

Logic



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Turn editing on

Instructor: Douglas Marshall

Class Meeting Times: Mondays and Wednesdays from 11:30 a.m. - 12:30 p.m.; Fridays 11:10 a.m. - 12:10 p.m.

Class Location: [Logic Zoom Classroom](#) (passcode: 483974)

Office Hours: Tuesdays, 9:00-10:20 a.m., Fridays, from 4:30-5:50 p.m. and by appointment. Please book office hours meetings in [My Google Calendar Appointment Page](#). Office Hours take place in my [Office Hours Zoom Room](#) (passcode: 766127).

 [Break FO Con Challenge](#)

 [Course Syllabus](#) Uploaded 3/01/21, 17:20

 [Logic Zoom Classroom](#)


 [My Google Calendar Appointment Page](#)

 [Office Hours Zoom Room](#)

 [Virtual Libe 306](#)

 [Announcements](#)

Launchpad for Further Reading And Research

 [Association for Symbolic Logic \(ASL\)](#)

 [Women In Logic Workshop 2021](#)

 [Quine on the Use/Mention Distinction](#)

Having trouble figuring out whether to enclose an expression in quotation marks? Quine is here to help.

 [Logicomix \(First Part\)](#) Uploaded 20/03/20, 15:28

 [Hofstadter Gödel, Escher, Bach Introduction](#) Uploaded 23/03/20, 10:41


 [George & Velleman Philosophies of Mathematics](#) Uploaded 23/03/20, 10:36

 [Tanya Kostochka's To Phi or Not to Phi Logic and Philosophy Comics](#)

Quizzes and Exams

 [Honor Code for Quizzes and Exams](#) Uploaded 20/01/21, 09:37

 [Quiz 1 Review Handout](#) Uploaded 14/01/21, 09:58

 [Submit Quiz 1 Here](#)


Hidden from students

 [Midterm Review Handout](#) Uploaded 3/02/21, 09:46

 [Submit Midterm Exam Here](#)

Hidden from students

 [Quiz 2 Review Handout](#) Uploaded 6/03/20, 12:58

 [Submit Quiz 2 Here](#)

Hidden from students

 [Final Exam Review Handout](#) Uploaded 6/03/20, 12:53

 [Final Exam](#) Uploaded 10/03/21, 22:56

 [Submit the Final Exam Here](#)

Hidden from students



Week 1

Welcome!

Please purchase the course textbook, *Language, Proof, and Logic (Second Edition; LPL for short)* and install the software.

Physical copies of the book are available through the college bookstore, Amazon, and other outlets. Digital-only copies are available through the publisher's website (<https://www.grade grinder.net>). Either works for this class; the essential thing is that you obtain a new registration code so you can install the software and hand in your homework.

Readings and Activities for this Monday: 1. Read the [Course Syllabus](#) 2. Read the Introduction to LPL, especially pp. 1 - 5 (see below for a PDF containing the readings from the textbook for this week). 3. Watch the videos "Reasoning, Propositions, and Valid Arguments", and "FOL - A Model of Natural Language" (these are available in the Online Course Materials at [grade grinder.net](https://www.grade grinder.net), though they also seem readily available on youtube if you do a search for "language, proof, and logic").

Readings and Activities for this Wednesday: 1. Read LPL Ch. 1.1-1.3. 2. Watch the Videos "Names and Individual Constants", "Predicates and Predicate Symbols"; "Putting the Pieces Together".

Readings and Activities for this Friday: 1. Read LPL Ch. 1.4-1.8. 2. Watch the Videos "The Pet Language", "Designing a Language", and "Function Symbols"

Exercises due this Sunday, January 10: All the "You Try It" Problems from the LPL readings, exercises 1.1-1.5, 1.9, 1.11, 1.12, 1.15, 1.17, and 1.20

Kanishk Singh, your logic TA, will be holding a logic problem solving session this Sunday to make sure people get up and running with the logic software and **the first exercises, which are due Sunday**. The session will take place from 2:00 p.m. to 4:00 p.m. in [Virtual Libe 306](#).

 [Language, Proof, and Logic Initial Readings](#) Uploaded 3/01/20, 11:38

 [Course Notes 1](#) Uploaded 4/01/21, 17:55

 [Course Notes 2](#) Uploaded 7/01/21, 13:26

 [Course Notes 3](#) Uploaded 9/01/21, 09:35

Dive Deeper // Optional Extras

There are four videos in Chapter 1 on the blocks world language that I have not assigned. I think they may be useful to some of you, but only once you are actually trying to operate the Tarski's World program. If you're finding that program counter-intuitive, consider watching the videos. Otherwise you can just skip them.

