NEW YORK CITY COLLEGE OF TECHNOLOGY

THE CITY UNIVERSITY OF NEW YORK

DIVISION OF LIBERAL ARTS AND SCIENCE

DEPARTMENT OF SOCIAL SCIENCES

PHIL 2102/PH102: LOGICAL THINKING
(formerly HU304)

COURSE DESCRIPTION: An introduction to the basic principles that underlie critical thinking, including: recognizing premises and conclusion of an argument; language and meaning; common errors in reasoning; Aristotle’s system of logic; the symbolic representation of simple and complex sentences; the idea of cause and effect and J. S. Mill’s scientific method. The subject matter of this course does not assume any prior acquaintance with logic or mathematics.

Prerequisite: CUNY Certification in Reading and Writing

3 class hours 3 credits

PH 102 has been approved for the PAL component of the Core Curriculum

Suggested Text:

Alternate Texts:


Grading: 25% Writing 25% Exam 1 25% Exam 2 25% Final

Prepared by: Dr. D. McKinney November 1989

Revised by: Dr. D. McKinney February 1994, January 1997

Revised by: Prof. W. Brand August 2001
WEEK 1: Basic Concepts

Arguments, Premises, Conclusions, Illustrations, Descriptions, Explanations, Arguments and Conditional Statements.

WEEK 2: Deduction and Induction

Types of deductive arguments: argument from definition, mathematics, and categorical, hypothetical and disjunctive syllogisms.
Types of inductive arguments: prediction, analogy, authority, generalization, signs, causal inference.
Validity, Truth, Soundness, Strength, Cogency.

WEEK 3: Meaning and Definition

Terms; intension and extension of terms.
Definitions and their purposes: stipulative, lexical, precising, theoretical and persuasive definitions.
Definitional Techniques: Extensional (Denotative) Definitions; Intensional (Connotative) Definitions.

WEEK 4: Criteria for Lexical Definitions; Review for Exam 1
EXAM 1

WEEK 5: Fallacies
Definition of a fallacy; Distinction between informal and formal fallacies

Informal Fallacies
Fallacies of Relevance:
Argumentum ad Baculum - appeal to force
Argumentum ad Misericordiam - appeal to pity
Argumentum ad Populum - appeal to people
Argumentum ad Hominem - argument against the person
Accident; Ignoratio Elenchi - missing the point
Straw Man; Red Herring
WEEK 6: Fallacies of Weak Induction

Argumentum ad Verecundiam - appeal to authority
Argumentum ad Ignorantiam - appeal to ignorance
Hasty Generalization (Converse Accident)
False cause: post hoc ergo propter hoc; non causa pro causa
Slippery Slope
Weak analogy

Fallacies of Presumption, Ambiguity, and Grammatical Analogy

Fallacies of Presumption:
Petitio Principii (Begging the question), Complex question;
False Dichotomy; Suppressed Evidence

Fallacies of Ambiguity:
Equivocation, Amphiboly

Fallacies of Grammatical Analogy:
Composition, Division

WEEK 7: Review Weeks 5 and 6 for Exam 2

EXAM 2

WEEK 8: Categorical Propositions

The components of categorical propositions
Quality, Quantity, and Distribution
Square of Opposition: Contradictory, Contrary, Subcontrary and Subalternation
Relations
Venn Diagrams
Translating Ordinary Language Statements into Categorical Form

WEEK 9: Categorical Syllogisms

Standard Form, Mood, and Figure
Rules and Fallacies
Ordinary Language Arguments
Enthymemes and Sorities
Rules of inference: modus ponens, modus tollens, hypothetical syllogism,
disjunctive syllogism, constructive dilemma, simplification, conjunction, addition

WEEK 10: Other deductive argument forms and fallacies
Review weeks 8 and 9
WEEK 11: Induction

Analogical Reasoning
Casualty: necessary, sufficient, and necessary and sufficient conditions
Mill’s Methods, Probability

