

Logic: Principles of Reasoning (LOGC) Course Syllabus

Content	Activities
<p>WEEK ONE</p> <p>1. Monday</p> <p><i>Morning</i></p> <ol style="list-style-type: none"> 1. Personal Introductions; Honor Code, Computer Use Form 2. Pre-test; Questionnaire 3. Hurley, chapter 1.1: The basics of arguments: argument, statement, truth value, non-statements (i.e. questions, proposals, etc). 4. Premises and conclusions—indicator words; inferences 	<ol style="list-style-type: none"> 1. Discussion: should one ever believe something on insufficient evidence? What constitutes evidence? How does it relate to arguments? 2. Students worked in teams to solve logic puzzle #1 3. Viewed Monty Python’s Argument Clinic and then discussed the difference between an argument and a verbal fight 4. Premise and Conclusion Indicator Game 5. Exercises in Hurley I.1.I + II (group work through the exercises)
<p><i>Afternoon</i></p> <ol style="list-style-type: none"> 1. Hurley 1.2: inferential versus non-inferential statements (arguments versus explanation, illustration, etc) 2. Introduction to the discipline of philosophy: etymology of “philosophy”, origin of philosophy, differences between philosophy and science and philosophy and religion 3. The Branches of Philosophy 	<ol style="list-style-type: none"> 1. Class rules discussed and established. 2. Students worked in teams to solve logic puzzle #2 3. Students in groups gave mini-presentations on the eight types of non-inferential passages 4. Exercises in Hurley I.2.I (group work through the exercises) 5. Discussion on how wisdom differs from knowledge; discussion on how science, religion, and philosophy differ from and overlap with each other.

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<p><i>Evening Study Hall</i></p> <p>1. What we don't argue about: (1) facts, (2) opinions. The difference between an opinion and an arguable statement.</p>	<p>1. A closer look at stating an opinion and giving an argument. Activity: write a rant about something. To what extent is it an argument? To what extent can it be turned into an argument?</p> <p>2. Students studied for Quiz #1</p>
<p>2. Tuesday</p> <p><i>Morning</i></p> <p>1. Quiz #1</p> <p>2. Hurley 1.3: Induction versus Deduction: How to distinguish induction from deduction; examples of five types of deductive and six types of inductive arguments.</p> <p>3. Introduction to the five logical operators for propositional logic (and, or, not, if...then, if and only if)</p> <p>4. Modus ponens, modus tollens, and the fallacies of denying the antecedent and affirming the consequent discussed.</p>	<p>1. Students worked in Harry Potter houses to solve logic puzzle #3</p> <p>2. Students paired up and read about each type of deductive or inductive argument, create their own example, and presented them to the class in a discussion format.</p> <p>3. Discussion of Sherlock Holmes: read a passage, talked about inductive methods and the difference between pure guessing and induction.</p> <p>4. Worked through problems sets for Hurley 1.3 individually</p>
<p><i>Afternoon</i></p> <p>1. Evaluating Deductive Arguments: validity and soundness (Hurley, 1.4).</p> <p>2. Evaluating Inductive Arguments: strength and cogency.</p>	<p>1. Students worked in Harry Potter houses to solve logic puzzles #4-5.</p> <p>2. Individual work on problem set for chapter 1.4.I Discussion of answers.</p> <p>3. As an example of a deductive argument, student paired up, read, and discussed also in pairs Anselm's Ontological Argument in his <i>Proslogion</i>.</p> <p>4. Then, as a class, we derived Anselm's premises and conclusion, and we began evaluating the argument.</p>
<p><i>Evening Study Hall</i></p>	<p>1. Discussion of Anselm continued. We explored how the argument was valid and then debated its soundness. We used Guanilo's island as an introduction to the counter-argument method.</p> <p>2. We looked at Descartes's formulation of the Ontological Argument and Kant's "existence is not a predicate" objection.</p> <p>3. Studying for the quiz #2</p>

