LPS 104

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SST 793
T Th 3-4pm

Introduction to Logic

"Introduction to Logic" is the Department of Logic and Philosophy of Science's intermediate formal logic course. The aim of the course is to cover fully the object language calculus of classical first order logic so that the student is prepared to begin thinking clearly about topics in mathematical logic such as metatheory and the differences between classical and non-classical logics. The course covers all the material that a student should be familiar with before taking the Department's mathematical logic sequence (105a, b, c) as well as other topics of independent interest not covered in other courses at this university. The Department offers another course in formal logic (30) which is the second part of a three course sequence with more modest objectives. Although the course is "intermediate", I don't presuppose any familiarity with logic whatever ('though a habit of clear thinking will help you a lot).

This course will cover the following topics:

1. logical validity and truth compared with formal validity

2. the syntax and semantics of classical sentential logic

3. disjunctive normal form

4. axiomatic formal systems

5. logical independence

6. the syntax and semantics of monadic quantificational logic

7. decidability of monadic quantificational logic

8. the syntax and semantics of polyadic quantificational logic

9. prenex normal form and quantificational complexity

10. the soundness and completeness of polyadic quantificational logic

11. natural deduction

We will be following the exposition of William Goldfarb's *Deductive Logic* (Hackett, 2003), currently the best manuscript on the fundamentals of formal logic. Let me explain briefly this choice. When I teach a more elementary logic course, I recommend a much simpler, very readable, and technically sloppy text, so that students can have something to look to when they want more security. But I do not follow the text in any way really. In this class I choose Goldfarb's manuscript not because it provides psychological comfort for the student, but because part of developing a robust scholarly approach to logic involves the ability to work through technically rigorous writing. I focus on teaching this skill almost as much as on teaching logic. Having said that, it is worth noting that all introductory logic texts have some drawbacks. Goldfarb presents some technical apparatus that is not of much use in the course, and this might seem like a distraction. Other texts try to avoid this by presenting only technical apparatus that is of use, but at the noxious cost of doing things very differently than they are done in the advanced study of logic today. I prefer Goldfarb's approach because students can jump right into advanced studies and understand the terminology and techniques being used.

Having said that, we will depart from Goldfarb's exposition toward the end of class, in favor of a more robust treatment of quantificational theory. The notes included in this syllabus will serve as our main text at that point.

In this course, we will not concentrate much on how logic appears in ordinary language or in informal arguments, but rather on the properties, strengths, and weaknesses of a particular formal system of logic. We will concentrate primarily on deriving formulas with this formal system and thereby familiarizing ourselves with the logical relationships among formulas. We will also emphasize that the formal system we are investigating is not the last word in logic. Maybe there are some logical relationships between formulas that our system "overlooks", and maybe there are some formulas that cannot even be written in our system.

You will get a grade in the course depending on your performance on three tests. The first test covers sentential logic and the second test covers monadic quantificational logic. You, as a class, will let me know when you feel ready for these tests. The final test will be devoted to polyadic quantificational logic. All three tests will have some technical parts and some parts where you are asked to reflect on the properties that our formal systems have. By the nature of the material, the tests are "cumulative".

The University of California is an equal opportunity institution, and I am an equal opportunity kind of guy. I hope that everyone is familiar with the information on the following web-site:

http://www.eod.uci.edu/

In addition, these two web-pages describe university policies and resources for disability services and academic honesty, both of which are part of equal opportunity provisions:

http://www.disability.uci.edu/policies_procedures/policies_index.htm

http://www.editor.uci.edu/catalogue/appx/appx.2.htm

I'm available to discuss any questions about this sort of thing.