PHIL(LING) 4510/6510
Deductive Systems
Fall 2007
MW 2:00–3:15pm, 205S Peabody Hall

Instructor: Chuck Cross
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Office: Peabody 101A, 706-542-2653
Office hours: Mon 3:30–4:30pm,
Tues 2:00–3:00pm, and by appointment

Required texts

- Bergmann, Moor, and Nelson, *The Logic Book, Fourth Edition*, with Student Solutions CD-ROM, New York: McGraw Hill, 2004 (ISBN 0-07-240189-3).
- Numerous printed handouts.

Prerequisite for undergraduate students

The prerequisite for this course is PHIL 2500 (Symbolic Logic), or the equivalent. This course makes heavy use of mathematical techniques, and some sophistication in mathematics will be assumed. Prior coursework in mathematics (e.g., first-semester calculus), while not a required prerequisite, is nevertheless helpful.

Course description[1]

This is a graduate-undergraduate second course in symbolic logic, i.e. prior background in symbolic logic will be assumed. In a previous logic course you learned how to use logical formulas to formalize arguments in sentential and predicate logic, and you learned how to construct formal proofs and counterexamples for formalized arguments. Instead of focusing on formalizing arguments and finding formalized proofs and counterexamples, this course will introduce you to the theory of sentential and predicate logic, i.e. the mathematical theory behind the problem-solving techniques you learned in your first logic course. We will spend some time on issues of formalization, but, when we do, we will tend to focus on more complicated kinds of problems and problems of a kind not covered in elementary logic.

For philosophy students this course provides background for more advanced work in logic. For students of artificial intelligence, the course provides an introduction to the theory behind an important medium for knowledge representation. For linguistics students the course can serve as background for the study of Montague Grammar, Discourse Representation Theory, Situation Semantics, and other applications of logic in linguistics.

Using primarily a Fitch-style natural deduction approach, we will cover the basic syntax and semantics of classical sentential logic and classical predicate logic with identity, with some attention to formal arithmetic, sentential modal logic, and possibly quantified modal logic (time permitting). The course will include such metatheoretical topics as the theory of proofs for Fitch-style systems, the expressive completeness and incompleteness of various sets of truth-functional connectives, and basic semantic theorems for sentential logic and predicate logic with identity.[2] The first part of the course (on sentential logic and predicate logic with identity) will include an accelerated tour of the Bergmann book as well as additional theoretical material not included in that book. In the Bergmann book I plan to cover Chapters 2, 3, 5 (sections 5.1-5.4 only), 6 (sections 6.1 and 6.2

[1] The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

[2] The soundness and completeness theorems for predicate logic are covered not in this course but in PHIL(LING) 4520/6520 Model Theory.

only), 7, 8 (sections 8.1-8.4 and 8.7 only), and 10 (sections 10.1-10.4 and 10.6 only). Throughout the course there will be lectures accompanied by handouts and homework assignments.

Please note: In the lectures, handouts, homework problems, and test problems for this course the emphasis will be most often on theoretical matters, not on the elementary logic problems and techniques that make up the bulk of the material in the Bergmann book. Class attendance will be essential because, although the material covered in the course depends on definitions and other background found in the textbook, and although some of the homework will come from the textbook, much of the material covered in class, as well as many of the homework and test problems, will go well beyond what is found in the textbook. Indeed, the most important material in the course will come from notes and handouts.

Coursework and grading

Homework will be assigned regularly and due on specific dates. In addition to homework, there will be two in-class midterm exams and a non-cumulative final exam. Also, from time to time I may call on members of the class (individually or in groups) to give (ungraded) presentations of problem solutions on the board.

Grades will be determined as follows: homework 40%, midterms 20% each, final exam 20%. Each homework assignment will be graded on a scale of 0 to 10. Each midterm and the final exam will be graded on a scale of 0 to 100. A final average in the range of 0 to 100 will be computed for each student. My tentative plan is to assign grades as follows based on final averages:

$100 \geq A \geq 93 > A- \geq 90$	$70 > D \geq 60$
$90 > B+ \geq 87 > B \geq 83 > B- \geq 80$	$60 > F \geq 0$
$80 > C+ \geq 77 > C \geq 73 > C- \geq 70$	

Schedule of exams

Make-up exams will not be offered without compelling evidence of illness or other emergency.

- First midterm: Wednesday, September 26th, in class
- Second midterm: Wednesday, Oct 31st, in class
- Final exam: Friday, December Dec 14th, 12:00 - 3:00 pm

All exams are scheduled to be held in 205S Peabody. The dates for the midterms are subject to change. Please take the date of the final exam into account when you make your travel arrangements. **I will not offer the final exam at alternative times to accommodate students' travel plans.**

Academic honesty

All academic work submitted for this course must meet the standards contained in the UGA document "A Culture of Honesty," which is available online at the following web address:

`http://www.uga.edu/ovpi/honesty/ah.pdf`

Each student is responsible for informing himself or herself about those standards before performing any academic work. Please note that collaboration in the formulation of solutions to homework problems violates the University's academic honesty policy and is not permitted.