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<p>3. Wednesday <i>Morning</i></p> <ol style="list-style-type: none"> 1. Quiz #2 2. The Counter-Example Method to Test for Invalidity: how to isolate the logical form of both categorical and hypothetical syllogisms (Hurley 1.5). 3. A closer look at hypothetical syllogisms: Necessary and Sufficient Condition 4. Introduction to Categorical Propositions and Deductive Arguments: discussion and practice of key concepts—quantity, quality, subject term, predicate term, copula, and distribution. 	<ol style="list-style-type: none"> 1. Students worked in Harry Potter houses to solve logic puzzles #6-7. 2. Problem set for Hurley 1.5: students took turns presented their answers on the board. 3. Problem set on necessary and sufficient conditions. 4. Problem set on categorical propositions (Hurley 4.1 & 4.2)
<p><i>Afternoon</i></p> <ol style="list-style-type: none"> 1. Review of Quiz #2 2. Introduction to Venn Diagrams 3. The Traditional Square of Opposition (immediate inferences involving implication, contraries, sub-contraries, and contradictories) 4. Using Venn Diagram to show the validity of the inferences on the Square of Opposition 5. Introduce The Trial and Death of Socrates as reported by Plato. Close reading of the dialogue, <i>Euthyphro</i>. Introduction to Socratic irony, Socratic Method, and “the unexamined life is not worth living.” 	<ol style="list-style-type: none"> 1. Students worked in Harry Potter houses to solve logic puzzle #8-9. 2. Students worked individually to explain how to represent A, E, I, and O propositions using Venn Diagrams. 3. Students discussed the four logical relationships of the Tradition Square of Opposition. 4. Discussion and group reading of first part of the <i>Euthyphro</i>: students worked outside for this.
<p><i>Evening Study Hall</i></p>	<ol style="list-style-type: none"> 1. Finish reading the Russell essay; student wrote a paragraph response to the essay 2. Studying for the quiz #3
<p>4. Thursday <i>Morning</i></p> <ol style="list-style-type: none"> 1. Quiz #3 2. Introduction to Fallacies: formal from informal fallacies distinguished. 3. The Informal Fallacies: examination of the fallacies of relevance (Hurley 3.1-3.2) and the fallacies of weak induction (Hurley 3.3) 	<ol style="list-style-type: none"> 1. Students worked in Harry Potter houses to solve logic puzzle #10 2. Students broke up into groups of two or three and presented one fallacy of relevance each to the class with examples. 3. Students also made small posters for each fallacy; these posters were hung around the room for future reference. 4. Students worked together on problem set in Hurley 3.2 and 3.3

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<p><i>Afternoon</i></p> <ol style="list-style-type: none"> 1. Review of Quiz #3 2. The Converse, Obverse, and Contrapositive of Categorical Propositions 3. Using Venn Diagrams to show the validity of each of these three immediate inferences. 4. The Informal Fallacies Concluded: fallacies of presumption, ambiguity, and grammatical syntax 	<ol style="list-style-type: none"> 1. Students worked in Harry Potter houses to solve logic puzzle #11 2. As in the morning, students broke up into groups of two and presented one fallacy of the eight remaining. 3. Additional fallacy posters were constructed for the remaining fallacies.
<p><i>Evening Study Hall</i></p>	<ol style="list-style-type: none"> 1. Logic Puzzle #12 2. Fallacy Skit Project: Students broke into five groups of three, and wrote and practiced skits illustrating at least three informal fallacies. 3. Quiet Study Time for morning quiz
<p>5. Friday</p> <p><i>Morning</i></p> <ol style="list-style-type: none"> 1. Quiz #4 2. Concluded reading and discussion of Plato's <i>Euthyphro</i>. 3. Overview of Plato's <i>Apology</i> and uses of logic and rhetoric in court cases. Socrates' Divine Mission and definition of a sophist. 4. Sophism connected to the informal fallacies. 5. Testing Validity for Categorical Syllogisms: the four rules to test for validity, including the Fallacies of Undistributed Middle, Illicit Minor, and Illicit Major 	<ol style="list-style-type: none"> 1. Discussion of Plato's <i>Euthyphro</i> and the first half of the <i>Apology</i>. 2. Logic Puzzle #13 3. Practice: testing validity of categorical syllogisms using the rules.

