

Course Syllabus

Douglas Marshall

January 3, 2021

LOGIC

1 Logistics

COURSE TITLE: PHIL 210 - Logic

MEETING TIMES:* M W, 11:30 a.m.–12:40 p.m., F, 11:10 a.m.–12:10 p.m.

MEETING LOCATION: Logic Zoom Room (See the Course Website for the URL)

INSTRUCTOR: Douglas Marshall (dmarshall@carleton.edu)

TEACHING ASSISTANT: Kanishk Singh (singhk@carleton.edu)

COMPUTER LAB: Libe 306

COURSE WEBSITE:

<https://moodle.carleton.edu/course/view.php?id=35069>

*NOTE ABOUT MEETING TIMES: All times listed are U.S. Central Time, the time in Northfield, MN. I am planning for this course to be primarily *synchronous*. It is important that you be available to attend class meetings via Zoom on Mondays, Wednesdays, and Fridays.

2 Course Text and Software

The main text for this course is *Language, Proof, and Logic* (2nd ed.) by Barker-Plummer, Barwise, and Etchemendy (ISBN-10: 1575866323). **The text has to be bought new, since it comes with a software package that is only licensed to the original owner of the book.** There is also a digital-only version of the text and software available directly from the publisher's website (www.gradegrinder.net). **Either the physical book or the digital-only version is fine for this course so long as you obtain an unused registration code for the software.**

All other readings will be available on the course website.

3 Homework

If you have not already done so, please purchase the course text and install the software now, since you will need them in order to do your homework. All homework assignments for PHIL 210 are to be submitted electronically. Many assignments will be submitted through the textbook's online service, called "Submit", but others will have to be sent separately by e-mail:

SUBMITTING WITH THE SUBMIT PROGRAM: When you submit exercises using the textbook's Submit program, be sure to mark an option to send a report to the instructor using "Douglas Marshall" as my name and "carlologic2@gmail.com" as my e-mail address. The Introduction and software manuals that come with the software package will give you more detailed instructions. There is also a video explanation on grade grinder.net.

SUBMITTING WRITTEN EXERCISES BY E-MAIL: When you submit written exercises directly through e-mail, please send your files to the logic e-mail address, "carlologic2@gmail.com". I prefer submissions in PDF or Microsoft Word. If you use L^AT_EX, please submit the PDFs and not the .tex files.

All of the problem sets for each week will be due by the end of the day on Sunday of that week (except for the very last problem set, which is due on the last day of classes). The first problem set is due this Sunday, January 10. Except under extraordinary circumstances, late homework assignments will not be accepted. You may opt out of submitting the exercises once during the term without a penalty to your grade. It would be a very bad idea to opt out of doing the exercises, because you do not want to get behind in the course.

4 Quizzes and Exams

Over the course of the academic term there will be two quizzes and two exams. **All quizzes and exams will be *take home*. You will need some way to print out the quizzes and exams, and also some way to scan and upload them to the course website when you are done.** Alternatively, some of you may have PDF software that would let you write out the exam on a tablet or computer, save the resulting PDF, and then upload the file to the website. That should also work.

5 Grading

Your grade for PHIL 210 will be determined by the following factors:

1. Problem Sets – 30%
2. Quiz 1 – 10% (projected date: January 22)
3. Midterm – 15% (projected date: February 5)
4. Quiz 2 – 10% (projected date: February 26)
5. Final – 25% (take home, March 13–15)
6. Class Participation – 10%

Class participation includes punctual attendance in class, contributions to class discussions—this is mostly helping us solve problems together as a group—and regular Moodle logins. I will take attendance at each meeting. I encourage everyone to be part of our class discussions. I will check in with Kanishk to hear who has been showing up to his problem solving sessions. I will also sometimes check on your Moodle activity. I expect you to log in to the Moodle at least twice per week, and I suggest that you log in to Moodle at least once every three days. There will be lots of updates to the Moodle as our course progresses, and I wouldn't want you to miss out.

6 Tentative Schedule of Readings and Assignments

Please see the course website for up-to-date readings and assignments. The readings and assignments for a given week will always be posted by Friday evening of the previous week. The longer-term plan is to cover the material in Parts I and II of the textbook: Propositional Logic and Quantification.

DATE	TOPIC	READINGS	EXERCISES
JAN 4	Introduction to Logic, Varieties of Inference	Course Syllabus, Introduction	—
JAN 6	Atomic Sentences	Ch. 1.1–1.3	All “You Try It” problems, 1.1–1.5
JAN 8	Language & Functions	Ch. 1.4–1.8	1.9, 1.11, 1.12, 1.15, 1.17, 1.20