Recordings from Class Meetings

 [Video of First Meeting](#)

 [Video of the Second Meeting](#)

 [Video of the Third Meeting](#)

 [Post Your Tennis Tournament Language Here](#)

Week 2

Readings and Activities for Monday: 1. Read Chapters 2.1–2.2. 2. Watch the videos "5.1 Counterexamples and Proofs", "5.3 Inference Rules and Justifications"; "6.1 The Indiscernability of Identicals"; "6.2 Reflexivity of Identity"; "6.3 Reflexivity, Symmetry, and Transitivity" 3. The exercises corresponding to this day are 2.1, 2.2, 2.5, 2.8, 2.9, 2.14.

Readings and Activities for Wednesday: 1. Read Chapters 2.3–2.6. 2. Watch the videos "7.1 Fitch Format", "7.2 Formal Description of the Identity Rules", "7.4 An Example Proof". 3. The exercises corresponding to this day are 2.15–2.17, 2.19, 2.21, 2.24–2.26

Readings and Activities for Friday: 1. Read Chapters 3.1–3.4. 2. Watch the videos "8.0 Truth Functionality and Describing Semantics", "9.0 Conjunction in English and FOL", "10.0 Inclusive and Exclusive Or, Truth Table Semantics". 3. The exercises corresponding to today are 3.1–3.3, 3.5, 3.6, 3.8, 3.9

As usual, all exercises for the week are due at the end of the day on Sunday (in this case, that's Sunday, Jan 17).

Kanishk will again hold a logic problem session this Sunday to help with this week's homework. The lab session will take place from 2:00 p.m. to 4:00 p.m. in [Virtual Libe 306](#).

 [Course Notes 4](#) Uploaded 13/01/21, 22:07

 [Course Notes 5](#) Uploaded 13/01/21, 22:08

 [Course Notes 6](#) Uploaded 17/01/21, 14:22

Dive Deeper // Optional Extras

There is a video from Chapter 2, "Formal Proofs in Fitch", that I have not assigned. I think it will be useful to some of you, but only once you are actually trying to build proofs in the Fitch computer program. If you're finding that program counterintuitive, consider watching the videos. Otherwise you can just skip them. (Two Quick Tips: 1. You can only edit the line of the proof that your arrow is pointing at. 2. In order to highlight or de-highlight premises of an inference by clicking on them, your pointer has to be pointing at the conclusion being inferred.) Similarly, the video "Demonstrating Nonconsequence Using Tarski's World" acts as a reasonable tech demo explaining how to use the Tarski's world program to construct a counterexample.

 [Ludwig Wittgenstein's Tractatus Logico-Philosophicus](#)

I add this here because some of you may find it intriguing.

Recordings from Class Meetings

 [Video of the Fourth Meeting](#)

 [Video of the Fifth Meeting](#)

 [Video of the Sixth Meeting](#)

Week 3

Note: Our first quiz will be due by Friday, January 22, at 5:00 p.m. The quiz may cover any material from the first two weeks of the course, but not material later than that. See the [Quiz 1 Review Handout](#).

Readings and Activities for Monday: Read Chs. 3.5 – 3.8; watch the videos on Equivalence and Translation ("de Morgan's laws"; "Translation from English into FOL"; "Summary"); exercises 3.12–14, 3.16, 3.18, 3.21, 3.22, 3.23

Readings and Activities for Wednesday: Read Chs. 4.1 – 4.2; watch the videos in the series Logical Truths and Tautologies ("Truth-functionality and Logical Possibility"; "Tautologies and the Truth Table Method"; "Another Example"; "Summary") and Tautological Equivalence ("A Test for Tautological Equivalence"; "Logical and Tautological Equivalence"; "Summary"); exercises 4.1, 4.2, 4.4, 4.5, 4.12, 4.17, 4.18

Readings and Activities for Friday: There are no new readings, and we will not have a class meeting today. The main activity will be to make sure you hand in your quiz by 5:00 p.m.

 [Course Notes 7](#) Uploaded 20/01/21, 09:49

 [Course Notes 8](#) Uploaded 20/01/21, 09:48

Dive Deeper // Optional Extras

 [How to Find The Game \(in Tarski's World\)](#)

 [H. P. Grice "Logic and Conversation"](#) Uploaded 17/01/20, 16:21

In the offline course, we often read and discuss this famous piece by Grice during this week. I've decided not to do that this week in the online course. If people are interested, we may be able to do it later on.

