

Logic: Principles of Reasoning

CTY Course Syllabus

Week 1

Monday

Content	Activities
<p><u>Morning:</u> Pre-test. Introductions, honor code, expectations for the course, agree on class rules, break into Harry Potter houses. General lecture and discussion about logic, evidence, arguments. Different types of non-arguments. Necessary and sufficient conditions.</p>	<p>Introductions, honor code, write expectations for the course on note-cards, and agree on class rules. Discussion about Clifford quote, logic puzzle, lecture/discussion about arguments, statements, facts and opinions. Read out loud and discussed a section from <i>Crimes Against Logic</i> about what it means to have a 'right to our opinion.'</p>
<p><u>Afternoon:</u> Philosophy generally, etymology of 'philosophy,' branches of philosophy. Our 'right to our opinions' – what does this mean? Arguments vs. rants. Russell's 'The Value of Philosophy.'</p>	<p>Quick review of morning concepts. Played a game for points on identifying arguments using indicator words. Group presentations of non-argument types. Logic puzzle. Lecture/discussion about philosophy: what is philosophy? What kinds of questions end up being philosophical and not scientific? Finished by beginning to read and discuss Russell's 'The Value of Philosophy.'</p>
<p><u>Evening:</u> Review about arguments and non-arguments, necessary and sufficient conditions. Finish short writing exercise – the rant and argument. Finish Russell's problems of philosophy.</p>	<p>Review of day's material for quiz. 'Rant' writing exercise: write a short rant about something; to what extent is it an argument – then turn it into an argument. Finish reading Russell. Write 1 page reaction to Russell's article.</p>

Tuesday

Content

Activities

<p><u>Morning</u>: More on arguments (deductive and inductive, and types of each. Validity & soundness, strength & cogency. Reading and interpreting arguments. Introduction to the logical symbols. Informal fallacies vs. formal fallacies.</p>	<p><i>Quiz 1</i>. Watched Monty Python 'Argument Sketch.' Read and discuss Hurley 1.3 and do group presentations on the different common deductive and inductive arguments. Practice problems on pp. 37. Break. Logic puzzle. Lecture/discussion on validity and implication. Introduction to the truth-functional operators.</p>
<p><u>Afternoon</u>: More on common fallacies and deceptive arguments. Concepts of vagueness and ambiguity.</p>	<p>Review of common mistakes from <i>Quiz 1</i>. Read together / discuss the 'motive fallacy' from <i>Crimes Against Logic</i>. Break up into groups and perform fallacy skits with supplemental discussion on spotting types of fallacies and where they can appear.</p>
<p><u>Evening</u>: Review of deduction, induction, validity & soundness, strength & cogency, and fallacious argument – formal and informal.</p>	<p>Finish Russell assignment and rant/argument assignment. Brief individual meetings with students to check in and see how things are going. Review of all the day's concepts for Quiz 2.</p>

Wednesday

Content

Activities

<p><u>Morning</u>: Quiz 2. Introduction to Categorical Logic: some history, Aristotle, types of categorical propositions, terms, quality and quantity, distribution, the traditional square of opposition. Introduction to Venn Diagrams. Some immediate inferences.</p>	<p>Quiz 2. More on validity/soundness, strength/cogency. Hurley exercises 1.4. <i>Crimes Against Logic</i>, fallacy of ambiguity. [Break] Logic puzzle. The counterexample method of proving invalidity. Hurley exercises 1.5.</p>
<p><u>Afternoon</u>: More on immediate inferences: bad immediate inferences: the counterexample method. Converse, observe, contrapositive.</p>	<p>Review common mistakes from the Quiz. The basics of categorical statements. Quality, Quantity. A, E, I and O basic forms. Individual work, then group vote on Venn Diagrams for the A, E, I and O propositions from the Aristotelian and Boolean standpoint. [break] Distribution of terms. Immediate inferences: the traditional square of opposition.</p>
<p><u>Evening</u>: Review for tomorrow's quiz 3. Start reading Paley's 'argument from design.'</p>	<p>Finish Paley reading. Review for tomorrow's quiz.</p>

Thursday

Content	Activities
<u>Morning</u> : Categorical syllogisms. Mood and figure. Proving validity using Venn Diagrams. The four fallacies. Finish reading Paley's argument from design.	Quiz 3. Work through some examples. Logic Puzzle. Reading Paley's argument.
<u>Afternoon</u> : In class debate: Paley's argument from design – full analysis of argument type, strength and cogency, truth of the assumptions, whether it commits any of the fallacies studied thus far.	Review problems from morning quiz. In class debate: Paley's argument from design. Logic Puzzle #7.
<u>Evening</u> : Review of Categorical syllogisms, mood and figure, proving validity using Venn Diagrams. The four fallacies restated	Reading from <i>How We Know What Isn't So</i> . Review for tomorrow's quiz.