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<p><i>Afternoon</i></p> <p>1. Further Illustration of the Informal Fallacies: students watched <i>Twelve Angry Men</i> starring Henry Fonda.</p>	<p>1. Students watched the film and given a character to especially scrutinize in order to determine which informal fallacies the character committed.</p> <p>2. Discussion of the film – including an introduction to the hypothetical deductive method; the role of prejudice in reasoning; the definition of reasonable doubt.</p>
<p>6. Sunday</p> <p><i>Evening Study Hall</i></p>	<p>1. Plato’s <i>Apology</i> – reading and discussion: is the examined life really better than the unexamined one?</p> <p>2. Review and study time for the first examination.</p>
<p>WEEK TWO</p> <p>7. Monday</p> <p><i>Morning</i></p> <p>1. First Examination</p> <p>2. Induction: Arguments from Analogy (Hurley, chapter 10) and Paley’s Teleological Argument (or Argument from Design) as an example</p> <p>3. Introduction to Semantics: theory of meaning; cognitive versus emotive meaning; defective cognitive meaning: vagueness and ambiguity; verbal versus factual (Hurley 2.1)</p>	<p>1. Logic puzzle #14</p> <p>2. Discussion of the Paley’s argument.</p> <p>3. Reading and discussion of George Wallace’s speech against the Civil Rights Act of 1964 as an example of emotive meaning</p> <p>4. Problem set on verbal and factual disputes.</p>

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<p><i>Afternoon</i></p> <ol style="list-style-type: none"> 1. Introduction to Mood and Figure as a way of classifying categorical syllogisms. 2. Testing categorical syllogisms using Venn Diagrams (Aristotelian tradition) 3. Continuation of our discussion of semantics using Martin's text. 	<ol style="list-style-type: none"> 1. Logic Puzzle #15 2. For the semantics section, student took turns reading chapter one in Martin's <i>There are Two Errors in the the Title of this Book</i>. (handout) Discussion of "differences that make no difference." [William James' Pragmatic Theory of Meaning.]
<p><i>Evening Study Hall</i></p>	<ol style="list-style-type: none"> 1. Wall of Shame game for practicing Venn Diagrams for categorical syllogisms. 2. Study time for tomorrow's quiz.
<p>8. Tuesday</p> <p><i>Morning</i></p> <ol style="list-style-type: none"> 1. Quiz #5 2. Semantics continued: Hurley 2.2: definition of a term, the use/mention distinction, and the difference between intension and extension (or sense and reference) 3. Philosophy of Logic: Aristotle versus Boole on categorical logic. Existential import, reinterpreting the Square of Opposition in light of Boole, and a look at "conditional validity," i.e. using Boole's assumptions to construct Venn diagrams . 	<ol style="list-style-type: none"> 1. Logic Puzzles #16-17 2. Fun with the word "buffalo" to illustrate problems with meaning. 3. For the semantics section, student took turns reading chapter one in Martin's <i>There are Two Errors in the the Title of this Book</i> (handout). Discussion of "differences that make no difference." 4. Discussion of Boole and the Square. Students worked in groups to figure out how the relationship on the Square change once we deny existential import. 5. Practice using Venn Diagrams under a Boolean interpretation for testing the validity of categorical syllogisms.

Content	Activities
<p><i>Afternoon</i></p> <p>1. THE FIRST DEBATE First Debate: on Socrates in Plato's <i>Apology</i>.</p>	<p>1. Entire afternoon devoted to the debate. Students spent the hour preparing for the debate. The two topics were:</p> <ul style="list-style-type: none"> (a) Resolve: Socrates corrupted the youth of Athens and deserved punishment? (b) Resolve: The unexamined life is not worth living. <p>2. Entire class split up into four groups: two representing the affirmative for (a) or (b); two representing the negative for (a) or (b). Two independent debates were held with the two groups not debating serving as the juror.</p> <p>3. During the afternoon, we finished only topic (a).</p>
<p><i>Evening Study Hall</i></p>	<p>1. Conclusion of the debate. Topic (b) debated by the affirmative and negative groups with remaining students serving as jurors.</p> <p>2. Quiet time studying for quiz.</p>
<p>9. Wednesday</p> <p><i>Morning</i></p> <p>1. Quiz #6</p> <p>2. Induction by Enumeration (Generalization); Hemple's Raven paradox as posing a problem for enumeration.</p> <p>3. Introduction to Propositional Logic: the limits of categorical prepositional logic; the notion of the statement as the elements of PL, and the meaning of the five logical connectives. (Hurley 6.1)</p> <p>5. Well-formed formulas (wff) versus poorly formed ones in propositional logic</p> <p>6. Translating English into Propositional Logic Notation</p> <p>7. Types of Inductive Inferences continued: Hypothetical or Scientific Reasoning (Hurley, chapter 13)</p>	<p>1. Logic Puzzle #18</p> <p>2. . Reading aloud from Martin's <i>There are Two Errors in the the Title of this Book</i> on Hemple. (handout)</p> <p>3. Problem sets on translating statements into propositional logic: students presented their answers on the blackboard.</p> <p>4. Reading and discussion on scientific method and hypothetical reasoning.</p>

