</td>
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<td>Causes and Hume - Chp 17</td>
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