

Course Outline

PHIL 1102 Introduction to Logic

Spring 2024

Course Format: Lecture 3.0 h + Seminar 1.0 h + Lab. 0.0 h

Credits: 3.0

Transfer Credit: For information, visit bctransferguide.ca

Course Description

In this course we will learn how to use an artificial language, called First-Order Logic, that is simple but fairly powerful. For sentences in this language some basic logical concepts, such as semantic consistency and entailment, can be defined precisely. Moreover, one can make rational inferences in the language simply by manipulating the formal sentences, according to exact rules. Most of the course will consist of becoming fluent in First-Order Logic, but we shall also examine the significance of formal languages for logic in general, and the relevance of logic to the rest of philosophy.

Prerequisites and Corequisites: None

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- Translate sentences of English into First-Order Logic (FOL), involving Boolean operators, multiple quantifiers, functions and identity.
- Translate FOL sentences into good, clear English.
- Answer questions about tautological consequence, equivalence and consistency by means of truth tables.
- Construct counter-example worlds to show that arguments in FOL are invalid.
- Construct formal proofs to show that arguments in FOL are valid, using a natural deduction system.
- Use a simple axiom system.

Instructor: Dr. Richard Johns

Office: A382d **Phone:** (604) 323-5830 **Email:** rjohns@langara.ca

Zoom Office: <https://langara.zoom.us/j/3475366594> (by prior appointment)

Office Hours:

Tues 11 – 12; 3:30 – 4:00
Weds 3:00 – 3.30
Thurs 1 – 2
Fri 11 – 12

Classes:

Tues + Thurs: 4.30 – 6.20
Room: A363B

Textbook and Course Materials:

Barker-Plummer, Barwise, Etchemendy, *Language, Proof and Logic*, 2nd edition, CSLI Publications, 2011. (The first edition can also be used.)

[**Important note:** Students may buy either a new or a used copy of the course text. While only new copies include a unique ID (that can be used by only the original owner) to access an automatic grading service, we will *not* be using this “Grade Grinder” service, *so students will not need this ID*.

The course text also includes some computer programs that, while not essential, students will likely find quite useful. These can be downloaded using the ID that is sold with the book. It is a slight advantage, therefore, to get a new copy that includes the ID. If you don’t get a new copy, but would like to try the software, you might be able to get the installation file from a classmate, or borrow my CD to install the programs.

Web site: <http://iweb.langara.bc.ca/rjohns> Handouts, problem set questions, solutions, etc. will be posted here. Grades and some announcements will be posted on Brightspace.

Assessments and Weighting:

- Best 9 of the 10 weekly problem sets. (35%)
- One midterm exam, on February 29. (30%)
- Final exam, during the April exam period. (35%)

Problem sets will be handed in during class on the **Thursday** of each week indicated on the schedule. (**PS** = problem set)

The midterm exam will cover the material from problem sets 1 to 6. The final exam will cover the entire course, but will focus on the material from problem sets 7 to 10.

Grading:

A+	90+	B	72-75	C-	55-59
A	85-89	B-	68-71	D	50-54
A-	80-84	C+	64-67	F	0-49
B+	76-79	C	60-63		

Detailed Course Schedule:

January	4	Introduction. Names, predicates, arguments.	19 – 92
	9, 11	Boolean connectives. Truth tables PS 1	93 – 126
	16, 18	Translations into FOL PS 2	128 – 142
	23, 25	Formal proofs in Boolean logic PS 3	143 – 177
February	30, 1	Harder Boolean proofs PS 4	178 – 215
	6, 8	Conditionals, proofs involving conditionals PS 5	229 – 277
	13, 15	Introduction to Quantification, PS 6	277 – 282
	19 – 23	*** Spring Break ***	
	27	Quantifier translations	283-288
	29	MIDTERM EXAM	
March	5, 7	PS 7 Satisfaction tables, syntax of FOL	298 – 302
	12, 14	PS8 Multiple mixed quantifiers and translations	302 – 317
	19, 21	PS 9 Easy formal proofs in FOL, shape axioms	328 – 361
	26, 28	PS 10 Harder formal proofs, other quantifiers	361 – 398
April	2, 4	Peano arithmetic, final exam prep	

On **Bold face** dates there is a problem set to hand in, or the midterm exam.

As a student at Langara, you are responsible for familiarizing yourself and complying with the following policies:

College Policies:

[E1003 - Student Code of Conduct](#)

[F1004 - Code of Academic Conduct](#)

[E2008 - Academic Standing - Academic Probation and Academic Suspension](#)

[E2006 - Appeal of Final Grade](#)

[F1002 - Concerns about Instruction](#)

[E2011 - Withdrawal from Courses](#)

Course Policies:

Students are responsible for using the weekly problem sets to earn the material adequately. Thus, while studying with other class members can be very helpful, each student must complete their own assignment. Note that, *in order to pass the course, you must pass the final exam*, so high marks on the problem sets and midterm do not ensure a passing grade.

The course instructor will hold office hours at the times listed on the previous page. You are encouraged to drop in (without appointment) to these if you either have a difficulty related to the course, or are especially interested in some topic and want to know more. I have set aside these times, and am very happy to interact with students. Also, I can meet at other times by appointment – in person or over Zoom (permanent link <https://langara.zoom.us/j/3475366594>) Send me an email to arrange this.

The instructor's email address is also listed. Students may use email to ask questions of the instructor, when this is more efficient than attending an office hour. In many cases, use of email is highly convenient to both the student and the instructor. Students should use only email the instructor when necessary, however. Always first check the course outline to see if it has the information you need, and consider asking a classmate for help.

Late assignments will be accepted, until the graded assignments are returned. There will be a late penalty of 5% per day. Assignments received by email will not normally be graded, but they will be

taken as proof that the assignment has been completed, and so can reduce or eliminate any late penalty.