UNIVERSITY OF CALGARY
FACULTY OF ARTS
Department of Philosophy

PHIL 279 Lec 01
Logic I
Spring 2022

COURSE OUTLINE

Instructor Name: Amirhossein Kiani (he/him)
Email: amirhossein.kiani@ucalgary.ca
Teaching Assistant: none

COURSE DELIVERY INFORMATION
Online Synchronous (Zoom), Monday-Wednesday, 6:00pm-8:45pm.

PREREQUISITE(S)
None; there are no prerequisites for this course.

COURSE INFORMATION
The course will introduce you to the semantics and proof-theory of Truth-Functional logic (TFL) and first-order logic (FOL). We will learn how to "speak" the language of FOL, study the method of truth tables, become proficient in giving formal proofs, and learn how to construct first-order interpretations. These methods provide us with precise ways to make sense of argument validity. The goal is to have you become comfortable with formal methods, and to use them to clarify and make precise logical relationships that are hard to understand or express otherwise. We will also look at some results and notions which are important for the applications of formal logic, such as the expressive power of truth-functional and first-order logic, as well as some important theorems relating semantics and proof theory (soundness, completeness), though we will not cover them in great detail. We will touch on applications of logic to philosophy and mathematics.

The kinds of things you will learn are mainly of three sorts: (1) symbolize sentences of English in a formal language, (2) give counterexamples (truth tables, interpretations) that show various things, (3) give formal proofs. Much of this will be completely new and not something that's like anything you've done before. It will not feel like what you might think of as philosophy. There will be lots of symbols. This is a course in formal logic, not a course on how to think or how to avoid fallacies. There are similarities to some things in discrete mathematics, but this formal logic is applied to more than mathematics.

Please notice that normally, class sessions will *not* be recorded, unless the majority of students vote otherwise (this will be determined early in the semester). Classes will have around 10-minute breaks in the middle due to length.

COURSE OBJECTIVES/LEARNING OUTCOMES
By the end of the course, you should be able to:
- work with the formal languages of truth-functional and first-order logic, with the ability to formalize natural language sentences in a formal language,

- use truth tables to evaluate sentences and arguments in truth-functional logic,
- understand the basic semantic concepts such as validity, entailment and logical equivalence, when they apply and how they can be used,
- construct correct derivations in a natural deduction system for truth-functional and first-order logic, with and without identity,
- use a proof system to determine whether a sentence is a logical truth, whether an argument is valid, and whether two formal sentences are equivalent,
- construct interpretations that make first-order sentences true or false and use them to show that arguments are invalid,
- appreciate some basic metatheoretic results, such as truth-functional completeness, and soundness and completeness of a natural deduction system for truth-functional logic,
- be able to articulate clear questions, explain logical concepts, and guide others through logical problems.

REQUIRED/RECOMMENDED TEXTBOOKS, READINGS AND MATERIALS

The textbook is: P.D. Magnus, et. al., forall x: Calgary. An Introduction to Formal Logic (Fall 2021 edition). forallx.openlogicproject.org. It is free and available on D2L in PDF, as well as in carnap. It comes in two formats, and many of the exercises in it have solutions in the accompanying solutions manual. You may also purchase a paper copy if you like.

Each lecture in the Content section on D2L will tell you which chapters of the book that section covers. The book is more of an accompaniment than a primary source. At times I might forward you more optional material on the relevant topics which go deeper than your textbook or otherwise cover neighboring material; you will not, however, be examined on the optional material.

HOW TO CONTACT AND ASK QUESTIONS

1. There are different modules in D2L's Discussion Board for you to ask your questions. Your question about the course content (logical concepts, course outline, etc.) may already have been answered on the course discussion board (or in this outline). Check these first. If you can't the answer to your question, consider posting your question in the discussion board instead of sending me an email. I will monitor the discussion boards and attend to questions regularly.

2. If your inquiry is specific to your personal situation, feel free to send an email to me (amirhossein.kiani@ucalgary.ca). Ensure that "Phil 279" occurs in the subject line of your emails about this course. Otherwise, there is a strong possibility that your message will be deleted, unread as spam or simply get lost under a pile of other emails. Please make sure your first and last names, and preferably also your UCID, are clearly included in the body of your email message.

3. I will do our best to reply within one business day. Please don't expect responses outside business hours or minutes after you submit them. But do consider reminding me if I didn't get back to you in 2 full business days.

4. You're highly encouraged to show up in the class, but that is *not* mandatory. If you do show, you'll have a chance to ask your questions first-hand and get an answer on spot, instead of going through the steps above and waiting a day or two. You can also see examples and exercises and discuss things with me and your peers; this is useful particularly because class sessions won't be recorded.

