**PHIL (LING) 4510/6510**
**Deductive Systems**
Fall 2003
MW 2:00–3:15pm, 220 Peabody Hall

*Instructor*: Chuck Cross
*Office*: Peabody 101A, 542-2653
*Office hrs*: MW 3:30–4:30pm,
and by appointment.

## Required texts

- Bergmann, Moor, and Nelson, *The Logic Book, 3rd Edition*, with solutions manual, (New York: McGraw Hill, 1998).
- Numerous printed handouts.

## Prerequisite for undergraduate students

The prerequisite for this course is PHIL 2500 (Symbolic Logic), or the equivalent. Please note: the UGA course PHIL 1500 (Logic and Critical Thinking) is *not* sufficient preparation for this course. If you are an undergraduate and you have not taken PHIL 2500 or an equivalent course at another institution, then please enroll in PHIL 2500 instead of this course.

While this course does not deal with numerical functions and their properties, the course does make heavy use of mathematical techniques. Some sophistication in mathematics (e.g. prior coursework in mathematics at the level of first-semester calculus), while not a required prerequisite, is nevertheless helpful.

## Course description

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 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 classical logic, i.e. the mathematical theory behind the problem-solving techniques you learned in your first logic course.

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 propositional logic and classical predicate logic with identity. I expect to cover the following topics in metatheory: the theory of proofs for the above-mentioned systems, the expressive completeness and incompleteness of various sets of truth-functional connectives, basic semantic theorems for propositional logic and predicate logic with identity,[1] and the theory of theories in propositional and predicate logic. Approximately the first twelve weeks of the course (on truth-functional 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. There will be lectures accompanied often with handouts and homework assignments. **Please note that the material I present in class and on handouts will be at least as important as the material**

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

**in the textbook.** In the Bergmann book I plan to cover Chapters 1, 2, 3, 5, 6 (sections 6.1, 6.2), 7, 8 (sections 8.1-8.4 and 8.7), and 10. The last two or three weeks of the course (on theories in propositional and predicate logic) will be based entirely on notes and handouts.

**Please note:** In homework and test problems for this course the emphasis will be on theoretical exercises, not the elementary logic problems that make up the bulk of the exercises in the Bergmann book. Class attendance will be essential because, almost without exception, the theoretical topics covered in class are not covered in the text.

## 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 current intention is to assign grades as follows based on final averages: $0 \leq F < 60$, $60 \leq D < 70$, $70 \leq C < 80$, $80 \leq B < 90$, $90 \leq A \leq 100$. If circumstances appear to warrant it, I may use a more lenient curve.

## Schedule of exams

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

- First midterm: Monday, September 22nd, in class
- Second midterm: Monday, November 3rd, in class
- Final exam: Wednesday, December 10th, 3:30–6:30pm

All exams are scheduled to be held in Peabody 220. The date, time, and place of the final exam is subject to change but will be finalized by the University during the first two weeks of November. Please take the date of the final exam into account when you make your travel arrangements. **I will not offer the final exam early 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/academic_honesty/academic_honesty.htm`

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.