

Syllabus

1. The Basics

Period: MW7
Room: HH-B5
Instructor: Zee R Perry
Contact: zee.perry@rutgers.edu
Office: Philosophy Department [[PTLoffice]]
Office Hours: Wednesdays 3-4:30pm, other times TBD, and by appointment

2. Course Description

Logic is the formalized study of reasoning and arguments. This course is an introduction to the field, and will cover the core concepts sentential logic, first-order logic, their proof theories, and the basics of their semantics. We will begin by understanding arguments in a simple way, and expressing them in coarse-grained formal language. This more precise language will enable us to evaluate the validity and soundness of various inferences, and to construct inference ourselves, using the Natural Deduction system.

We will then go back through these questions with a finer-toothed comb, and break sentences down into their component parts. First-order logic, or “Predicate logic”, relies on a formalism that breaks sentences down into subjects and predicates, and introduces tools that allow us to represent concepts like “something”, “everything”, and “nothing” and evaluate inferences involving these terms.

During the course, we will learn to construct truth tables to break down complex inferences and determine their truth conditions, and we will learn to construct proofs using the tools of first-order logic. Students who complete the course will have gained a greater ability to understand the structure of statements in formal as well as ordinary languages, and to evaluate and construct inferences involving them. These abilities will translate well to more advanced logic courses (whether philosophical or mathematical) as well as advance courses in analytic philosophy, as well as other fields like computer science, mathematics, and linguistics.

3. Course Resources and Readings

Book:

- *forall x: Calgary Remix*—An Introduction to Formal Logic (the Spring 2020 edition), By P. D. Magnus and Tim Button; with additions by J. Robert Loftis; remixed and revised by Aaron Thomas-Bolduc and Richard Zach

The textbook is free and open source. I will provide PDFs of the book (in whole and divided into parts) on SAKAI. In addition, you can find it for download at forallx.openlogicproject.org and other places. However, if you try to download it from somewhere other than SAKAI: Be Careful!! There are multiple different versions and editions (written and/or modified by different authors).

If you'd prefer a physical copy, one can be had for relatively cheap (\$9.50) on Amazon (among other places): <https://www.amazon.com/dp/1077319851>

4. Course Requirements and Grading

a. Requirements

Attendance Quizlets and Participation:	12%
Homeworks and Problem Sets:	15%
Midterm Unit Exams:	4 x 12% = 48%
Final Exam:	25%

b. Attendance Quizlets and Participation

Attendance and participation in this course are mandatory. Participation requires attendance. In addition, skipping too many class meetings will be *directly* detrimental to your grade, unless your absence is legitimate or excused. If you have a legitimate or excused absence, you will receive half-credit for your attendance that day.

Attendance will be checked via a system I call the "Attendance Quizlet". At one or more points during class, there will be a question about the material that you must answer, or a problem you must solve. You will answer this question on a piece of paper, signed with your name and the date. At the end of class, you will turn this paper in as evidence of your attendance. Sometimes, the attendance quizlet will be peer-checked for correctness.

An absence can only be excused by prior approval by me or if there's some serious stuff going on (which could be a medical emergency, crisis in the family, car won't start, cat ran away, you're feeling really depressed, you're super hungover). You DO NOT have to justify or provide documentation or "proof" that serious stuff is going on. You're an adult, and I trust your judgment about your own life situation.

Philosophical logic is a discipline best understood through practice and in-depth discussion. Participation during class will be graded on the following rubric:

Level	Criteria
C	<ul style="list-style-type: none"> ▪ Present, not disruptive. ▪ Tries to respond when called on but does not offer much. ▪ Demonstrates sporadic involvement in discussion.
B	<ul style="list-style-type: none"> ▪ Demonstrates adequate preparation. ▪ Offers straightforward information (e.g., straight from the reading). ▪ Regularly contributes to discussion
A	<ul style="list-style-type: none"> ▪ Demonstrates good preparation ▪ Offers interpretations and analysis ▪ Contributes well to discussion in an ongoing way: responds to other students' points, thinks through own points, questions others in a constructive way, offers and supports suggestions that may be counter to the majority opinion. ▪ Demonstrates consistent ongoing involvement.
A+	<ul style="list-style-type: none"> ▪ Demonstrates excellent preparation. ▪ Contributes in a very significant way to ongoing discussion: keeps analysis focused, responds very thoughtfully to other students' comments, contributes to the cooperative argument-building, suggests alternative ways of approaching material and helps class analyze which approaches are appropriate, etc. ▪ Demonstrates ongoing very active involvement.

