Syllabus

1. The Basics
Period: Monday/Wednesday 2:45pm – 4:00pm (CST)
Room: 1555 Century Ave, Room 304
Instructor: Zee R Perry
Contact: zee.perry@nyu.edu
Office: 1555 Century Avenue, Office 1256 (though not currently)
Office Hours: TBD, and by appointment. (Held online until in-person is possible)

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, expressing them in coarse-grained formal language. This more precise notation 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 true 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 Fall 2021 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 the class website (and, later, NYU Brightspace). 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 the course website (or NYU Brightspace): Be Careful!! There are multiple different versions and editions (written and/or modified by different authors)!

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, but these concepts are also extremely malleable in a hybrid setting like ours.

Rather than requiring any kind of in-person attendance or a watching requirement (for the early, remote, portion of the semester), I will test for "attendance" (broadly construed) 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. This will be very quick to answer, and you should be able to fit it on a scrap of paper, or in a couple paragraphs or just a few lines of a text document. You will submit these on the course website or the NYU Brightspace site, and you'll be expected to send this submission within 24-48 hours of streaming/uploading of the class video.

Lateness on attendance quizlets or the other small assignments count as "unexcused absences" unless you receive prior approval from me.

Lateness on quizlets and small assignments (aka "absences") can also be excused 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, etc.). 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.

However, if you feel you are falling behind in your small assignments, or your readings, or in keeping up with the class session videos, or anything else, you should reach out to me as soon as you are able! This is a difficult situation that we're all in, and I want this class to be a positive and educational experience! This class should be fun and challenging and intellectually stimulating, but it shouldn't be putting you in a stress-spiral (or contributing to an existing spiral)!!

c. **Homeworks**
Many weeks there will be a series of questions distributed during Wednesday's class having to do with the material covered that week. These questions will be due in-class on the following Wednesday.

d. **Four Midterm Exams**
There will be four open-book open-notes online 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. The exams will be (very generously) timed but not proctored.

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

Schedule
Part 1: Basic Logical Concepts; Translation, Truth Tables, and Arguments

Aug 30: Admin and syllabus. Introduction: what is logic?

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

Sept 6: The meaning of 'and'; Logical Connectives and Translations into Truth-Functional Logic.
Readings: Chapter 5-7

Sept 8: Truth tables and Truth Functionality
Readings: Chapters 8-10

Sept 13: Truth tables and semantic concepts
Readings: Chapters 11-14)

Part 2: Natural Deduction in Truth-Functional Logic

Sept 15: Foundations of Natural deduction proof systems.
Readings: Chapter 15-16

[Midterm Quiz 1] – *Covering:* Chapters 1-14

Sept 20: Additional rules for Truth-Functional Logic, and basic Proof Theory.
Readings: Chapter 17

Sept 22nd [NO CLASS!] *Day after Mid-Autumn Festival*

Sept 27: Proof Theory and Proof Strategies.
Readings: Chapters 18 and 19.

Sept 29: Soundness and Completeness of Truth-Functional Logic.
Readings: Chapters 20 and 21

October 1st [NO CLASS!] *Fall Break*

Part 3: First-order Logic ("FOL")

Oct 11: Building blocks of FOL: Subjects, Predicates and Quantifiers
Readings: Chapter 22 and 23

[Midterm Quiz 2] – *Covering:* Chapter 14-20

Oct 13: The full power of First-Order Logic
Readings: Chapter 24 and 25

Oct 18: Definite descriptions and the concept of a sentence
Readings: Chapters 26 and 27

Oct 20: Predicates and Interpretations
Readings: Chapters 29-31

Oct 25: Reasoning about Interpretations
Readings: Chapters 32 and 33.

[Midterm Exam 3] – *Covering:* Chapters 22 to 31

Part 4: Natural Deduction for FOL

Oct 27: Basic rules of Natural Deduction in First-Order Logic
Readings: Chapter 34

Nov 1: Using and Manipulating Quantifiers in Proofs
      Readings: Chapters 35 and 36

Nov 3:   More proof theory for FOL, identity and derived rules
      Readings: Chapters 37 to 39

Nov 8: More proofs in FOL, connecting semantic and proof-theoretic notions
      Readings: Re-read 34-39

Nov 10: Make-up day

[Midterm Exam 4] – *Covering:* Chapters 34 to 39

Nov 15: Soundness and Completeness of FoL
      Readings: Chapter 43 and 44, and [TBD]

Nov 17: Soundness and Completeness of FoL (cont'd)
      Readings: Chapter 45 and 46, and [TBD] (cont'd)

Part 5: Non-Classical Logics and Extensions beyond FOL

Nov 22: Introducing Modal Logic
      Readings: Chapter 40

Nov 24: Two Modal Logics: Temporal Logic and the Logic of Possibility
      Readings: [TBD] and Chapter 41

Nov 29: Natural Deduction for Modal Logic, and Different Axiomatizations of Modal Logic
      Readings: Chapters 40-41 and [TBD]

Dec 1: Semantics of Modal Logic
      Readings: Chapter 42

Dec 6: Introduction to Non-classical logics
      Readings: [TBD]

Dec 8: Make-up Day

Final Exam:

Held online during our class's normally-scheduled finals time, which is: [[TBD]]