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<p><i>Afternoon</i></p> <ol style="list-style-type: none"> 1. Science versus Pseudo-science (Hurley, chapter 14) 2. Karl Popper on the difference between science and pseudo-science. 3. Further practice translating into propositional notation. 	<ol style="list-style-type: none"> 1. Discussion on pseudo-science. 2. Students took turns reading and discussing Karl Popper's essay. 3. Wall of Shame Game: further practice on how to translation English into propositional notation.
<p><i>Evening Study Hall</i></p>	<ol style="list-style-type: none"> 1. Preparation of debate on science and pseudo-science in the Siena College's library computer lab.
<p>10. Thursday</p> <p><i>Morning</i></p> <ol style="list-style-type: none"> 1. Quiz #7 2. Propositional Logic continued: introduction to truth tables for the five logical connectives (Hurley 6.2) 3. De Morgan's Law 	<ol style="list-style-type: none"> 1. Logic Puzzle #19 2. Problem sets from Hurley 6.2 3. Students worked on figuring out how to reduce the five operators into two: negation + either conjunctions, disjunctions, or conditionals. 4. Students continued to preparation for the debate.

Content	Activities
<p><i>Afternoon</i></p> <p>1. THE SECOND DEBATE</p>	<p>1. Entire afternoon devoted to the debate. The issues: “should intelligent design be taught alongside evolution in high school biology classes?” and “is evolution a scientific theory under Popper’s and Hurley’s definitions?”</p> <p>(a) Entire class split up into four groups: two representing the affirmative; two, the negative.</p> <p>(b) Two independent debates were held with the two groups not debating serving as the juror.</p>
<p><i>Evening</i></p>	<p>1. Practice truth tables for well-formed formula (wffs).</p> <p>2. Silent reading: Hume on the problem of induction. (Section four and five of the <i>Enquiry Concerning Human Understanding</i>.)</p> <p>3. Studying for quiz #8</p>
<p>11. Friday</p> <p><i>Morning</i></p> <p>1. Quiz #8.</p> <p>2. Classifying propositions with truth tables: tautologies, self-contradictions, and contingent wffs (Hurley 6.3)</p> <p>3. Comparing Propositions: logical equivalence, logically contradictory, consistency and inconsistency. (Hurley 6.3)</p> <p>4. Using truth table to prove validity and invalidity. (Hurley 6.4)</p> <p>5. Hume and the problem of induction: discussion on logical necessity versus physical necessity; a prior versus a posteriori knowledge.</p> <p>6. Kant on Hume: the Copernican Revolution; the mind as experience maker, the influence of Kant on psychology and linguistics</p>	<p>1. Practice classifying and comparing wffs.</p> <p>2. Practice using truth tables to test validity</p> <p>3. Discussion on the various issues surrounding Hume and Kant.</p>

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<i>Afternoon</i>	1. Students watched <i>Inherit the Wind</i> , and then discussed the movie afterwards. The movie is a fictional account of the Scopes “monkey trial”, over the teaching of evolution in public school.
12. Sunday <i>Evening</i>	1. Review and study for the second examination.
13. Monday <i>Morning</i> 1. First Examination 2. Indirect Truth Tables for evaluating arguments with many different propositions.	1. Logic Puzzles #20-21 2. Practice using indirect truth tables. Hurley 6.5 problem set.
<i>Afternoon</i> 1. Descartes’ <i>Meditations on First Philosophy</i> (lesson led by TA) 2. Natural Deduction (Hurley 7.1). The first four rules of implication in Hurley’s system, (a) Modus Ponens (b) Modus Tollens (c) Hypothetical Syllogism (d) Disjunctive Syllogism	1. Students took turns reading and commenting on the first meditation, wherein Descartes proposes his method of systematic doubt. 2. Representing some of Descartes’ arguments using the propositional notation. 3. Practice using the problem set in Hurley 8.1.
<i>Evening</i>	1. Studying indirect truth tables and natural deduction. 2. Readings: Plato’s <i>Crito</i> and chapter two from Thomas Gilovich’s <i>How We Know What Isn’t So: The Fallibility of Human Reason in Everyday Life</i> .
14. Tuesday <i>Morning</i> 1. Quiz #9 2. Lecture and discussion on the origin of modern science: medieval cosmology, scholasticism, the Century of Genius, the methods of Bacon and Descartes	1. Logic Puzzle #22 2. Review and practice: indirect truth tables and natural deduction 3. Discussion of Bacon’s four idols of the mind as examples of mistakes in reasoning. 4. Bacon led into a discussion of Gilovich’s chapter on misunderstanding randomness. (Reading assigned in Monday’s study hall)

