PHI 451/651: Logic and Language

Syracuse University, Fall 2021

Michael Rieppel
Email: morieppe@syr.edu
OH: TBD or by
appointment

Course Description

The aim of this course is to provide students with a background in various concepts, methods, and results from mathematical logic that are of philosophical importance. We will study basic set theory, topics in the model- and proof-theory of propositional logic, modal logic, and first-order logic, as well as the application of formal techniques to the study of meaning in natural language.

Though this course is open to undergraduates, it is taught at a graduate level. This means that you must be comfortable proceeding at a rapid pace, reading difficult material, and putting in a substantial amount of independent work every week. PHI 251 or an equivalent introductory logic course is required; additional background in logic, mathematics, or relevant areas of philosophy is beneficial. If you are unsure whether you have adequate preparation, come speak with me individually.

Texts

The primary textbook for this course will be Ted Sider's *Logic for Philosophy* (OUP, 2010). Order a copy from the bookstore or online. We will also draw on material from the following:

- Devlin, *The Joy of Sets: Fundamentals of Contemporary Set Theory* (Springer, 1993)
- Heim and Kratzer, *Semantics in Generative Grammar* (Blackwell,

1998) I will provide pdfs of this material and other supplementary readings.

Course Requirements

(i) Attendance and participation (UG: 10%, G: 10%)
(ii) Problem Sets (UG: 90%, G: 70%)
(iii) Article Exegesis (G: 20%)

'UG' indicates the percentage weight for undergraduate students, 'G' for graduate students. The arti- cle exegesis is due at the end of the semester and is required of graduate students only.

I prefer it if problem sets are typed. A good resource for typing work in logic is LaTeX (I use this for my handouts, and both Sider's and Devlin's textbooks are written in it), though MS Word works too. An online LaTeX editor is available here:

https://www.overleaf.com

You may submit handwritten work, but make sure that it is written and presented neatly. If I cannot read your work, I will ask you to begin typing it up.

Schedule

The precise schedule and material covered will depend on how quickly we proceed. It is your respon- sibility to ensure that you know what the reading and homework is for each class meeting. Roughly, we will cover the following topics in the order indicated:

Introduction:

- Review of natural deduction and proof strategies. (Handout)

Part 1: Set Theory

- Basic set theory. (Devlin Ch. 1)
- Diagonalization and the cardinality of sets. (Sider Ch. 1)

Part 2: Propositional Logic - Sider Ch. 2-3

- The semantics of propositional logic.
- Axiomatic proofs in propositional logic.
- Metatheoretic proofs by induction.
- Soundness and completeness of propositional logic.

Part 3: Modal Propositional Logic - Sider Ch. 6

- The semantics of modal propositional logic.
- Axiomatic systems for modal propositional logic and frame correspondence.

Part 4: Predicate Logic - Sider Ch. 4-5

- Symbolization in predicate logic with identity.
- Semantics of predicate logic.
- Russell's theory of descriptions.

Part 5: Formal Semantics for English

- Heim and Kratzer *Semantics in Generative Grammar* (1998)

Course Policies

Academic Integrity

Do not cheat. Any established academic integrity violation may result in course failure, regardless

of violation level. For details on SU's academic integrity expectations and policies visit:

http://class.syr.edu/academic-integrity/policy/

Discussing problem sets with others is fine, and indeed encouraged. However, all work that you submit *must have been written up by you individually*. Directly copying someone else's work or relying on detailed notes produced in collaboration with others is considered a violation of academic integrity. You may not collaborate with others in any form on quizzes or exams.

Health

You must abide by the public health guidelines specified by the university. For the current COVID Alert Level and associated guidelines see https://www.syracuse.edu/staysafe/

Mental health and overall well-being have a significant impact on academic success. It is important to develop skills and resources to effectively navigate stress, anxiety, depression and other mental health concerns. Please familiarize yourself with the range of resources the Barnes Center provides and seek out support for mental health concerns as needed. Counseling services are available 24/7, 365 days a year, at 315.443.8000, and I encourage you to explore the resources available through the Wellness Leadership Institute.

Accommodations for Students with Disabilities

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to dis- cuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process. Since accommoda- tions may require early planning and generally are not provided retroactively, please contact the CDR as soon as possible.

Extensions and Absences

To request an extension on an assignment you need to contact me *at least two days* before the due date. Unexcused late work will not be accepted.

If you expect to miss a class meeting due to a religious observance, please inform me of the dates on which you will be absent within the first two weeks of the semester.

You can have two unexcused absences without it affecting the participation portion of your grade. Any additional absences should come with an official excuse (e.g. a doctor's note). If you arrive late, you will be marked as absent for that day.

Electronic Devices

Please do not use electronic devices in class. Phones, tablets, computers etc. should be put away and the volume muted. If you think you need to use an electronic device during class in order to succeed in this course, please come speak to me personally.

Email Policy

I will do my best to reply to emails about *brief* class-related questions within a day (on weekdays). For substantive inquiries, please come see me during office hours or schedule an appointment.

You can also ask questions via the Q&A forum for this class on piazza.com I encourage you to also answer each other's questions on piazza! Please use this tool responsibly: you can offer suggestions and clarifications for problem set questions, but don't just give out the answer.