Introduction to Formal Logic (Summer 2016)

MTWR, 1:30-3, seminar room 202, Philosophy Department on 5 Washington Place
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Office hours: Thursdays 3 - 5 pm (Office 514)

Course Summary
This course is a first introduction to logic. Logic is the study of how to reason well, or – putting it differently – how to make good arguments. It is an essential tool in philosophy and in mathematics, and a basic schooling in logic will benefit anyone who needs proficiency in the art of reasoning and argumentation. In this course, you will learn what a valid argument is, and you will learn methods for checking whether or not a given argument is valid. You will also learn how to use and understand formal logical languages, and how to translate English arguments into the language of logic. This will enable you to better assess other people's arguments, and also to produce better arguments yourself.

Textbook: Peter Smith, *An Introduction to Formal Logic*, Cambridge University Press 2003.

Homework
Each week for the first 5 weeks, I will give you two batches of exercises to do ('problem sets'), except for week three when we will spend all week on one set. Your solutions to the first set are due at the start of the Thursday class, and your solutions to the second are due at the start of the Monday class of the following week. In addition, I will ask you to do exercises from Peter Smith's book. I will not mark those, but you should check your own solutions at www.logicmatters.net.

I expect most of you will submit handwritten solutions most of the time, and that's absolutely fine. But if you want to hand in word-processed solutions, you are very welcome to do so, especially if you've got bad handwriting! You can hand in your answers either by giving them to me in person at the start of the class, or by e-mailing them to daniel.hoek@nyu.edu.

I'll mark this work and return it to you with feedback. I'll also give you a grade for each set, but you won't see these grades until the end of the class. The overall grade you receive for the problem sets will be the average of your eight best performances. Or to put it differently, the two worst grades won't count. However, you **must** attempt all ten problem sets. You have to hand them in **on time** because we will sometimes discuss the problems on the day they are due. If, for some good reason, you are unable to hand in your work in time for the class, you must let me know at least a day before they are due. Otherwise, you automatically get an F for the problem set in question, and that F counts towards your overall mark no matter what your other grades are.

Assessment

Most of your final grade depends on how well you do on the exercise sheets. In addition, there will be a test in the final class covering all the material in the course (on Thursday 30 June). Finally, you will each get a mark for class participation. If you come to class prepared, ask a good question from time to time and do the reading, you get an A for this. The final grade for the course is determined by the following weightings:

Problem sets:	60%
Final test:	30%
Class participation:	10%

Monday 30 May is Memorial Day, and so there won't be class then. Instead, there will be an extra class the next Friday, the 10th of June

Week 1 (23 – 26 May): Natural language

Key terms: *meaning*, *synonymy and ambiguity*, *use and mention*, *quotation*, *truth and falsehood*, *consistency and inconsistency*, *intension and extension*, *object language and metalanguage*

Reading: Peter Smith, chapter 1 (p. 1-8)

Homework for Thursday: Set I

Week 2 (31 May – 2 June): Formal language

Key terms: *formal languages*, *syntax and semantics*, *the language of propositional logic* (*$\mathcal{L}_0$ or* **PLC**), *interpretations and structures for $\mathcal{L}_0$*, *truth functions*, *truth tables*, *tautologies*, *contradictions*, *validity and entailment*, *counterexamples*, *induction vs. deduction*

Reading: Peter Smith, chapter 7-13 (p. 53-124)

Homework for Monday: Set II

Homework for Thursday: Set III

Week 3 (6 – 10 June): Arguments and Validity

Key terms: *formalisation of arguments, validity*, *truth table*, *counterexample, tautology, contradiction*

Reading: Peter Smith, chapter 14-18 (p. 125-178)

Homework for Monday: Set IVa

Homework for Friday: Set IVb

Week 4 (13 – 16 June): Proofs and Predicates

Key terms: *proof vs entailment*, *proof calculus*, *tree proofs for propositional logic (the calculus $\mathcal{T}_0$), the language of quantified logic with identity ($\mathcal{L}_1$ or* $\mathbf{QL}^{=}$*), predicates, variables, quantifiers, domains, interpretations for $\mathcal{L}_1$*

Reading: Peter Smith, chapter 19-29 (p. 192-285)

Homework for Monday: Set V

Homework for Thursday: Set VI

Week 5 (20 – 23 June): Quantifiers and Relations

Key terms: *formalisation of arguments in $\mathcal{L}_1$, trees for quantified logic (the calculus $\mathcal{T}_1$), reflexivity, symmetry, transitivity, equivalence relations, Russell's analysis of definite descriptions, expressions of number*

Reading: Peter Smith, chapter 31-35 (p. 294-338)

Homework for Monday: Set VII

Homework for Thursday: Set VIII

Week 6 (27 June – 30 June): Revision & Test

Homework for Monday: Practice Test