

# PHIL-1020: INTRODUCTION TO LOGIC

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## Cuyahoga Community College

**Viewing: PHIL-1020 : Introduction to Logic**

**Board of Trustees:**

2012-05-24

**Academic Term:**

Fall 2021

**Subject Code**

PHIL - Philosophy

**Course Number:**

1020

**Title:**

Introduction to Logic

**Catalog Description:**

Introduction to evaluation of arguments. Concentration on basic principles of formal logic and application to evaluation of arguments. Explores notions of implication and proof and use of modern techniques of analysis including logical symbolism.

**Credit Hour(s):**

3

**Lecture Hour(s):**

3

**Lab Hour(s):**

0

**Other Hour(s):**

0

## Requisites

**Prerequisite and Corequisite**

ENG-0995 Applied College Literacies, or appropriate score on English Placement Test; or departmental approval.

Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.

## Outcomes

**Objective(s):**

1. Distinguish premises from conclusions in passages containing arguments.
2. Reflect the structure of arguments through diagrams.
3. Distinguish deductive from inductive argument structures.
4. Classify fallacies according relevance, defective induction, presumption and ambiguity.
5. Recognize fallacies as they appear in argumentative passages.
6. Recognize fallacies as they appear in advertising and politics.
7. Manipulate immediate inferences with respect to the traditional square of opposition.
8. Manipulate the immediate inferences of conversion, obversion, and contraposition.
9. Apply issues of existential import as they relate to immediate inferences.
10. Rewrite categorical syllogisms containing standard form categorical propositions to reflect standard form order.
11. Construct Venn diagram proofs of validity for categorical syllogisms containing standard form categorical propositions.
12. Construct Rule Method proofs of validity for categorical syllogisms containing standard form categorical propositions.
13. Translate non-standard form categorical propositions into standard form categorical propositions.
14. Translate non-standard form categorical syllogisms into standard form categorical syllogisms.
15. Show a facility for translating statements in natural language into their basic forms, using a given symbol system (logical syntax).
16. Give evidence of understanding how the following notions are related to each other: truth/falsity, implication, and equivalence.

17. Construct truth table proofs of validity for deductive arguments translated into logical symbolism.
18. Recognize and apply rules of inference and rules of replacement.
19. Construct formal proofs of validity for deductive arguments translated into logical symbolism.
20. Demonstrate mastery of quantifier negation rules.
21. Successfully construct formal deductions in monadic predicate logic.
22. Distinguish premises from conclusions in passages containing arguments.
23. Reflect the structure of arguments through diagrams.
24. Distinguish deductive from inductive argument structures.
25. Classify fallacies according to relevance, defective induction, presumption and ambiguity.
26. Recognize fallacies as they appear in argumentative passages.
27. Recognize fallacies as they appear in advertising and politics.
28. Manipulate immediate inferences with respect to the traditional square of opposition.
29. Manipulate the immediate inferences of conversion, obversion, and contraposition.
30. Apply issues of existential import as they relate to immediate inferences.
31. Rewrite categorical syllogisms containing standard form categorical propositions to reflect standard form order.
32. Construct Venn diagram proofs of validity for categorical syllogisms containing standard form categorical propositions.
33. Construct rule-method proofs of validity for categorical syllogisms containing standard form categorical propositions.
34. Translate non-standard form categorical propositions into standard form categorical propositions.
35. Translate non-standard form categorical syllogisms into standard form categorical syllogisms.
36. Show a facility for translating statements in natural language into their basic forms, using a given symbol system (logical syntax).
37. Give evidence of understanding how the following notions are related to each other: truth/falsity, implication, and equivalence.
38. Construct truth table proofs of validity for deductive arguments translated into logical symbolism.
39. Recognize and apply rules of inference and rules of replacement.
40. Construct formal proofs of validity for deductive arguments translated into logical symbolism.
41. Demonstrate mastery of quantifier negation rules.
42. Successfully construct formal deductions in monadic predicate logic.