WEEK 12: Statistical Reasoning

Sources of ambiguity and deception
- Problems in sampling
- The meaning of “average”
- The importance of dispersion in a sample
- The use of graphs and pictograms
- The use of percentages for the purposes of comparison

WEEK 13: Hypothetical Reasoning

Four basic stages: Occurrence of, or identifying problem; formulating a hypothesis; drawing implications from the hypothesis; testing the implications

WEEK 14: Review for Final Exam

FINAL EXAM

14 WEEKS BEHAVIORAL OBJECTIVES LOGICAL THINKING

At the end of each week indicated, the student should be able:

WEEK 1: 1) To define logic, an argument and a statement;
2) To identify premise(s) and conclusion of an argument;
3) To distinguish among arguments, illustrations, conditional statements, and explanations.

WEEK 2: 1) To explain the difference between deduction and induction;
2) To identify the different types of deductive and inductive arguments;
3) To explain the concepts of validity, truth, soundness, strength and cogency;
4) To identify examples of 1-3 above

WEEK 3: 1) To define a term and explain the difference between the intension and extension of terms.
2) To distinguish among stipulative, lexical, precising, theoretical and persuasive definitions;
3) To identify the different types of extensional (ostensive, enumerative and subclass) and intentional (synonymous, operational, and genus and difference) definitions.

WEEK 4: 1) To identify the criteria for lexical definitions and definitions which do not meet these criteria;
2) To demonstrate comprehension of material by correctly answering exercises covering week 1-4.

WEEK 5: 1) To define a fallacy and to explain the distinction between formal and informal fallacies.
2) To identify the different fallacies of relevance and weak induction.

WEEK 6: 1) To identify the fallacies of presumption, ambiguity, and grammatical analogy, and the other fallacies listed in week 6.

WEEK 7: 1) To demonstrate comprehension of informal fallacies by correctly answering exercises covering the material discussed in weeks 5 and 6.

WEEK 8: 1) To define a categorical propositions and to identify its components.
2) To determine the quantity and quality of the four types of categorical propositions.
3) To define and distinguish among contradictory, contrary, subcontrary, and subalternation relations.
4) To translate ordinary language statements into categorical form.

WEEK 9: 1) To define a categorical syllogism;
2) To express categorical propositions into standard form, and name the mood and figure.
3) To identify the five rules for a valid syllogism, and the specific fallacies when each is violated.
4) To translate ordinary language arguments into categorical form;
5) From a selection of enthymes, to determine whether the missing statement is a premise or conclusion; to supply the missing statement, and where possible to convert the enthyme into a valid argument.
6) To identify the different rules of inference, giving examples to illustrate each.

WEEK 10: 1) To identify other deductive argument forms (modus ponens, modus tollens, hypothetical syllogism, disjunctive syllogism, simplification, conjunction, addition) and fallacies.
2) To demonstrate comprehension of formal fallacies by correctly answering exercises on material covered in weeks 8-10.

WEEK 11: 1) To identify primary and secondary analogates and to evaluate arguments from analogy
2) To explain the different meanings of “causes” by distinguishing among necessary, sufficient, and necessary and sufficient conditions;
3) To explain and be able to use Mill’s five methods of inductive inference.

WEEK 12: 1) To show how biased samples, the different meanings of average, the importance of dispersion, the use of percentages and the use of graphs and pictograms can cause ambiguity and deception in statistical reasoning.

WEEK 13: 1) To distinguish between theoretical and empirical hypotheses, and to explain the four criteria for tentative acceptance of a hypothesis.

WEEK 14: 1) To demonstrate comprehension of the content of the course by correctly answering exercises on the material covered in weeks 1-12.