Friday

Content	Activities
<u>Morning</u> : More on syllogisms. 3 premise categorical arguments and four-term Venn diagrams. Boolean logic, the existential assumption, the Boolean square and the supernumeraries.	Quiz 4. Logic Puzzle. Review of Venn Diagrams. Mood and Figure. Translation from English syllogisms into standard form categorical syllogisms. [Break] Empty Words section from <i>Crimes Against Logic</i> . Proving validity of categorical syllogisms using Venn Diagrams.
<u>Afternoon</u> : Movie: <i>12 Angry Men</i> w/ Henry Fonda, and discussion.	Watched <i>12 Angry Men</i> . Groups identified fallacies committed by jurors they are assigned to.

Sunday

<u>Evening</u> : Review material from the week in preparation for Monday's test.	Review mistakes from Friday's quiz. Review session.
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Week 2

Monday

Content	Activities
<u>Morning</u> : Test 1. The limits of Aristotelian logic. Introduction to propositional logic, truth-function operators. Translation from English into propositional logic, well-formed formulas. Truth-tables. A small bit on informal fallacies from <i>Crimes Against Logic</i> .	Test 1. Quick intro to the allowed sentences of propositional logic. [break] Logic puzzle. Group reading and discussion from <i>Crimes Against Logic</i> .
<u>Afternoon</u> : Plato's <i>Euthyphro</i> – quick background lecture and then reading. Logical equivalence, contradictions, tautologies, contingencies, and consistency in propositional logic.	Logic Puzzle. Group reading (hopefully outside): Plato's <i>Euthyphro</i> : quick background lecture and then reading out loud.
<u>Evening</u> : Review for tomorrow's quiz. Start reading for Friday's debate.	Review session.

Tuesday

Content	Activities
<p><u>Morning</u>: Review of operator diagrams and translation. Arguments in propositional logic. Using truth tables to prove validity. St. Anselm's 'Ontological Argument:' is it valid? Proving validity using truth-tables.</p>	<p>Quiz 5. Wall of shame for propositional logic arguments. Work in groups to translate St. Anselm's argument. Prove the validity of Anselm's argument and discuss what this proof 'proves.' Logic puzzle #11. Individual/group activity: what is a scientific theory? Group, then class discussion of the scientific method.</p>
<p><u>Afternoon</u>: Finish Plato's <i>Euthyphro</i>, hopefully reading outside.</p>	<p>Finish reading the <i>Euthyphro</i> out loud – discussion. What is piety? Discussion of relativism and its problems.</p>
<p><u>Evening</u>: Review for tomorrow's quiz. Start reading some materials for Friday's debate.</p>	<p>Review for Quiz. Short writing assignment on the <i>Euthyphro</i>: in 2-3 pages, briefly defend some opinion or answer a question you see as raised by Plato's <i>Euthyphro</i>. Some might be: (1) can we know what piety is? (2) Are Socrates' arguments valid and sound? (3) Does one have to know the definition of 'right' or 'good' to be justified in calling a particular action right or good? (4) What do you think a definition of piety might be?</p>

Wednesday

Content	Activities
<p><u>Morning</u>: Arguments in propositional logic. Truth table analysis. <i>Reductio ad absurdum</i> – short-cut truth-tables. Truth-trees and ‘valid inferences.’</p>	<p>Quiz 6. Introduction to validity in propositional logic. Truth-table method of diagnosis. Practice problems. Logic puzzle. [break] Hooray words from C.A.L. The ontological argument. Translated into ‘logician english’ in groups and then into propositional logic.</p>
<p><u>Afternoon</u>: Meet with Ethics class groups for an hour. A paradox.</p>	<p>Groups presented translations of Ontological arguments and then we discussed whether it was valid and whether it was sound. [break] Meet with Ethics debate class groups for an hour.</p>
<p><u>Evening</u>: Friday’s debate.</p>	<p>Review for quiz 7. Readings for debate. Reading on the difference between science and pseudoscience.</p>

