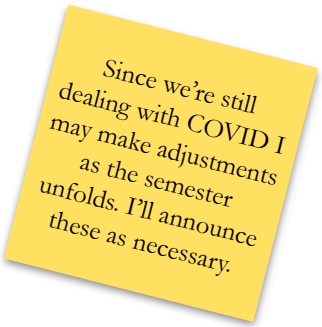
Symbolic Logic

Fall Semester 2022
Rochester Institute of Technology



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Course Description

This course covers the basic rules of good logical reasoning. By studying logic we sharpen our ability to reason things through, to see the logical implications of our beliefs, and to distinguish good reasoning from bad. Logic is both useful as well as intellectually rewarding: it illuminates our rational nature as well as the often surprising connections among our beliefs. In this course we will learn a symbolic notation that allows us to express these connections with great efficiency and elegance. (That's what makes this a course in *symbolic* logic.) In many ways this is like learning a new language: one might even think of it as the language of thought. In other ways this is like learning a game with specific goals and objectives.

Logic is about reasoning from particular **premises** (or evidence) to a particular **conclusion**. This chain of reasoning is an **argument**, and logic helps us determine whether a given argument is good or bad. We will focus primarily on **deductive** logic which tells us whether a conclusion **necessarily** follows from certain premises. In a deductive argument, true premises **guarantee** the truth of the conclusion (i.e., they don't merely make it likely). It is often easier to assess a deductive argument if we translate it into symbolic notation. By doing so we can more easily recognize the logical thread the runs from the premises to the conclusion.

Because it studies the abstract relations among claims, logic trains us to think analytically. This is a useful skill in a number of areas: law, medicine, and computer programming, to name a few. In addition, it is helpful in taking standardized tests, such as the LSAT and GRE. But logic is also philosophically interesting since it suggests that good arguments follow certain rules regardless of topic. Because these rules hold true for everyone, everywhere, they help us better understand the nature of rational thought and what it is to be a rational animal.

This logic course is unlike most other philosophy courses and many other logic courses. For one thing, much of the time there will be clear right and wrong answers. Things will be much more black-and-white than in most philosophy courses. (This can be a good or a bad thing. Here, it is mostly good.) This is why most logic courses around the world have the flavor of a mathematics course. However, this course will be different by also including more philosophy of logic in addition to the standard logical topics. This means that, in addition to learning a system of deductive logic, we'll also discuss the philosophical and historical implications of logic and logical reasoning.

I've thought a lot about the best way of approaching logic. Sometimes I think it's helpful to view it as shedding light on the rules that any rational being *must* follow. There's something stupendously awe-inspiring about there being logical laws that are necessary and universal: these are laws that hold for all people at all times, and even for aliens and gods. This makes logic a window into some pretty deep topics, so by studying logic we also learn something deep about ourselves. But other times I think it's helpful to view logic just as a game or as a kind of mental workout. As with games, logic has sets of rules that we use to reach goals. When we succeed we get a nice "a-ha" feeling. This means that logic is a lot like doing a crossword puzzle, sudoku, or wordle: it's a fun pastime that warms up our brains, but without much practical payoff. Of course, learning logic may be a combination of these attitudes, too, and as we work through this semester's material I think it will be helpful to keep both in mind.

Texts

There are two sets of readings for this class. These are all .pdfs you can download from myCourses.

The first is *forallx:Calgary*. This is an open access logic textbook. Note that there is also a solutions manual you may want to consult.

The second set of readings is a collection of articles and book chapters dealing with various philosophical aspects of logic.

It's an excellent idea to print out all of these .pdfs. I figure we're spending a lot of time on screens these days so it's probably smart to take a break, unplug, and read something on paper. It's also a good idea to have a copy of the text accessible during class. Sometimes we'll be looking at specific problems and these won't make sense unless you have the text in front of you.

Expectations

1. Logic requires a healthy work ethic. It is especially important that we not fall behind: it is much easier to stay on schedule than try to catch up.

Belaboring the Obvious

2. Logical thinking is a skill. Like all skills, we develop proficiency through practice and exercise; the more we practice, the easier and more natural logic becomes.

3. Get help quickly if you ever feel unclear. I mean this! Because the material in this course is cumulative, it is hard to recover if you fall behind. On the other hand, new material is easier to absorb if you are already comfortable with earlier material. Send me an e-mail if you ever have any questions or problems; we can always set up a meeting. I would much rather help you early on than wait until the situation becomes critical.

Quizzes

4. Every other week or so there will be a short quiz on recent material. I don't plan to offer make-ups if you miss the quiz. There will also be an opportunity to retake 2 quizzes (same material, new questions) on the last day of class. If you miss a quiz, then I'll just have you take the make-up. There is no final exam.

Homework

5. There will be frequent homework assignments drawn from the "practice exercises" in *forallx*. Even though I won't collect these practice exercises please do them! Not only are these (sometimes) fun puzzles but they really do prepare you for the quizzes and later work. Answers to the practice exercises can be found in the solutions manual so you can check your own work.