JAN 11	Logical Consequence	Ch. 2.1–2.2	2.1, 2.2, 2.5, 2.8, 2.9, 2.14
JAN 13	Formal Proofs	Ch. 2.3–2.6	2.15–2.17, 2.19, 2.21, 2.24–2.26
JAN 15	Boolean Connectives	Ch. 3.1–3.4	3.1–3.3, 3.5, 3.6, 3.8, 3.9
JAN 18	Implicature	H.P. Grice	—
JAN 20	Ambiguity	Ch. 3.5–3.8	3.12–3.14, 3.16, 3.18, 3.21, 3.22, 3.23
JAN 22	Quiz 1	Ch. 4.1–4.2	4.1, 4.2, 4.4, 4.5, 4.12, 4.17, 4.18
JAN 25	Tautological Consequence	Ch. 4.3–4.6	4.20, 4.22, 4.24, 4.27, 4.34, 4.36
JAN 27	Formal Rules and Methods	Ch. 5.1–5.4	5.11, 5.16, 5.17
JAN 29	How to Prove It	Ch. 6.1–6.3	6.1, 6.2, 6.4, 6.5, 6.7, 6.9, 6.12
FEB 1	Subproofs, Tactics	Ch. 6.4–6.6	6.18, 6.19, 6.34, 6.36
FEB 3	Conditionals	Ch. 7.1–7.5	7.2, 7.4, 7.6, 7.12, 7.13, 7.25
FEB 5	Midterm Exam	—	—
FEB 8	Midterm Break	—	—
FEB 10	Proofs	Ch. 8.1–8.2	8.1, 8.3, 8.18, 8.20–8.22, 8.24, 8.31, 8.35, 8.38
FEB 12	Soundness, Completeness	Ch. 8.3	8.39, 8.40
FEB 15	Quantifiers I	Ch. 9.1–9.5	9.2, 9.3, 9.4, 9.6, 9.8, 9.9, 9.12
FEB 17	Quantifiers II	Ch. 9.6–9.7	9.15, 9.17, 9.19, 9.20, 9.24

FEB 19	Consequence, Validity	Ch. 10.1–10.4	10.1, 10.2, 10.4, 10.6, 10.8, 10.10, 10.13, 10.16, 10.20, 10.22, 10.23, 10.25, 10.26, 10.30, 10.31
FEB 22	Translation	Ch. 11.1–11.4	11.1, 11.2, 11.4, 11.5, 11.9, 11.11, 11.13, 11.17
FEB 24	Proof Methods	Ch. 12.1–12.3	12.4, 12.5, 12.6, 12.9, 12.10
FEB 26	Quiz 2	—	—
MAR 1	Quantifier Rules	Ch. 12.4, 13.1– 13.2	12.11, 12.13, 12.14, 12.16, 12.18, 13.1, 13.2
MAR 3	Proof Strategies	Ch.13.3–13.5	13.5, 13.7, 13.10, 13.11, 13.13, 13.15, 13.19, 13.20, 13.21, 13.23, 13.30
MAR 5	Soundness & Com- pleteness	—	—
MAR 8	Special topic	Ch. 14.1 - 14.3	13.47, 13.49, 13.50, 14.3, 14.4, 14.10, 14.11, 14.28
MAR 10	Final Exam Review	—	Last problem set due today!
MAR 13–15	Final Exam	—	—

Table 1: Tentative Readings and Assignments

7 Continuity of Instruction in a Time of Crisis

We are living in a difficult time. COVID-19 is interfering with our ability

to be at college in the normal way. Deeply disturbing racial injustices are taking place, and so is social and political unrest. In times like these, we will need to exhibit flexibility with each other throughout the term.

I have done my best to design the course so that everyone can be successful, even if illness or external factors beyond our control mean that some of us may have to be absent for some of the class. If your personal situation is affecting your ability to engage with the course, please contact the Dean of Students Office so we can work towards reasonable accommodations. If technological problems are limiting your ability to participate, please contact the ITS Helpdesk at 507-222-5999 or helpdesk@carleton.edu.

8 Privacy

In some instances, videos of our class will be recorded either by me or by students for purposes of study or review. Class members should not share, replicate, or publish the recording, in whole or in part, or use the recording for any other purpose than for class-related studying. Recordings of class sessions that include student participants should not be saved or used past the end of the term. In particular, I will delete any audio or video recordings that include students within one month after the academic term is over. In return, I ask that you not share the videos I create for purposes of this course.

9 Academic Integrity

All work submitted by you is assumed to be your own original work that has not been submitted elsewhere. Any words or ideas borrowed from other sources must be properly attributed. Any cases of suspected dishonesty will be forwarded to the Academic Standing Committee, as required by Carleton's policy on academic integrity. In confirmed cases of academic dishonesty, I will recommend a penalty ranging from a failing grade for the assignment to failure in the course. Carleton College may pursue further action.

For more information about academic integrity at Carleton and guidelines about how to avoid plagiarism in your work, please go to: <https://www.carleton.edu/writing/plagiarism/>.

Special note for PHIL 210: Though you are allowed and even encouraged to work together on homework assignments, you must write up your own individual solutions. In the case of all homework

submitted using the Submit program, the files you submit must either be (i) files you have created, and you are the sole author, or (ii) files that were originally provided to you with the textbook software, and only you have edited them subsequently. If these conditions are not met—if, for instance, you submit a file that has been created or at some point been edited by another student—the LPL software will automatically notify us that more than one student is submitting the same solution. This is strong evidence of a violation of academic integrity, and it will be turned over to the dean’s office for further investigation.

10 Course Description

The study of formal logic has obvious and direct applicability to a wide variety of disciplines (including mathematics, computer science, linguistics, philosophy, cognitive science, and many others). Indeed, the study of formal logic helps us to develop the tools and know-how to think more clearly about arguments and logical relationships in general. Arguments and logical relationships form the backbone of any rational inquiry. In this course we will focus on propositional logic and predicate logic, and we will look at the relationship that these have to ordinary language and thought.

11 Course Objectives

- A. To gain a precise concept of deductively valid inference by learning how to build and assess proofs carried out with the help of a formal language.
- B. To learn how to translate between a natural language, such as English or Spanish, and a formal first-order language.
- C. To understand the notion of a model (a.k.a. an interpretation) for a formal language, in part by being able to construct models.
- D. To be able to recognize sentences that are true by virtue of logic alone.
- E. To gain a sense for where deductive inferences are at play in other areas, such as mathematics, CS, physics, law, and ordinary life. But also to recognize that deductive inference is just one type of inference, along with inductive inference, explanatory inference, and other sorts of inference.