PHIL 50 — *INTRODUCTION TO LOGIC*

STANFORD UNIVERSITY

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time: Spring 2014
Mon, Wed, Fri
12:15–1:05 PM
venue: 380-380W

Broadly speaking, logic is the study of reasoning. It can help us identify good and bad reasoning patterns. Mathematics and the sciences have always obeyed the rules of logic. Even the seemingly counterintuitive results of Quantum Mechanics have been arrived at in compliance with logic. Any argument that departs from logic, after all, should be met with suspicion.

More specifically, the term 'logic' refers to a logical system—i.e. a general and precise method for identifying good and bad reasoning patterns. Given this more specific understanding of logic, there are *many* logics, and not just *one* logic. (This does not mean that anything will do; there are still some constraints on what can count as a logic.) The most prominent and revered logic of all times is known as *classical logic*. This will be the focus of this course. You will also be exposed, however, to glimpses of non-classical logic here and there.

COURSE OVERVIEW

The course will begin with (classical) propositional logic and then move on to (classical) predicate logic. Propositional logic deals with statement of the form 'φ,' 'not-φ,' 'φ or ψ,' and 'φ and ψ.' Predicate logic, instead, deals with more expressive statements which contain constants, variables, functions, predicates and quantifiers. The language of predicate logic is so powerful that you can express lots of mathematics and physics with it. The course will end—time permitting—with a short overview of modal and inductive logic. There are no prerequisites for this course. You will learn (almost) everything from scratch.

COURSE MATERIALS

The textbook for the course is *Logic in Action* (LiA) which is available on-line (www.logicinaction.org). Slides and other course materials will be posted on the course webpage.

REQUIREMENTS

(1) Ten weekly assignments due Monday before class; only the eight best will count [40%]
(2) A midterm in-class exam on April 25th [30%]
(3) A final in-class exam on June 6th [30%]

SCHEDULE & READINGS

PART A – Propositional Logic	
WEEK 1: *What's logic about?*	
Some history Reasoning patterns	LiA, 1.1—1.5 LiA, 2.1—2.3
WEEK 2: *Syntax and Semantics*	
Symbols and formulas Recursive definitions Truth-tables	LiA, 2.4 LiA, A.6 LiA, 2.5
Validity Expressiveness	LiA, 2.6 LiA, 2.9
WEEK 3: *Derivations*	
Derivation rules	Lectures notes
WEEK 4: *Applications*	
Soundness, completeness Logic and cognition	Lectures notes LiA, 2.12

PART B – Predicate Logic	
WEEK 5: *Syllogistic Logic*	
Syllogistic and sets	LiA, 3.1–3.4
WEEK 6: *Translations*	
Translation patterns	LiA, 4.1–4.4
WEEK 7: *Syntax and Semantics*	
Variables and quantifiers Semantics and validity	LiA, 4.5 LiA, 4.6 and 4.7
WEEK 8: *Derivations*	
Derivation rules Review	Lecture Notes

PART C – Modal and Inductive Logic	
WEEK 9: *Modal Logic*	
Possibility and Necessity	Lecture notes
WEEK 10: *Inductive logic*	
Probability axioms Probabilistic proofs	Lecture notes Lecture notes

STUDENTS WITH DISABILITIES

Students who have a disability which may necessitate an academic accommodation or the use of auxiliary aids and services in a class must initiate the request with the Disability Resource Center (DRC). The DRC will evaluate the request with required documentation, recommend appropriate accommodations, and prepare a verification letter dated in the current academic term in which the request is being made. Please contact the DRC as soon as possible; timely notice is needed to arrange for appropriate accommodations (phone 723-1066; TDD 725-1067).