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<p><i>Afternoon</i></p> <p>1. Natural Deduction continued: four new rules of implication (Hurley, 7.2)</p> <ul style="list-style-type: none"> (a) Constructive Dilemma (b) Simplification (c) Conjunction (d) Addition <p>2. Plato's <i>Crito</i>—beginning of an analysis of Socrates' arguments for not escaping from prison.</p>	<ol style="list-style-type: none"> 1. Practicing natural deduction 2. Natural deduction relay races 3. Discussion of Plato's <i>Crito</i>.
<p><i>Evening</i></p>	<ol style="list-style-type: none"> 1. Preparation for debate with the Ethics class. Students read articles on their topics in preparation. Topics to be debate: capital punishment and cloning.
<p>15. Wednesday</p> <p><i>Morning</i></p> <ol style="list-style-type: none"> 1. Debate preparation 	<ol style="list-style-type: none"> 1. Students spent the entire morning working with the Ethics class preparing for the debate. 2. Public speaking exercises (for a half hour) in preparation for the debate.

Content	Activities
<p><i>Afternoon</i></p> <p>1. THE THIRD DEBATE</p>	<p>1. Two separate debate held: one on capital punishment; the other on cloning. Students not debating served as jurors. Each debate lasted an hour.</p>
<p><i>Evening</i></p> <p>1. Issues in natural deduction.</p> <p> (a) Rules of replacement, e.g. De Morgan's, Commutativity, Distribution, Associative, Double Negation</p> <p> (b) Conditional Proof</p> <p> (c) Indirect Proof</p> <p>2. The Deduction Theorem</p> <p>3. Are all deductive argument just a form of begging the question?</p>	<p>1. Practice problems</p> <p>2. Discussion: Are all deductive argument just a form of begging the question?</p> <p>3. Silent reading: Plato's <i>Crito</i>.</p>
<p>16. Thursday</p> <p><i>Morning</i></p> <p>1. Aristotle's Three Laws of Thought: Identity, Excluded Middle, Non-contradiction.</p> <p>2. Paradoxes: what is the difference between a contradiction and a fallacy.</p> <p>3. Self-referential statements</p>	<p>1. Logic puzzles #23-24</p> <p>2. Discussion of the Monty Hall paradox</p> <p>3. Discussion over the various paradox's I presented (such as Zeno's paradoxes, Russell's paradox, liar paradox, Grelling's paradox.)</p> <p>4. Paradoxes and psychology (mental illness and treatment)</p> <p>5. Self-referential statements in math and elementary set theory</p> <p>6. Discussion of Plato's <i>Crito</i> and the death scene of Socrates</p>

Content	Activities
<p><i>Afternoon</i></p> <p>1. Brief introduction to quantification theory</p> <p>(a) Translating English into predicate logic notation</p> <p>(b) Universal and existential quantifiers</p> <p>(c) Translating the Square of Opposition using quantification theory</p> <p>(d) Introduction to natural deduction for predicate logic: universal and existential generalization & universal and existential instantiation rules presented</p>	<p>1. problems sets involving predicate logic</p> <p>2. discussion of predicate logic and Boole's rejection of Aristotle's assumption of existential import</p> <p>3. Study time for the post-test</p>
<p><i>Evening</i></p>	<p>1. Post-test</p>
<p>17. Friday</p> <p><i>Morning</i></p> <p>1. Wrap-up and goodbyes</p>	