In addition I will also be assigning some short homework sets so I can gauge how everyone is doing. These I will collect and grade.

You'll notice that several days have been set aside as "workshop days." These are for extra practice so please bring any questions you might have.

Attendance and Participation

6. Attendance is, of course, entirely expected and participation is strongly encouraged.

Grading Scale

7. There will be 8 quizzes. These quizzes will cover both the material in *forallx* and, possibly, the philosophical texts we'll be reading. Each quiz is worth 100 points (800 points total).

There will be 5 homework assignments that I will collect and grade. Each of these is worth 40 points (200 points total).

Attendance and participation is worth 100 points for a grand total of 1100 points (quiz points + homework points + attendance and participation). It's possible that I'll include extra credit on some of the quizzes or devise extra credit assignments later in the semester.

Finally, I will follow a standard grading scale where A=93% or greater, A-=90-92%, B+=88%-89% and so on.

Additional Information

8. Because I think logic and philosophy are really wonderful and important I'm always happy to talk about the course. Feel free to speak to me after class, e-mail me, or come to office hours.

9. Last of all, do feel free to ask if you have any questions about your grade. While I expect you're able to keep track of this, too, I'm happy to tell you where you stand if you have any concerns. Please be aware that myCourses often calculates grades in weird and confounding ways.

Readings and Assignments

Please note: a particular day's reading and assignment should be done *before* class.

		Reading	Homework
	08.22.22	Introductory Remarks	
	08.24.22	Jennifer Fisher: *On the Philosophy of Logic* "Introduction," "Formal Logic—An Introduction"	
	08.26.22	*forallx* Chapters 1-2	1: 1-4 2: A-B
	08.29.22	*forallx* Chapters 3-4	3: A, D, G (odds), H (odds)
	08.31.22	*forallx* Chapter 5 **Quiz #1**	5: A, C, E, H, I
	09.02.22	No Class	
	09.05.22	**Labor Day—No Class**	
Basic notions and truth-functional/ sentential logic	09.07.22	Paul Horwich: "What is Truth?"	
	09.09.22	*forallx* Chapters 6-8	6: A-C 7: A
	09.12.22	Workshop Day	
	09.14.22	**Quiz #2**	
Truth Tables	09.16.22	*forallx* Chapters 9-11 Jennifer Fisher, "The Conditional"	11: A, C
	09.19.22	*forallx* Chapters 12-14	12: A, C, H, I, K (odds) 13: A (odds) 14: H
Proofs and Natural Deduction for Sentential Logic	09.21.22	*forallx* Chapter 15	
	09.23.22	Richard Taylor: "Fatalism"	
	09.26.22	*forallx* Chapter 16	16: A, B, C
	09.28.22	**Quiz #3**	
	09.30.22	*forallx* Chapter 17	17: A, C, D (evens)

	10.03.22	*forallx* Chapters 18-20	18: A, B 19: A, D 20: A
	10.05.22	Gilbert Ryle: "It Was To Be"	
Quantifiers and First-Order/Predicate Logic	10.07.22	*forallx* Chapters 22-23	23: A, B, D
	10.10.22	**Fall Break — No Class**	
	10.12.22	Workshop Day	
	10.14.22	**Quiz #4**	
	10.17.22	*forallx* Chapter 24	24: A, D, E
	10.19.22	*forallx* Chapter 25	25: A, B
	10.21.22	Aldisert et al.: "Logic for Law Students: How to Think Like a Lawyer"	
	10.24.22	*forallx* Chapters 26-28 Jennifer Fisher, "Two Logical Truths"	26: A 27: A, C 28: B
	10.26.22	**Quiz #5**	
Interpretations and Models	10.28.22	*forallx* Chapters 29-31	30: A, B
	10.31.22	*forallx* Chapters 32-33	32: A, D
Proofs and Natural Deduction for First-Order/Predicate Logic	11.02.22	*forallx* Chapter 34	34: A, B, E (odds), H 1-2
	11.04.22	Jennifer Fisher: "Which Logic is Right?"	
	11.07.22	Workshop Day	
	11.09.22	**Quiz #6**	
	11.11.22	*forallx* Chapters 35-36 Jennifer Fisher: "The Metaphysics of Logic"	35: B 36: B, C 1-3
	11.14.22	*forallx* Chapters 37-38	37: A, C
Metatheory, Metalogic and Philosophy of Logic	11.16.22	*forallx* Chapter 39 Jennifer Fisher: "The Epistemology of Logic"	
	11.18.22	Jennifer Fisher: "Rationality and Logic"	
	11.21.22	*forallx* Chapters 43, 45 **Quiz #7**	45: A
	11.23.22	Thanksgiving — No Class	
	11.25.22	Thanksgiving — No Class	
	11.28.22	*forallx* Chapters 21, 46	
	11.31.22	Ted Sider: "Completeness of PL"	
	12.02.22	Workshop Day **Quiz #8**	
	12.05.22	Make-up Quizzes	