

Intermediate Logic I

Meeting time and place

Mondays and Wednesday at 1:10 PM – 2:30 PM
Freylinghuysen Hall, room A2

Instructor

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Course description and learning goals

This course will explore some of the main results in the metatheory of classical first-order logic (e.g. its soundness and completeness). We will also study a few philosophically interesting systems that differ from classical first-order logic either by *extending* it (e.g. modal logic) or *deviating* from it (e.g. paraconsistent logic). Along the way, we will address several debates about the nature of logic, and develop some of the mathematical tools and proof methods needed for further work in the subject. In short: this course will help you venture beyond the scope of an introductory formal logic course—both in breadth and depth, both technically and philosophically.

Prerequisites

The only formal requirement is completion of 730:201 ('Introduction to Logic').

Course texts

You are required to get a hold of the following textbook:

- Theodore Sider, *Logic for Philosophy* (2010, Oxford University Press)

Further readings from the following textbook will be distributed through the course website:

- Merrie Bergmann, James Moor, and Jack Nelson, *The Logic Book*, 6th edition, (2014, McGraw-Hill Education)

You are required to bring the assigned reading to every session, but you may choose the format: original hard copy, print-out, and electronic PDFs are all fine.

Course assessments

- Take-home problem sets **40%**
- Two take-home midterm exams **2 x 15%**
- In-class final exam **30%**

Attendance and participation policy

Although not a fixed component of the final grade, I reserve the right to lower your final grade for failure to regularly attend sessions and/or meaningful contribute to the discussion (which includes avoiding inappropriate use of electronics. I will be using a sign-in sheet, which I will take up after the first five minutes of the session. If you must be absent due to a University-approved reason, you are required to formally report your absence using the Self-Reporting Absence Application (<https://sims.rutgers.edu/ssra>), as well as submit any relevant documentation.

Academic integrity policy

Cheating, plagiarism, and other forms of academic malfeasance come in many forms—if you haven't already, I would recommend familiarizing yourself with the Academic Integrity Policy (<http://academicintegrity.rutgers.edu/academic-integrity-policy/>) for a short list of examples. Any suspected violation—and I am quite talented at detecting these—will be automatically referred to the Office of Judicial Affairs, and can carry penalties up to and including a failing grade in the course or expulsion from the university. Note well: ignorance about what counts as academic malfeasance, or carelessness in acting in accordance with this policy, is *not* a defense. Thus, if you have any questions about whether you are toeing the line, please do not hesitate to consult with me *before* you submit your work.

University disability statement

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation. For more info, visit <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. In order to begin this process, please register at <https://webapps.rutgers.edu/student-ods/forms/registration>.

Tentative schedule of topics and readings

I have incorporated some extra time into the schedule in case we need it—and if not, to allow us to explore topics we haven't discussed in the seminar yet, or to revisit ones we have.

22 January *Introducing the course and set-theoretic machinery*

Text: Sider, “What is Logic?”, pp. 1-11

27 January *More set-theoretic machinery*

Text: Sider, “What is Logic?”, pp. 12-24

29 January *The syntax and semantics of PL*

Text: Sider, “Propositional Logic”, pp. 25-37

3 February *Natural deduction in PL*

Text: Bergmann *et al.*, pp. 146-174

5 February *Sequent proofs in PL*

Text: Sider, “Propositional Logic”, pp. 37-46

10 February *Axiomatic proofs in PL and mathematical induction*

Text: Sider, “Propositional Logic”, pp. 46-53

12 February *The soundness of PL and Cut*

Text: Sider, “Propositional Logic”, pp. 53-58

17 February *The deduction theorem for PL*

Text: Sider, “Propositional Logic”, pp. 58-62

19 February *The completeness of PL*

Text: Sider, “Propositional Logic”, pp. 62-66

24 February *Adding further truth-functional connectives to PL; denying bivalence*

Text: Sider, “Beyond Standard Propositional Logic”, pp. 67-79

26 February *Denying bivalence*

Text: Sider, “Beyond Standard Propositional Logic”, pp. 79-86

- 2 March** *The syntax and semantics of MPL*
Text: Sider, “Modal Propositional Logic”, pp. 133-148
- 4 March** *The semantics of MPL*
Text: Sider, “Modal Propositional Logic”, pp. 148-158
- 9 March** *Axiomatic systems of MPL*
Text: Sider, “Modal Propositional Logic”, pp. 158-172
- 11 March** *Deontic, epistemic, and temporal interpretations of MPL*
Text: Sider, “Beyond Standard Modal Propositional Logic”, pp. 183-192
- 16 March** NO CLASS [spring recess]
- 18 March** NO CLASS [spring recess]
- 23 March** *The syntax and semantics of PC*
Text: Siderits, “Predicate Logic”, pp. 90-98
- 25 March** *Natural deduction in PC*
Text: Bergmann *et al.*, “Predicate Logic: Derivations”, pp. 474-491
- 30 March** *Axiomatic proofs in PC*
Text: Sider, “Predicate Logic”, pp. 99-104
- 1 April** *The metatheory of PC: preliminaries*
Text: Bergmann *et al.*, “Predicate Logic: Metatheory”, pp. 545-557
- 6 April** *The soundness of PC*
Text: Bergmann *et al.*, “Predicate Logic: Metatheory”, pp. 561-566
- 8 April** NO CLASS [Pacific APA]
- 13 April** *The completeness of PC*
Text: Bergmann *et al.*, “Predicate Logic: Metatheory”, pp. 566-576
- 15 April** *Identity, function symbols, and descriptions*
Text: Sider, “Beyond Standard Predicate Logic”, pp. 107-119

- 20 April** *Adding further quantificational expressions to PC; complex predicates*
 Text: Sider, “Beyond Standard Predicate Logic”, pp. 119-132
- 22 April** *Free logic*
 Text: Sider, “Beyond Standard Predicate Logic”, pp. 129-132
- 27 April** *The syntax and semantics of SQML*
 Text: Sider, “Quantified Modal Logic”, pp. 227-236
- 29 April** *Philosophical questions about SQML*
 Text: Sider, “Quantified Modal Logic”, pp. 236-249
- 4 May** TBD