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**Course Outcome(s):**

Reflect the structure of arguments through diagrams

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. A student will read an argument and diagram the premises and conclusion by using methods that might include the following; the Toulmin method, a mind map, paraphrasing and listing the premises and conclusion, by underlining the premises and circling the conclusion. A student will construct their own arguments and be able to summarize them by diagramming them in methods that might include the following; the Toulmin method, a mind map, paraphrasing and listing the premises and conclusion, by underlining the premises and circling the conclusion.

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**Course Outcome(s):**

Distinguish premises from conclusions in passages containing arguments

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. From a selection of arguments found in various media, (such as editorials) the student will identify the conclusion and the premises meant to support the conclusion. A student will be able to state a claim (a conclusion) and formulate premises to support the conclusion. This can be done verbally or written or both.

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**Course Outcome(s):**

Distinguish deductive from inductive argument structures

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. A student will read an argument and identify it as either an inductive or a deductive argument; or if the argument contains elements of both types of inference, to distinguish them within that given argument. A student will construct arguments to back up their own claims. They should be able to recognize when this calls for inductive and/or deductive inferences and apply them.

**Course Outcome(s):**

Manipulate immediate inferences with respect to the traditional square of opposition

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. A student will, given the truth value of a standard form categorical proposition, use the traditional square of opposition to determine the truth values of any of the other standard form categorical propositions that contain the same subject and predicate. A student will construct their own truth claim as a standard form categorical proposition and use the traditional square of opposition to determine the truth values of the other standard form categorical propositions that contain the same subject and predicate.

**Course Outcome(s):**

Manipulate the immediate inferences of conversion, obversion, and contraposition

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will perform the operations of conversion, obversion, and contraposition on any categorical proposition. A student will recognize when it is allowable and necessary to perform an operation or any combination of the operations of conversion, obversion, and/or contraposition on a categorical proposition in order to be able to use a square of opposition.

**Course Outcome(s):**

Apply issues of existential import as they relate to immediate inferences

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. A student will use a Venn diagram to evaluate arguments and determine if existential import applies and when the existential fallacy has taken place. A student will use a Venn diagram to show an Aristotelean approach allows for the subaltern relation and how this relates to existential import.

**Course Outcome(s):**

Rewrite categorical syllogisms containing standard form categorical propositions to reflect the standard form order

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. A student will recognize a categorical syllogism that is not in standard form and be able to organize the premises and conclusion so that it is in standard form. A student will read an argument in a natural language and, when they recognize it as a categorical syllogism, be able to write it as a standard form categorical syllogism.

2. A student will read a categorical syllogism in a natural language and recognize that it is a categorical syllogism. Having done so, the student will perform the following: -identify premises and conclusion -place them in standard order -identify major, minor, and middle terms -write the syllogism in standard form -identify mood and figure.

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**Course Outcome(s):**

Construct Venn diagram proofs of validity for categorical syllogisms containing standard form categorical propositions

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Using a Venn diagram, the student will be able to mark the appropriate regions as indicated by the premises in a standard form categorical syllogism and read that Venn diagram to determine if the categorical syllogism is valid, invalid or conditionally valid.

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**Course Outcome(s):**

Construct Rule Method proofs of validity for categorical syllogisms containing standard form categorical propositions

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will be able to use five rules that determine if a conclusion follows from premises in a standard-form categorical syllogism. They will identify whether or not an argument is valid from a Boolean standpoint and an Aristotelean standpoint.

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**Course Outcome(s):**

Translate non-standard form categorical propositions into standard form categorical propositions

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Students will identify categorical propositions that are not in standard form. Having identified them as such, they will be able to correctly apply the operations of conversion, obversion, and contraposition as needed to make the proposition into a standard-form categorical proposition.

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**Course Outcome(s):**

Translate non-standard form categorical syllogisms into standard form categorical syllogisms

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Students will recognize non-standard categorical syllogisms when they see them and identify them as such. Having done so, they will use the principles of major, minor, and middle terms along with the operations of conversion, obversion, and contraposition when necessary to re-write the non-standard categorical syllogism as a standard-form categorical syllogism.