5. We don't have regular office hours, and your questions and concerns should be mainly addressed in the class, discussion board or through email. If you tried these channels and they didn't help, or if, say, you had a medical or other pressing personal issues that prevented you to do any of the above in due time, we can schedule a short Zoom meeting to help you get

back on track. Just shoot me an email and we'll schedule a time (with the same regulations for sending emails at 2). Please don't make an appointment until you've engaged with the material and tried to figure out the answer to your question yourself first, or asked your question in the discussion board or class. Zoom sessions aren't about teaching the whole class material from scratch, but to help you navigate through them if for some reason you couldn't utilize the regular channels made for it.

6. Feel free to call me "Amir" or "Amirhossein," or if you feel formal, "Mr. Kiani". I'm not a doctor yet, so please don't call me "Dr. Kiani" or "Prof. Kiani". I also prefer not to be called "Sir".

7. Make sure you keep the conversations, posts and in-person meetings (class or individual) civil and respectful. Everyone from all backgrounds are welcome and equal in this class, and everyone should feel welcome and comfortable in asking questions, engaging with discussions and working towards their desirable results in the course.

COURSE ASSESSMENT
ASSESSMENT COMPONENTS

The aim of this course is for you to become proficient in the learning objectives listed below. Your success in this will be assessed by the number of activities (problem sets, quizzes, and timed problems) you complete successfully, and your performance in each of them. Each activity has a minimum level of performance that counts as "complete (✓)." Completing an activity roughly corresponds to earning at least a B on that activity. Problem sets and quizzes have a higher level of performance that earns you a "complete+ (✓+)." Completing a quiz or problem set at this level roughly corresponds to an A (see below for details).

Problem sets

You must score 70% on a problem set for it to count as complete. If you score at least 90%, you earn a "complete+." (You can check your answers before submitting.)

Quizzes

A quiz counts as complete if you score at least 70% on it, and complete+ if you score at least 90%. (You have four attempts at each quiz, and although the questions you get each time are randomized, they are of equivalent difficulty.)

Timed problems

Each week there will be timed problems to complete. These problems will be timed (usually 30-60 minutes, but more if deemed needed), but they will be available to complete up until their deadlines are due. (You can check your answers before submitting.)

Overall, there are 12 sets of three assignments (PS, Q and TP) prepared for the 6 weeks of the class, and you'll be assessed through your engagement with these 12 sets. See the section Course Evaluation and Grading Scheme to see how exactly you'll be graded. See the course schedule (on D2L) to see what assignments you'll be doing on a specific week, the deadlines, etc.

Remember: you get immediate feedback on all your activities, so you will know right away whether you have completed it, or your grade after submission. On the quizzes you will not see which questions you got wrong: part of the learning experience is figuring that out. On the carnap.io activities, you can check that your answers are correct before submitting them. Overall, you can take your time and learn from your mistakes.

Collaboration

In addition to the learning outcomes, an objective of the course is the development of collaborative study habits. You should become able to ask clear questions about the course material and problem sets in class and on the discussion board, to explain topics to and answer questions of your peers, and to work with others in small groups during class time. You will *not* be formally assessed on this learning outcome.

CLASS SCHEDULE AND DEADLINES

The first session of the two sessions in each week will cover the material outlined in the course schedule; you'll then be given one week to do the quiz, problem set and timed problem of the relevant material covered in that week (some weeks you get more times due to the load of assignments – see the course schedule for exact deadlines). The second session will consist of me going through examples and exercises with you, and/or you asking questions and discussing things with me and with one another.

For example: in the first session of the second week, Monday (May 9), I'll teach you the material on Symbolization and Semantics in TFL (lectures 2 and 3). You will then be given a whole week, that is until the next Sunday midnight (May 15, at 11:59pm), to do your assignments covering the relevant material. In the second session of the second week, Wednesday (May 11), we go through examples and exercises related to the material taught in the first session.

REDOING PREVIOUS ASSIGNMENTS

In four out of the six weeks of the class, each time you will be given a chance to resubmit *two* assignment, *any* assignment they may be, from the weeks before (see the course schedule to see which weeks qualify) until the deadline for the present week's assignments is due. In order to do this, you'll put your name in a spreadsheet that will be provided to you, and specify what assignments from the previous weeks you'd like to redo. I will then give you access to it (or a variant of it), no question asked, and you may resubmit it by the designated deadline. This is essentially a chance for you to shoot for higher-tier marks in this course, in case you had other pressing obligations, personal issues or just like high grades. At the end of the semester, only your highest performance in each assignment counts towards your final grade.