 [Jason Decker's Lecture Notes on Grice](#) Uploaded 22/01/20, 17:54

Recordings from Class Meetings

 [Video of the Seventh Meeting](#)

 [Video of the Eighth Meeting](#)

Week 4

Readings and Activities for Monday: Read Ch. 4.3–4.6; watch the videos in the series "Pushing Negation Around" ("Substitution of Logical Equivalents"; "Proving and Using Substitution of Equivalents"; "A General Procedure for NNF"; "More Equivalences"; "A Worked Example"); exercises 4.20, 4.22, 4.24, 4.27, 4.34, 4.36

Readings and Activities for Wednesday: Read Ch. 5.1–5.4; watch the videos in the series "Proof by Cases" ("Introduction to Proof By Cases"; "Another Example of Proof by Cases"; "Validity and Summary"), "Indirect Proof" ("Introduction to Proof by Contradiction"; "Two Example Proofs by Contradiction"; "No Trip to Hawaii"), and the single video towards the end entitled "Inconsistent Premises"; exercises 5.11, 5.16, 5.17

Readings and Activities for Friday: Read Ch. 6.1–6.3; watch the videos "The Formal System F", "Conjunction Elimination and Introduction", "Disjunction Introduction and Subproofs", "Disjunction Elimination", "Reiteration in Proof by Cases", "Negation Introduction (and a bonus inference rule)", "Contradiction Elimination", "Summary [of formal rules for negation]"; exercises 6.1, 6.2, 6.4, 6.5, 6.7, 6.9, 6.12

 [Course Notes 9](#) Uploaded 27/01/21, 17:18

 [Course Notes 10](#) Uploaded 3/02/21, 07:53

Recordings from Class Meetings

 [Video of the Ninth Meeting](#)

 [Video of the Tenth Meeting](#)

 [Video of the Eleventh Meeting](#)

Week 5

As a reminder, the Midterm will be due on Friday, February 5 by 5:00 p.m. It will cover the course material up through Chapter 6 of our text. See the [Midterm Review Handout](#).

Readings and Activities for Monday: Read Ch. 6.4-6.6; watch the videos "Citing Formulae Inside Subproofs", "Proofs With No Premises", "The Need for a Strategy"; "Working Backwards", and "Important Advice for Constructing Proofs"; exercises 6.18, 6.19, 6.34, 6.36

Readings and Activities for Wednesday: Read Ch. 7.1-7.5; watch the videos "Syntax and Truth Table For \rightarrow ", "Is This the Right Truth Table?", "If, Only If and Provided", "Some Example Translations", "Syntax and Semantics of the Biconditional"; exercises 7.2, 7.4, 7.6, 7.12, 7.13, 7.25

Readings and Activities for Friday: There are no new readings for Friday, and there will be no class meeting. The only activity is to make sure you upload your Midterm Exam by 5:00 p.m.

 [Course Notes 11](#) Uploaded 3/02/21, 07:54

 [Solutions to Exercises from Course Notes 11](#) Uploaded 5/02/20, 17:09

 [Course Notes 12](#) Uploaded 3/02/21, 07:57

 [Midterm Evaluation](#) 

Please use this module to submit a midterm evaluation for our course. The evaluations are anonymous (so please don't include your name in your answers).

Recordings from Class Meetings

 [Video of the Twelfth Meeting](#)

 [Video of the Thirteenth Meeting](#)

Week 6

Monday is Midterm Break. Happy Midterm Break!

Readings and Activities for Wednesday: Read Ch. 8.1-8.2; Watch the Chapter 7 videos "Definability of a Binary Connective", "Generalizing the Procedure", and "Other Truth-functionally Complete Sets of Connectives", as well as the Chapter 8 videos, "Conditional Elimination and Introduction", "Biconditional Elimination and Introduction"; exercises 8.1, 8.3, 8.18, 8.20-22, 8.24, 8.31, 8.35, 8.38

Readings and Activities for Friday: Read Ch 8.3; Watch the videos in the Soundness and Completeness of F_T series ("Two Theories of Consequence", "Soundness and Completeness", "Summary"), as well as the "Propositional Logic Summary and Celebration" video under "Halfway!" bar; exercises 8.39, 8.40

 [Course Notes 13](#) Uploaded 12/02/21, 10:48

 [Solutions to Exercises from Course Notes 13](#) Uploaded 16/02/20, 10:37

 [Course Notes 14](#) Uploaded 12/02/21, 10:49

 [Solutions to Exercises from Course Notes 14](#) Uploaded 22/02/20, 15:00

Recordings from Class Meetings

 [Video of the Fourteenth Meeting](#)

 [Video of the Fifteenth Meeting](#)

Week 7

Readings and Activities for Monday

There will be no class meeting on Monday My suggestion is that you use your time to make sure you've watched the videos from Chapter 9 of the textbook before we meet on Wednesday. In general, please do watch the videos from the textbook that are assigned for a given day *before* class meets on that day.