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**Course Outcome(s):**

Show a facility for translating statements in natural language into their basic forms, using a given symbol system (logical syntax)

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will be given arguments written in a natural language. They will use letters to symbolize the components of the argument and combine them with the appropriate symbols of logical syntax to translate the statements of the argument into the logical notation that delineates each premise and the conclusion of the argument.
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**Course Outcome(s):**

Give evidence of understanding how the following notions are related to each other: truth/falsity, implication, equivalence

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will be able to explain how the truth and falsity of given claims impact statements of implication. They will be able to explain the relationship between antecedents and consequents in a statement of implication. They will recognize and distinguish necessary conditions and sufficient conditions and also be able to construct statements that illustrate this distinction. Finally, they will be able to recognize and construct statements that combine necessity and sufficiency, namely equivalent statements.
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**Course Outcome(s):**

Construct truth table proofs of validity for deductive arguments translated inot logical symbolism

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will be able to construct deductive arguments, premises, and conclusion, using logical syntax. They will apply truth table definitions to the main operators of each statement in the argument. They will read the truth table that they have constructed and identify the argument as valid or invalid.
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**Course Outcome(s):**

Recognize and apply rules of inference and rules of replacement

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

1. Students will recognize deductive arguments written in logical notation. They will use the rules of inference and the rules of replacement correctly and where it is applicable to do so in order to demonstrate that the conclusion can be derived from the premises given.
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**Course Outcome(s):**

Construct formal proofs of validity for deductive arguments translated into logical symbolism

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Course Outcome(s):**

Course Objective

**Objective(s):**

1. Students will read deductive arguments written in a natural language and symbolize the components of the argument and combine this with a logical syntax to produce an argument written purely with logical notation. Then, they will use the rules of

inference and the rules of replacement correctly and where applicable in order to determine if the conclusion follows from the premises of the deductive argument.

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**Methods of Evaluation:**

1. Unit exams covering 20-50% of the term
2. Section quizzes
3. Text exercise assignments
4. Class participation

**Course Content Outline:**

1. Why study logic?
  - a. Improve critical thinking skills
  - b. Improve analytical reasoning skills
2. What is logic?
  - a. Distinguishing between correct and incorrect reasoning
  - b. Definition of "argument":
    - i. Premises
    - ii. Conclusions
    - iii. Proof
3. Identifying arguments: indicator words and phrases
  - a. Classifying arguments as deductive
  - b. Classifying arguments as inductive
4. The Traditional Square of Opposition
  - a. Construct the Square of Opposition
  - b. Construct logical relations around the Traditional Square of Opposition
5. Construct the three further immediate inferences of conversion, obversion, and contraposition
  - a. Apply the three further immediate inferences to standard form categorical propositions.
  - b. Show validity and invalidity of immediate inferences.
6. Understand the implications of existential import
  - a. Recognize instances of the existential fallacies.
  - b. Show the Boolean response to the problem of existential import.
7. Construct Venn diagram proofs of validity for standard form categorical syllogisms.
  - a. Construct diagrams for syllogisms containing universal propositions exclusively.
  - b. Construct diagrams for syllogisms containing singular propositions exclusively.
  - c. Construct diagrams for syllogisms containing both universal and particular propositions.
8. Construct rule-method proofs of validity for standard form categorical syllogisms
  - a. Master the six rules
  - b. Develop a hierarchy for applying the rules in a proof
9. Perform reduction to standard form analyses on non-standard form categorical syllogisms
  - a. Reduce syllogisms to three terms using the three further immediate inferences of conversion, obversion, and contraposition
  - b. Recognize terms that are equivocated to reduce the terms of the syllogism to three
10. Translate non-standard form categorical propositions into standard form categorical propositions
  - a. Demonstrate why singular propositions can be treated as universals
  - b. Apply techniques aimed at creating proper subject and predicate terms
11. Perform uniform translations of non-standard form categorical propositions.
12. Analyze enthymematic argument structures
13. Syntax (structure of compound statements)
  - a. Statements and their forms
    - i. Simple
    - ii. Conjunction
    - iii. Disjunction
    - iv. Hypothetical
    - v. Biconditional
  - b. The parts of compound statements/statement forms
    - i. Conjuncts
    - ii. Disjuncts
    - iii. Antecedents
    - iv. Consequents