GENERAL EDUCATION
General Education at New York City College of Technology, The City University of New York, provides students with a well rounded knowledge base, an appreciation of diverse cultural and intellectual traditions, an interest in relating the past to the contemporary world, and the skills necessary to reflect upon and shape society. A general education provides the opportunity to explore knowledge from various disciplines and perspectives, and to develop students’ abilities to read, write and think critically, and to assess information from a variety of sources. Further, and perhaps most importantly, general education develops students’ intellectual and creative curiosity and commitment to lifelong learning.

GENERAL EDUCATION LEARNING OUTCOMES

Communication
Read and listen analytically, comprehending the meaning of texts, including identifying an argument’s major assumptions and evaluating its supporting evidence.

Write clearly and coherently in varied academic formats using standard English to critique others’ texts and to improve upon one’s own texts. Present a formal or an informal spoken presentation, speaking to persuade or to describe. Listening to detail by way of analyzing the meanings of texts.

Critical Thinking
Learning the language of logic, formally and informally, for reasoned argumentation. Critical thinking involves the interpretation and criticism of texts, often primary sources. Philosophical positions are evaluated from a variety of sources. Information is integrated into one’s own system of
beliefs. The basic concepts of logic are identified and studied, i.e., truth and falsehood, the statement, the argument, premises and conclusion, deductive logic, validity, soundness, inductive logic, strength and cogency, identifying fallacies, translating natural language into symbolic form, testing for consistency and entailment, studying and applying the scientific method.

**Information, Research and Computer skills**
Information literacy begins with knowing when information is needed. How is the information acquired and then evaluated for its quality? Information literacy allows us to synthesize information from multiple, perhaps, conflicting sources. The importance of using information ethically and legally is stressed throughout.

**Scientific and Mathematical Literacy**
Understanding logical argumentation as the basis for an understanding of the scientific method; scientific literacy studies the history of the sciences, and recognizes the contribution of science to human progress. It studies the interrelationships among the sciences and between science and the language of mathematics. An understanding of basic statistical analysis, for example, is necessary for evaluating scientific data and interpreting scientific literature.

**Humanistic and Social Inquiry**
Humanistic inquiry studies and comes to respect the diversity of human experience while learning the interconnectedness of global and local concerns. The diversity of cultural traditions is stressed throughout together with an understanding of social and political institutions. Humanistic and social inquiry recognizes a variety of perspectives that emerge from new scholarship on gender, race, and class as well as from non-western cultural traditions. The arts are stressed as a basic human activity. Art forms find their expressions culturally, politically, philosophically and ethically.

**ASSESSMENT OF GENERAL EDUCATION LEARNING OUTCOMES**
The methods for assessing general education objectives are generic but specificity may arise depending on which area of general education is being stressed.

- Multiple choice quizzes are especially useful for assessing reading comprehension of basic content as well as attention to detail.

- The written assignment is many and various depending on the purpose of the assignment. Assignments range from the low-stakes one-pager to the formal term paper.

- In class, group work resulting in formal/informal oral presentations.

- Short answer quizzes addressing basic reading comprehension.

- Collaborative, in-class editing of written work.
Following texts contain chapters which further illustrate material covered in course and which provide additional exercises.


Ch.6: Detecting fallacies; Ch. 10: Deductive/Inductive distinction; Ch. 12: Induction: Analogies and Statistical reasoning.


Gray, William D. *Thinking Critically about New Age Ideas*, Belmont, Ca.: Wadsworth 1991
Includes a chapter on Common Fallacies (Ch. 3) and one on Science versus Pseudoscience (Ch. 4)


Part I includes section on analyzing arguments; Part 3 includes section on fallacies


Seech, Zachary. *Open Mind and Everyday Reasoning*. Belmont, Ca.: Wadsworth, 1993 Good sections on clarity and unstated conclusions and premises (Chapters 2 and 4).


Note: New editions of Logic textbooks are frequent--in some cases, every two to three years. Consequently, there may be later editions of the above works, in which case chapters and pages mentioned may be differently numbered. For entries which are not annotated, please see list of contents and/or indices for relevant material.