For example: suppose we're at week 3 and you didn't perform well on Problem Set 2, Quiz 1 and Timed Problem 1. On Monday of week 3, and submitting your name in the spreadsheet that will be provided to you, you'll be given a chance to re-do any (but at most two) of these three until next Monday when your week-3 assignments are due.

Caution: It is highly encouraged that you try your best in your first attempts on the assignments and engage with each assignment in its original deadline because most material in the later weeks somehow build on the ones from earlier weeks. If you push all the assignments to later weeks in the hope that you'll get them done all together, that will likely cause you lots of stress and make things harder because at that point you may not have a good understanding of the earlier material due to not having practiced; and yet not much time is left.

A REGULAER WEEK OF THE CLASS

Here's the ideal way of proceeding in the class.
1. Before Monday (which is the teaching session of the relevant week), take a look at the book chapters specified in the course schedule and, if any, the optional material posted on D2L.
2. Attend the class. (Remember: this is not mandatory but highly encouraged.)
3. Work and practice on the problems of the week by the deadline, e.g., next Monday. (Remember: for four out of six week you'll get to redo things from the previous weeks, but it

is highly encouraged that you engage with each week's assignments on time to avoid accumulating many of them for the end of the semester and the stress resulting from it.)
4. Ask and answer questions on the D2L discussion board. (<u>Remember</u>: there is no official scheme to count your activity towards your final grade.)
5. If (4) doesn't work or your issue is personal, shoot me an email (<u>amirhossein.kiani@ucalgary.ca</u>).

COURSE EVALUATION AND GRADING SCHEME

Instead of earning point scores on each, and then determining your final grade based on some frankly arbitrary system of weights, averages, and cutoffs, your final grade will be determined on the basis of how many activities you complete and your best performance on them.

This mapping of performance on activities to letter grades is more complicated than a points system with percentage cutoffs, but it captures more accurately how much you've shown to have learned in the course. The following table lists how many activities of each type you have to complete in order to earn a given grade. "Total" is the overall minimal number of activities you must complete for that grade range. For A-range grades, you must also earn complete+ marks on a sufficient number of activities. You earn the highest grade you qualify for on the basis of the number of ✓'s and ✓+'s you have earned in each category, and the total number you have earned.

Grade	PS	Q	TP	Total
A+	12✓+	12✓+	12✓	36
A	12✓/10✓+	12✓/10✓+	12✓	36
A−	11✓/8✓+	11✓/8✓+	11✓	33
B+	10✓	10✓	10✓	32
B	10✓	10✓	10✓	30
B−	8✓	8✓	8✓	28
C+	8✓	8✓	8✓	26
C	8✓	8✓	8✓	24
C−	6✓	6✓	6✓	22
D+	6✓	6✓	6✓	20
D	6✓	6✓	6✓	18

For instance, to earn a B−, you must complete 8 of each activity (that's 24 total) but overall must complete at least 28 activities (so e.g., an additional two problem sets and two quizzes, or two problem sets, a quiz, and a timed problem). For an A, you must complete all activities, and for 10 problem sets and 10 quizzes you must receive a ✓+. (An A+ requires 12 ✓+ on problem sets and quizzes, and an A− requires 11 problem sets and quizzes completed, of which 8 must be ✓+.)

Note that the number of activities alone does not guarantee a higher grade. E.g., if you have completed all 12 problem sets and 12 timed problems, but only 8 quizzes, this earns you only a B−, not a B+ even though you have 32 activities completed in total. Also, ✓+ only play a role in earning A-range grades. So 8 ✓+ on problem sets, 8 ✓+ on quizzes, and 8 ✓ on timed problems is still just a C.

EXAMS

There are no exams (mid-term or final) for this course.

IMPORTANT DEPARTMENTAL, FACULTY AND UNIVERSITY INFORMATION

Academic Accommodations

It is the student's responsibility to request academic accommodations according to the University policies and procedures. The student accommodation policy can be found at ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf.

Students needing an Accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to their instructor.

Absence or Missed Course Assessments

Students who are absent from class assessments (tests, participation activities, or other assignments) should inform their instructors as soon as possible. If the reason provided for the absence is acceptable, instructors may decide that any arrangements made can take forms other than make-up tests or assignments. For example, the weight of a missed grade may be added to another assignment or test.

Student Support and Resources

Full details and information about the following resources can be found at ucalgary.ca/current-students/student-services

- Wellness and Mental Health Resources
- Student Success Centre
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk

Academic Advising

If you are a student in the Faculty of Arts, you can speak to an academic advisor in the Arts Students' Centre about course planning, course selection, registration, program progression and more. Visit the Faculty of Arts website at https://arts.ucalgary.ca/current-students/undergraduate/academic-advising
 for contact details and information regarding common academic concerns.

