

Philosophy 1880

Advanced Deductive Logic

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Course Structure and Requirements

The course will meet Monday, Wednesday, and Friday, at 10am, in Rockefeller B17. Class meetings will consist primarily of lectures.

The text for the course is *Computability and Logic*, by Boolos, Burgess, and Jeffrey. Please note that this edition, the fourth, contains a large number of misprints. A list of errata can be downloaded from <http://www.princeton.edu/~jburgess/addenda.htm>.

As with any mathematical subject-matter, it is impossible to learn this material without doing a lot of exercises. The book contains many, and problem sets drawing upon these exercises will need to be submitted N times during the semester. Students are *encouraged* to work on the problems together—though, of course, submitted material should be a student’s own work. There will also be a take-home final examination.

Prerequisites

Formally speaking, Philosophy 0540 (previously PL54) is a prerequisite for this course. But more strictly speaking, we will be presuming a familiarity with basic logical notation, with how it can be used to represent the ‘logical forms’ of ordinary English statements and of mathematical claims, and with basic facts about validity, implication, and formal deduction. So you should understand what something like $\forall x\exists y(Fxy)$ might mean, and how it would differ from $\exists y\forall x(Fxy)$; and you should understand what it means to say that the latter implies the former, but not conversely, and how this could be shown.

Less specifically, this course is very mathematical in content. Perhaps the most important thing a student will need to be successful is a solid understanding of what it is to *prove* something mathematically. No particular mathematical knowledge is presumed, but a familiarity with ‘mathematical induction’ will be very helpful.

Syllabus

The following syllabus is approximate—and very much so.

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| 7–12 September 2007 | Chapters 1–2 |
| 14–19 September 2007 | Chapters 3–4 |
| 21–30 September 2007 | Chapters 5–6 |
| 1–5 October 2007 | Chapter 7 |
| 8 October 2007 | No Class: Columbus Day Holiday |
| 10 October 2007 | Chapter 7 |
| 12–19 October 2007 | Chapters 9–10 |
| 22–26 October 2007 | Chapter 12 |
| 29–31 October 2007 | Chapter 13 |
| 2 November 2007 | Chapter 14 It is worth reading this material, but what we do in class will be somewhat different. |
| 5–7 November 2007 | Chapter 15 (probably not 15.3) |
| 9–14 November 2007 | Chapter 16 |
| 16 November 2007 | No class: Instructor out of town |
| 19 November 2007 | Chapter 16 |
| 21–23 November 2007 | No Class: Thanksgiving |
| 26–30 November 2007 | Chapter 17, probably plus some additional material on truth |
| 3–7 December 2007 | Chapter 18, probably plus some additional material |

Problem Sets

Note that in many cases you have a choice of what problems to do, and of course you're welcome to do more. You probably *should* do more problems than these since, as said above, that's really how you learn this kind of material. So what follows are really just some suggestions of problems I think are particularly useful.

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| Problem Set 1 | 1.3, 1.5, 1.7 and one other from Ch 1 2.1, one other from 2.2–2.6, 2.8, 2.13 Due 19 September |
| Problem Set 2 | Two from 3.1–3.4, one from 3.5–3.6 4.1, 4.2, and one other Due 26 September |
| Problem Set 3 | 5.1 or 5.2, 5.3 or 5.4, one of 5.7–5.8, one of 5.11–5.12 6.1 or 6.2, 6.5, 6.7, one of 6.8–6.9 Due 10 October |
| Problem Set 4 | 7.1, 7.3, one of 7.4–7.7, one of 7.9–7.11; if you want to challenge yourself, try 7.12 and 7.13 or, better yet, 7.14–7.17 Due 17 October |
| Problem Set 5 | If you've not previously had much logic, you should work 9.1–9.3, 10.2, and 10.3 9.4, 9.5, 9.6 (and 9.7 if you don't do 9.1–9.3) 10.4, two of 10.5–10.9 (and try 10.11 for a challenge) Due 26 October |
| Problem Set 6 | Two of 12.1–12.4, one of 12.5–12.7, 12.9, one of 12.12–12.14 (and for a challenge try 12.16 and the sequence 12.20–12.27) Due 2 November |
| Problem Set 7 | 13.8 and four from among 13.9–13.15 Due 9 November |
| Problem Set 8 | 15.2, 15.5, 15.9, 15.10 (and for a challenge, 15.3, 15.7, or 15.9) Due 16 November |
| Problem Set 9 | This is a longer one, as we're spending several sessions on Ch 16. Start early! 16.1 or 16.2, 16.3, 16.8, 16.9, 16.10, 16.17, and 16.18 (continue through 16.20 if you like) For a challenge, try 16.4 and the series 16.5–16.7 and 16.13–16.15 Due 28 November |
| Problem Set 10 | 17.1, 17.3 (generalize it further, if you can), 17.9, 17.11–17.12 and, for a challenge, 17.2 and 17.7–17.8 |