- c. Analysis of grouping words and punctuation device
  - i. "Both"
  - ii. "Either"
  - iii. Commas
- d. Distinguishing "if" from "only if" and both from "if and only if"
- e. Unpacking the syntax of "packed" statements; e.g., "Smith and James hit and ran."
- 14. Semantics (truth and meaning)
  - a. Two values: true/false
  - b. Principles of identity, non-contradiction, and excluded middle
  - c. Five semantic principles
    - i. Negation
    - ii. Conjunction
    - iii. Disjunction
    - iv. Hypothetical
    - v. Biconditional
  - d. Constructing value tables
  - e. Semantic types of statement form
    - i. Tautology
    - ii. Contradiction
    - iii. Contingent form
  - f. Logically true, logically false, and contingently true and false statements
  - g. Semantic relations between statement forms
    - i. Logical equivalence
    - ii. Implication between equivalence and implication
- 15. Proofs
  - a. Rewriting arguments in standard order; translating standard order proofs into proof form
  - b. The notion of the proof's validity, as derived from the notion of implication; the use of value tables to show validity/invalidity
  - c. Distinguishing soundness from mere validity; inductive from deductive inference
  - d. Formal proofs: rules of inference and rules of replacement
  - e. Indirect proof

## Resources

Copi, I., C. Cohen, and Kenneth McMahon. *Introduction to Logic*. 14th. Prentice Hall, 2014.

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Govier, Trudy. *A Practical Study of Argument*. 7th. Wadsworth, Boston, MA, 2013.

---

Hurley, P. J. and Lori Watson. *A Concise Introduction to Logic*. 13th. Thompson/Wadsworth/Cengage: Boston, MA, 2017.

---

Sacks, Oliver. *The Man Who Mistook His Wife for a Hat and Other Clinical Tales*. 1st. Picador, 2015.

---

Schick, Theodore and Lewis Vaughn. *How To Think About Weird Things: Critical Thinking for a New Age*. 7th ed. McGraw-Hill; New York, New York, 2013.

---

Copi, Irvin, Car Cohen, and Samuel LiPuma. *Introduction to Logic, Custom Edition*. 1st ed. Upper Sadle River, New Jersey: Pearson, Prentice Hall, 2010.

---

Carter, Codell, K. *A First Course in Logic*. 1st. Pearson, Prentice Hall; Upper Sadle River, New Jersey, 2004.

---

Hausman, Alan, Howard Kahane, and Paul Tidman. *Logic and Philosophy: A Modern Introduction*. 12th ed. Wadsworth/Cengage; Boston, MA, 2012.

---

Baronett, Stan. *Logic*. 3rd. Oxford University Press, 2015.

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Howard-Snyder, Frances; Howard-Snyder, Daniel; Wasserman, Ryan. *The Power of Logic*. 5th. McGraw-Hill; New York, New York, 2012.

### Resources Other

1. Internet Encyclopedia of Philosophy: <http://www.iep.utm.edu/>
2. Stanford Encyclopedia of Philosophy: <http://plato.stanford.edu/>
3. EpistemeLinks: <http://www.epistemelinks.com/index.aspx> (<http://www.epistemelinks.com/>)
4. Yale University Library, Philosophy: <http://www.library.yale.edu/humanities/philosophy/associations.html>
5. P (<http://www.library.yale.edu/humanities/philosophy/associations.html>)hilosophy Courses at [philosophy.lander.edu](http://philosophy.lander.edu) <http://philosophy.lander.edu/logic/trans.html>

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