c. Homeworks

Most weeks (with a couple exceptions) there will be a series of questions distributed during Thursday's class having to do with the material covered that week. These questions will be due in-class on the following Tuesday.

d. Four Midterm Exams

There will be four closed-book in-class midterm exams, which will come at the end of four of the class units. Some of the questions on the midterm will be taken from past homeworks, but most will be new. You will have the opportunity to prepare a one-page "cheat sheet" in advance of class, which can contain any information you think might be helpful to you during the exam.

e. Final Exam

There will be a final exam that will occur during our class's regularly-scheduled exam period.

Schedule

Part 1: Introduction; Basic Logical Concepts, Formalism, and Translation

Jan 22 Admin and syllabus. Introduction: what is logic?

Jan 27 Logical notions: validity and consequence. First steps towards symbolization.
Readings: Chapter 1-4

Jan 29 The meaning of 'and'; Logical Connectives
Readings: Chapters 1-5, focusing on Chapter 5

Feb 3 Translations into Truth-Functional Logic.
Readings: Chapter 6 and 7

Feb 5 Midterm Exam 1
Covering: Chapters 1-7

Part 2: Arguments and Truth Tables

Feb 10 Truth tables and Truth Functionality
Readings: Chapters 8 and 9

Feb 12 Truth tables and semantic concepts
Readings: Chapters 10-12 (*Optional:* Chapter 13)

Feb 17 Truth tables and arguments
Readings: Chapters 12 and 13 [[]]

Feb 19 Midterm Exam 2

Covering: Chapters 8-13

Part 3: Natural Deduction in Truth-Functional Logic

Feb 26 NO CLASS (Zee's out of town)

Feb 26 Foundations of Natural deduction proof systems. Conjunction Rules
Readings: Chapter 14, Beginning of Chapter 15 up to the end of 15.2

Mar 2 Conditional Rules and Subproofs
Readings: Chapter 15.3 and 15.4

Mar 4 Biconditional, disjunction, and negation rules
Readings: Chapter 15.5-15.7

Mar 9 Additional rules for Truth-Functional Logic, and basic Proof Theory.
Readings: Chapter 16 and beginning of 17 until 17.2 [[]]

Mar 11 Proof Theory and Proof Strategies. Derived Rules
Readings: Chapters 17 and 18. (*Optional:* 19)

Mar 23 Midterm Exam 3

Covering: Chapter 14-18

Part 4: First-order Logic ("FOL")

Mar 25 Soundness and Completeness of Truth-Functional Logic
Readings: Chapter 20

Mar 30 Building blocks of FOL: Subjects and Predicates
Readings: Chapter 21

Apr 1 Introduction to Quantifiers
Readings: Chapter 22

Apr 6 The full power of First-Order Logic
Readings: Chapter 23 and 24

Apr 8 Definite descriptions and the concept of a sentence
Readings: Chapters 25 and 26

Apr 13 Predicates and Interpretations
Readings: Chapters 27 and 28

Apr 15 Midterm Exam
Covering: Chapters 21 to 28

Part 5: Natural Deduction for FOL

Apr 20 Basic rules of Natural Deduction in First-Order Logic
Readings: Chapter 32

Apr 22 Using and Manipulating Quantifiers in Proofs
Readings: Chapters 33 and 34

Apr 27 More proof theory for FOL, identity and derived rules
Readings: Chapters 35 to 37

Apr 29 Make-up day

Final Exam:

During our class's normally-scheduled finals time, which is: [TBA]