

Phil 210: Introduction to Deductive Logic
Summer 2020, McGill University

SYLLABUS

Lectures: Monday to Thursday 1:35–3:55 pm, via MyCourses and Zoom
Instructor: Anaid Ochoa Echeverria (anaid.ochoa@mcgill.ca)
Office hours: Thursday 4:30-6:30pm

Course Overview

This course is an introduction to formal logic, comprising two deductive logical systems: Sentential Logic (SL) and (first-order) Quantificational Logic (QL). Deductive logic studies *logically valid* arguments, that is, those arguments that are valid in virtue of their logical structure. The systems we will learn in this course are intended to formally represent some types of logically valid arguments. SL studies logically valid arguments involving (truth-functional) sentential operators, such as ‘it is not the case that’, ‘and’, ‘or’, ‘if...then...’, among others; while QL formally studies logically valid arguments involving the use of quantifiers such as ‘all’ and ‘some’, as well as numerical identity (typically expressed by ‘=’).

We will study the syntax of the languages of SL and QL (including how to translate sentences and arguments from English to the language of each system). We will also study the rules of deductive inference (also called “rules of natural deduction”) of SL and of QL, and we will practice doing formal proofs. Additionally, we will learn the basics of the formal semantics of SL and QL, and how to do informal proofs about the logical properties of (and logical relations among) sentences (and formulas) of the languages of both systems. Finally, we will learn some elementary notions of meta-theory about both logical systems (some results regarding their semantics, their proof-system, and the interrelation of their semantics and their proof-system).

Course material

Textbook. We will be using the open-source textbook *forallx: An Introduction to Formal Logic*, by P.D. Magnus. A copy is available on MyCourses, and can also be downloaded from <https://www.fecundity.com/codex/forallx.pdf>.

Zoom links, videos, slides, exercise sheets, take-home assignments, a take-home final exam, optional readings, and other course material will be distributed through MyCourses.

Contacting the instructor and the TA

The instructor’s and TA’s office hours will take place via Zoom by appointment, within the office hour time frames. Substantive questions about course material and exercises will be addressed only during office hours, and not by email. For all other questions about the course, please email us.

Course TA: Sarah Clairmont, sarah.clairmont@mail.mcgill.ca, Office hours: Wednesday, 2-3pm.

Assignments and Grades

- 10% - Daily participation through exercises and polls in Zoom
- 60% - Three take-home assignments (each worth 20% of the final grade). All take-home assignments will be released and submitted through MyCourses. You will have 24 hours to complete and submit each assignment.
- 30% - Take-home final exam. It will be released and submitted through MyCourses, and you will have 48 hours to complete and submit it.

Policy for late work

The deadlines for assignments and final exam are indicated on the provisional schedule of the course. Late work for assignments and final exam are subject to a penalty of a 10% deduction of your grade per day.

McGill Policy Statements

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures: www.mcgill.ca/students/srr/honest/.

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

Provisional Schedule

(subject to change, **except** for the deadlines)

| Date | Topics | Reading | Exercises |
|--------------------------------------|---|------------|----------------------------------|
| May 4 | Introduction to the course and basic concepts | pp.1-14 | p.15 Part A – Part D |
| May 5 | Sentential Logic (SL). Introduction, vocabulary, and translations | pp.16-31 | pp.31-34 |
| May 6 | Truth tables for truth-functional connectives and various uses | pp.35-42 | pp.42-45 |
| May 7 | SL Proof System Rules (Part I) | pp.103-112 | p.128 Part A, Exercise sheet SL1 |
| May 8 - deadline Assignment 1 | | | |

| | | | |
|---------------------------------------|---|-------------------|--|
| May 11 | SL Proof System Rules (Part II) | pp.112-115 | pp.128-129 (Parts B,C), p.129 Part G (Exercises 1-3), Exercise sheet SL2 |
| May 12 | Proof strategies and proving equivalences | <i>No reading</i> | <i>In-class exercises</i> |
| May 13 | Quantificational Logic (QL). Vocabulary, basic concepts | pp.46-58 | p.73 Part B, p.76 Part H |
| May 14 | QL Vocabulary, basic concepts. Translations (Part I) | pp.55-58 | pp. 72 (Parts A,C) |
| May 15 - deadline Assignment 2 | | | |
| May 18 | <i>Statuary Holiday – no class</i> | | |
| May 19 | Preliminary informal semantics. QL Translations (Part II) | pp.58-63 | pp.72-78 (Parts D, E, F, G, I-K) Exercise sheet QL1 |
| May 20 | QL Translations (Part III). Syntax of QL. QL Proof System Rules (Part I) | pp.64-72, 115-121 | p.129-131 (Parts H, I, K, M,Q) |
| May 21 | QL Proof System Rules (Part II) and Proof strategies | pp.115-123 | <i>In-class exercises</i> |
| May 22 - deadline Assignment 3 | | | |
| May 25 | Semantics (Part I). Defining logical concepts in SL, and defining logical concepts in QL. | pp.79-90 | May 25&26: |
| May 26 | Semantics (Part II). Truth in models and constructing models | pp.90-98 | p.98-101 (Parts A-H) |
| May 27 | Semantics (Part III) Informal proofs for tautologies, contradictions, inconsistency, and validity | <i>No reading</i> | p. 101 (Parts I,J), and <i>In-class exercises</i> |
| May 28 | Proof-theoretic concepts, soundness and completeness | pp.124-127 | pp.129-133 Selected exercises (TBD) |
| June 1 | Review Session | <i>No reading</i> | |
| June 2 | Study Day | | |
| June 3 - Final EXAM | | | |