Phil 120: Symbolic Logic

Instructor: Samuel Z. Elgin

Lecture: Tuesday/Thursday 12:30-1:50 CSB 001
Course Website: TritonEd
Office Hours: Friday 1:00-2:00 HSS 7059
Email: selgin@ucsd.edu

Course Overview and Objectives

Overview:

Logic is the formal study of how truths fit together. It investigates the notions of deductive inference, validity and provability, and is an invaluable tool in distinguishing good arguments from bad ones. Logical developments have impacted many fields of study including mathematics, computer science, linguistics, cognitive science and philosophy. The study of logic can be traced at least back to Aristotle, but was rigorously formalized at the end of the 1800s by Gottlob Frege. This course will provide an overview of first-order logic, introduce a model-theoretic notion of validity, and rigorously define provability.

Objectives:

i) To be able to express English sentences in the language of first-order logic.

ii) To understand and to use the rules of inference in first-order logic.

iii) To be familiar with model-theoretic conceptions of validity and provability.

iv) To begin to prove things about logic itself.

Prerequisites:

An introductory logic or logical reasoning course such as Phil 10, or the consent of the instructor.

Course Materials

The textbook for this course is:

The Logic Manual
Volker Halbach, Oxford University Press

This textbook was originally published in 2010, with a reprinted version published in 2015. It is strongly recommended that you obtain the 2015 version, as there are some mistakes

in the 2010 original. The other required readings are supplementary handouts that will be made available in class and online.

There are other textbooks that cover the same topic. For different presentations of this material, I recommend *also* reading one of the following:

> *An Introduction to Symbolic Logic*
> Terence Parsons
>
> *The Logic Book*
> Merrie Brigman, James Moor and Jack Nelson, McGraw-Hill
>
> *Deductive Logic*
> Warren Goldfarb, Hackett

The Parsons is available online (https://sites.google.com/site/tparsons5555/home/logic-text), and the other two are available in UCSD's library. Please note that all textbooks other than *The Logic Manual* are both optional and supplementary. They are not required for this class, and should only be read in conjunction with, rather than instead of, the Halbach.

Course Expectations and Evaluations

Student Expectations

1. Reading and Attendance: You are expected to attend all lectures. You are required to bring a pencil and paper to lectures, as you will be asked to complete practice proofs during class. In addition, you are required to complete all readings before each lecture. I will assume familiarity with the readings in class.

2. Problem Sets and Exams: Each week, I will provide a handout with lecture notes. These handouts will contain practice problem sets that address the material presented in the readings and lectures. These problem sets are strongly recommended, but are not required. Logic is a subject that can only be fully understood with practice, and problem sets are the best way to practice. Some of the questions on the midterms and final will be taken directly from the problem sets, so students who complete the problem sets will have a head-start in preparing for exams.

You are required to bring a new blue-book and pencil to all exams. If you require any special accommodation, please let me know as soon as possible in advance. Similarly, if there is any conflict between an exam and a religious or university obligation, please let me know sooner, rather than later.

3. Academic Integrity: You are expected to conduct yourself honorably in this class. UCSD has high standards of academic integrity and expects all students to uphold these values:

> Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. Instructors, for their part, will exercise care in planning and supervising academic work, so that honest effort will be upheld. (UCSD Policy on Integrity of Scholarship)

If you are unsure whether something constitutes academic dishonesty, contact me before submitting your work. Students found plagiarizing or cheating will fail the class and be reported to the Academic Integrity Office.

Evaluations

The grades for this course will be determined by your midterms and final exam. The first midterm will take place in class on April 25th, the second midterm will take place in class on May 21st and the final exam will take place on Monday, June 10th between 11:30-2:29 at a location to be determined. Each midterm is worth 25% of your overall grade, and the final is worth 50%. That said, if there is substantial improvement throughout the semester, I will consider rounding up students' grades.

Tentative Course Calendar

Date	Topic	Reading
April 2nd	Introduction	None
April 4th	Review of Propositional Logic I	Introduction and 2–2.2
April 9th	Review of Propositional Logic II	6–6.1
April 11th	Proof Bootcamp	6–6.1
April 16th	Slimming Logic Down	2.3
April 18th	Review for 1st Midterm	None
April 23rd	**1st Midterm**	None
April 25th	The Language of First Order Logic	4–4.3
April 30th	Proofs in First-Order Logic	4.3
May 2nd	Introduction to Set Theory	1–1.1
May 7th	Relations and Functions	1.2–1.4
May 9th	The Syntax of Propositional Logic	1.6, 2.2
May 14th	The Syntax of Predicate Logic	4–4.3
May 16th	Review for 2nd Midterm	None
May 21st	**2nd Midterm**	None
May 23rd	Model-Theoretic Notion of Validity	1.5, 2.4
May 28th	The Compactness Theorem	2.4
May 30th	Validity for Predicate Logic	5.3
June 4th	Provability for Propositional Logic	6–6.1
June 6th	Provability for Predicate Logic	6.2