MATHEMATICAL LOGIC I (W4801)

Fall 2000 • W 11:00 – 12:50

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- GENERAL DESCRIPTION. This course will study, from a metalogical perspective, the concepts and principles that form the basis of classical elementary logic (as studied e.g. in the prerequisite course V3411/G4415, *Symbolic Logic* / *Introduction to Formal Logic*). The focus will be on the interplay between semantic (model-theoretic) and syntactic (proof-theoretic) properties of classical sentential and quantificational logic, up to Gödel's and Henkin's completeness theorems and related results. The course is technically self-contained and a background in mathematics is not required (except for some familiarity with normal everyday set-theoretic apparatus). However, a willingness to master technicalities and to work at a certain level of abstraction and rigor is essential.

- REQUIREMENTS. There will be two one-hour tests and a final examination. Each test will be worth 25% of the final grade; the examination will account for the remaining 50%. Weekly assignments will be optional and will not count for the final grade, but everybody is encouraged to do them on a regular basis and to hand them in for correction. (Solutions will be posted on the web.)

- TEXT. The textbook is H. B. Enderton's *A Mathematical Introduction to Logic* (Academic Press, 1972). Copies of the book are available at Labyrinth Books.

- SCHEDULE. A tentative schedule is given in the table below.

Week	*Date*	*Topic*	*Reading(s)*
1.	9/6	Presentation	/
2.	9/13	Introductory remarks on formal languages	§ 1.0
		The language of sentential logic	§ 1.1
3.	9/20	Induction and recursion	§ 1.2
4.	9/27	Truth assignments	§ 1.3
5.	10/4	Unique readability	§ 1.4
		Connectives and Boolean functions	§ 1.5
6.	10/11	Compactness and Effectiveness	§ 1.7
		TEST (25%)	
7.	10/18	First-order languages	§ 2.0 + 2.1
8.	10/25	Truth and models (basic notions; validity; logical consequence)	§ 2.2(a)
9.	11/1	Truth and models, cont'd (definability and homomorphisms)	§ 2.2(b)
10.	11/8	Axioms and derivations (basic notions; strategies and examples)	§ 2.4(a)
11.	11/15	Axioms and derivations, cont'd (alphabetic variants; identity)	§ 2.4(b)
		TEST (25%)	
12.	11/22	The soundness theorem	§ 2.5(a)
13	11/29	The completeness theorem	§ 2.5(b)
14.	12/6	Models of theories	§ 2.6
		Review and conclusion	/
	TBA	FINAL EXAMINATION (50%)	