Thursday

Content	Activities
<u>Morning</u> : Indirect truth tables. Hempel's 'paradox of the ravens.' Semantic tableaux resolution	Quiz 7. Logic puzzle. Indirect truth tables. Introduction, two examples then two practice problems. Break. Hempel's paradox: read from '2 errors' and discussion. Wall of Shame Game for indirect truth tables and semantic tableaux.
<u>Afternoon</u> : Meet with Ethics class for an hour. Paradoxes of decision theory.	Met with debate groups and formulated arguments.
<u>Evening</u> : Descartes' Meditations.	Silent reading and group review for quiz.

Friday

Content	Activities
<u>Morning</u> : Introduction to proofs. Rules and derivability.	Quiz 8. Logic puzzle. Lecture introduction to proofs. Proving the rules are valid via truth table reasoning. Practice simple proofs.
<u>Afternoon</u> : Debate with Ethics class on imposing democracy.	Debate with Ethics class on imposing democracy.

Sunday

<u>Evening</u> : Review the material covered this week for the test.	Review session.
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Week 3

Monday

Content	Activities
<u>Morning</u> : Test 2. [break] Logic Puzzle. Newcomb's paradox. Game theory: the prisoner's dilemma. More proof rules.	Test 2. Students formulated individual theories of the paradox, then came to a group decision, then had a class discussion. Learned new proof rules and practiced simple examples using the 'wall of shame' game.
<u>Afternoon</u> : Proof rules and practice proofs. Strategies for proofs: backwards 'induction.'	Studied useful heuristics for solving proofs and practiced harder proofs.
<u>Evening</u> : Review for quiz, and negation rules. Begin writing essay on democracy and foreign policy.	Review for quiz 9.

Tuesday

Content

Activities

<p><u>Morning</u>: Quiz. Science on causes and Hume on causes. Causal over- and underdetermination. Hume on relations of ideas and matters of fact, induction and knowledge. Goodman's 'new riddle of induction.' The limits of propositional logic: where truth-tables go wrong. Introduction to predicate logic: well-formed formulas, universe of discourse, predicates, quantifiers. Translation from English into predicate logic.</p>	<p>Quiz 9. Logic puzzle. Lecture and discussion. Identified causes using necessary and sufficient conditions.</p>
<p><u>Afternoon</u>: The liar paradox. What is truth? Theories of truth. Lewis Carroll's <i>What the Tortoise Said to Achilles</i>.</p>	<p>Logic puzzle. Individual, then group, then full class discussion on the liar paradox and the question of what is truth.</p>
<p><u>Evening</u>: Review for quiz 10. Writing: democracy and foreign policy.</p>	<p>Review for quiz. Writing: democracy and foreign policy.</p>

Wednesday

Content

Activities

<p><u>Morning</u>: Quiz. Philosophical problem: The paradox of implication. ...A quick introduction to probability. Determining simple and complex probability. Common probabilistic fallacies. The base-rate fallacy endemic to courtrooms and clinics.</p>	<p>Quiz 10. Lecture/discussion. Learned rules for determining probability of an event. Generalized from examples and solved problems in Harry Potter Houses.</p>
<p><u>Afternoon</u>: Proving theorems of logic using the rule of assumptions.</p>	<p>Students worked together to prove theorems of logic from no premises. Logic puzzle.</p>
<p><u>Evening</u>: Objects and predicates: specifying models to prove invalidity of an argument in predicate logic. Computer lab writing session.</p>	<p>Lecture and discussion. Computer lab writing session.</p>

Thursday

Content	Activities
<u>Morning</u> : No quiz. The philosophy of science. Scientific realism and anti-realism. The 'No Miracles Argument' and the 'Pessimistic Meta-Induction.'	Class discussion. Groups used previous lesson on determining conditional probabilities to show that prominent arguments in the philosophy of science commit a fallacy about probability.
<u>Afternoon</u> : Post test. SPEs. Logic puzzle.	Post test. SPE's. Worked in groups to solve a logic puzzle.
<u>Evening</u> : Logic Jeopardy against the Mathematical Logic class.	Students played Logic Jeopardy against the mathematical logic class, covering all concepts they learned in the past three weeks.

Friday

<u>Morning</u> : Goodbyes.	Goodbyes.
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