

Introduction to Logic - Video course

COURSE OUTLINE

This course introduces the basic concepts of logic and explores various principles, techniques concerning valid reasoning. Since Reasoning is involved in most intellectual activities, logic is relevant to broad range of pursuits.

The study of logic is essential for students of computer science, philosophy (used as a tool for their arguments) and students of Mathematics who attempts to understand the foundations of mathematics in a better way.

Mathematicians might be interested in what goes on in a lengthy proof or what constitutes a mathematical proof.

Introduction to Logic presents the basic techniques used to derive a valid conclusion from the premises of an argument and also techniques for determining whether or not a argument (deductive or inductive) is valid/strong.

The goal of this course is to introduce students to the essential ideas and techniques from logic that are widely used in Philosophy, Computer Science, Natural sciences, and the argumentation used in the daily discourse.

The subject matter of Logic is {argumentation} which is nothing but a study of effective {reasoning}.

Hence, the main purpose of this course has been to learn the tools and techniques of various reasoning processes.

As a starting point, we attempt to recognize, analyze and evaluate arguments in any given passage consists of natural language sentences. Then we classify the arguments into inductive and deductive based on the strength of support that premises provide to the conclusion.

Then we study fallacies some of which are detected from the usage of invalid form, and the other detected only by properly analysing and scrutinizing the content.

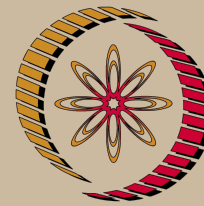
While discussing the Aristotelian Logic which dominated over 1900 years, we move on to the modern logic, also called first order logic, via Boolean Logic.

We introduce various concepts of propositional and predicate logic and discuss issue of whether the formal systems are consistent. In a nutshell, it studies the principles of correct reasoning, using the symbolic techniques of propositional calculus and basic quantifier calculus.

This course is unique in the sense that it has both mathematical, philosophical flavour and secondly, special care has been taken to present the concepts of logic through puzzles (puzzles of Raymond Smullyan and Martin Gardner) to make the subject matter least boring.

COURSE DETAIL

Sl.No.	Topics and Contents	No. of Lectures.



NP-TEL

NPTEL

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Humanities and Social Sciences

Hyperlinks:

1. <http://groups.google.com/group/sci.logic/topics> [Sci.Logic].
2. <http://www.cs.nyu.edu/pipermail/fom/> [Foundations of Mathematics[FOM]].
3. <http://world.logic.at/>[Logic Around the World].
4. <http://groups.google.com/group/sci.math/> [Sci.Math].
5. <http://sakharov.net/foundation.html> [Topics in Logic[best site]].
6. <http://plato.stanford.edu/> [Stanford Encyclopedia of Philosophy].

Coordinators:

Dr. A.V. Ravishankar Sarma

Department of Humanities and Social Sciences IIT Kanpur

	Basic Concepts	
Part 1:	Introduction: Logic and its relationship to other disciplines.	2
	Argument, Premises, conclusion, Indicators.	2
	Nature and scope of Deductive and Inductive Arguments.	2
	Validity and strength of Deductive and Inductive arguments.	2
	Truth and Soundness, Counter example method for invalidity of deductive arguments.	2
	Diagramming Arguments.	1
Part 2:	Formal and Informal Fallacies: Denial of Antecedent, Affirming the consequent.	2
	Fallacies of relevance.	3
	Fallacies of Induction.	2
	Fallacies arising from the ambiguities in Language.	2
Part 3:	Traditional Logic: Why formal Logic?	1
	Aristotle Theory of Syllogisms.	2
	Square of Opposition, Validity of syllogisms using Venn, Euler diagrams.	3
	Limitations of Aristotle Logic, Boolean logic and birth of Modern Logic.	2
	Modern Logic	
	Propositional and predicate Logic: Syntax and Semantics.	2
	Validity, Consistency, Soundness, Proof, Completeness.	2

Various techniques such as Truth Table method.	2
Indirect truth table method.	1
Natural Deduction.	2
Tree Method.	1
Godels incompleteness theorem.	2
Limitations of standard two valued logic.	3
Total Number of Lectures:	44

References:

1. Patrick Hurley A Concise Introduction to Logic, Wardsworth, 2007 [Standard Course Book].
2. Elliot Mendelson Introduction to Mathematical Logic, pp: 1-90 [Propositional and Predicate Logic].
3. Shawn Hedman, A first course in Mathematical Logic, oxford university press, pp 1-115[Extra].
4. Bertrand Russell and A. N. Whitehead, Principia Mathematica, 1910, pp. 89-135.
5. Raymond Smullyan, Forever Undecided: A Puzzle Guide to G"odel, 1987.
6. Martin Gardner, aha! Insight & aha! Gotcha.The mathematical association of America, 2002.
7. Lewis Carroll, Symbolic Logic, available in the Link <http://www.Lewis Carroll.org/texts.html>.
8. Stephen Read, Thinking about Logic: An Introduction to the Philosophy of Logic, Oxford University Press.
9. Graham Priest, Logic: A Very Short Introduction, Oxford University Press, 2001.