For questions specific to the philosophy program, please visit arts.ucalgary.ca/philosophy. Further academic guidance is available by contacting Jeremy Fantl (Undergraduate Program Director jfantl@ucalgary.ca) or David Dick (Honours Advisor dgdick@ucalgary.ca).

Writing Assessment and Support

The assessment of all written assignments—and, to a lesser extent, written exam responses—is based in part on writing skills. This includes correctness (grammar, punctuation, sentence structure, etc.), as well as general clarity and organization. Research papers must include a thorough and accurate citation of sources. Students are also encouraged to use Writing Support Services for assistance. For more information, and other services offered by the Student Success Centre, please visit ucalgary.ca/student-services/student-success.

Required Technology
In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote, and blended courses are required to have reliable access to the following technology:
- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection.

Most current laptops will have a built-in webcam, speaker and microphone.

Responsible Use of D2L
Important information and communication about this course will be posted on D2L (Desire2Learn), UCalgary's online learning management system. Visit https://ucalgary.service-now.com/it for how-to information and technical assistance.

All users of D2L are bound by the guidelines on the responsible use of D2L posted here: https://elearn.ucalgary.ca/commitment-to-the-responsible-use-of-d2l/. The instructor may establish additional specific course policies for D2L, Zoom, and any other technologies used to support remote learning. Instructional materials, including audio or video recordings of lectures, may not be posted outside of the course D2L site. Students violating this policy are subject to discipline under the University of Calgary's Non-Academic Misconduct policy.

Media Recording
Please refer to the following statement on media recording of students: https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf

Academic Misconduct/Honesty
Cheating or plagiarism on any assignment or examination is as an extremely serious academic offense, the penalty for which will be an F on the assignment or an F in the course, and possibly a disciplinary sanction such as probation, suspension, or expulsion. For information on academic misconduct and its consequences, please see the University of Calgary Calendar at ucalgary.ca/pubs/calendar/current/k.html.

Intellectual honesty requires that your work include adequate referencing to sources. Plagiarism occurs when you do not acknowledge or correctly reference your sources. If you have questions about referencing, please consult your instructor.

University Policies
The Instructor Intellectual Property Policy is available at ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Intellectual-Property-Policy.pdf

The University of Calgary is under the jurisdiction of the provincial Freedom of Information and Protection of Privacy (FOIP) Act, as outlined at https://www.ucalgary.ca/legal-services/access-information-privacy. The instructor (or TA) must return graded assignments *directly* to the student UNLESS written permission to do otherwise has been provided.

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Acceptable-Use-of-Material-Protected-by-Copyright-Policy.pdf) and requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html).

Course Schedule – Phil 279, SPRING 2022, L1

Instructor: Amirhossein Kiani (amirhossein.kiani@ucalgary.ca)

Your main reference for this course is the following textbook: P.D. Magnus, et. al., forall x: Calgary. An Introduction to Formal Logic (Fall 2021 edition). forallx.openlogicproject.org. It is free and available on D2L in PDF, as well as in carnap. It comes in two formats, and many of the exercises in it have solutions in the accompanying solutions manual.

Week	When to meet?	Do Over?	Topics Covered (First Session of Week)	Assignments Due Date	What to Read?	Assignments to Complete
1	Wednesday: May 4	No	Arguments and Validity	(11 Days) May 15, 11:59pm	Part I	Q1, PS1, TP1
2	Monday: May 9	No	Symbolization in TFL	May 15, 11:59pm	Part II	Q2, PS2, TP2
	Wednesday: May 11		Truth Tables		Part III	Q3, PS3, TP3
3	Monday: May 16 Wednesday: May 18	Yes	Proofs in TFL	May 22, 11:59pm	Part IV	Q4, PS4, TP4
4	Monday: May 23	Yes	Basic Symbolization in FOL	May 29, 11:59pm	Chapter 22	Q5, PS5, TP5
	Wednesday: May 25		Semantics in FOL		Chapter 23	Q6, PS6, TP6
5	Monday: May 30	No	Basic Proofs in FOL	(Two Weeks) June 12, 11:59pm	Chapters 34, 35, 36	Q7, PS7, TP7
	Wednesday: June 1		Advanced Symbolization in TFL		Chapters 24, 25, 26, 27, 28	Q8, PS8, TP8 Q9, PS9, TP9
6	Monday: June 6 Wednesday: May 8	Yes	Proofs in Full FOL	June 12, 11:59pm	Part VII	Q10, PS10, TP10
7	Monday: June 13	Yes	Semantics in Full FOL	June 19, 11:59pm	Part VI	Q11, PS11, TP11
	Wednesday: May 15		Metatheory		Part IX	Q12, PS12, TP12