Readings and Activities for Wednesday

Read Ch. 9.1 – 9.5; Watch all the videos for Chapter 9, though you may skip the segment entitled "Implicatures and Vacuously True Generalizations" if you wish; exercises 9.2, 9.3, 9.4, 9.6, 9.8, 9.9, 9.12

Also: if you find the diagram showing the traditional Aristotelian square of opposition confusing, you may ignore it.

Reading and exercises for Friday:

Read Ch. 9.6–9.7; exercises 9.15, 9.17, 9.19, 9.20, 9.24.



[Course Notes 15](#) Uploaded 17/02/21, 14:11



[Exercises Corresponding to Course Notes 15 With Solutions](#) Uploaded 19/02/20, 17:25



[Course Notes 16](#) Uploaded 19/02/21, 21:54



[Solutions to Exercises from Course Notes 16](#) Uploaded 22/02/20, 14:13

Recordings from Class Meetings



[Video of the Sixteenth Meeting](#)



[Video of the Seventeenth Meeting](#)

Week 8

As a reminder, Quiz 2 will be due at 5 p.m. on Friday, February 26. Quiz 2 covers the material up until the end of Ch 9 in the textbook. See the [Quiz 2 Review Handout](#) for concepts and abilities to review.

Readings and Activities for Monday: Read Chs. 10.1 – 10.5; Watch the videos in the series entitled "Tautologies and Quantifiers", "First-Order Equivalence and DeMorgan's Laws", "Quantifier Equivalences", and "The Axiomatic Method"; exercises 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.

Special Notes for Monday: (1) While this is not normally the case, for this Monday's class you *do not* need to watch the videos prior to our class meeting. Our class meeting will make sense even if you haven't watched the videos or read the textbook. Nonetheless, at some point you should watch the videos, because they are good and will help you with homework. (2) After class, I recommend (but do not require) reading textbook sections 18.1 and 18.2, especially if you are interested in the semantics of formal languages.

Reading and Activities for Wednesday: Read Chs. 11.1 – 11.4; Watch the videos in the series entitled "Sentences Containing Multiple Quantifiers" and "Translation and Ambiguity"; exercises 11.1, 11.2, 11.4, 11.5, 11.9, 11.11, 11.13, 11.17

Special note for Wednesday: Please *do* watch the videos for Wednesday's class before we meet on Wednesday, because I want to devote most of our meeting to doing more difficult translations, and the videos (and textbook) help you prepare for that.

Readings and Activities for Friday: There are no new readings or exercises for Friday, and we will not have a class meeting. The only activity is to upload Quiz 2 by 5 p.m.



[Course Notes 17](#) Uploaded 25/02/21, 10:16



[Exercises Corresponding to Course Notes 17](#) Uploaded 25/02/21, 10:17

 [Course Notes 18](#) Uploaded 25/02/21, 10:18

Recordings from Class Meetings

 [Video of the Eighteenth Meeting](#)

 [Video of the Nineteenth Meeting](#)

Week 9

Readings and Activities for Monday: Read 12.1 – 12.3; watch the videos in the series "Informal Rules for Quantifiers" from chapter 12; exercises 12.4, 12.5, 12.6, 12.9, 12.10

Reading and Activities for Wednesday: Read 12.4, 13.1 – 13.2; watch the videos in the series "Proofs Involving Mixed Quantifiers" from chapter 12; exercises 12.11, 12.13, 12.14, 12.16, 12.18, 13.1, 13.2

Reading and Activities for Friday: Read 13.3 – 13.5; watch the videos "Dependent Constants in Formal Proofs" and "A Worked Example and Strategic Advice" from chapter 13; exercises 13.5, 13.7, 13.10, 13.11, 13.13, 13.15, 13.19, 13.20, 13.21, 13.23, 13.30

 [Course Notes 19](#) Uploaded 1/03/21, 09:59

 [Course Notes 20](#) Uploaded 10/03/21, 09:52

 [Course Notes 21](#) Uploaded 10/03/21, 09:52

Recordings from Class Meetings

 [Video of the Twentieth Meeting](#)

 [Video of the Twenty-First Meeting](#)

 [Video of the Twenty-Second Meeting](#)

Week 10

Readings and Activities for Monday: Read chapters 14.1 – 14.3; Watch the videos in the series entitled "Numerical Quantifiers", "Proving Numerical Claims", and "Definite Descriptions"; exercises 13.47, 13.49, 13.50, 14.3, 14.4, 14.10, 14.11, 14.28.

A note about the exercises: Even when our textbooks says you are free to justify inferences using Taut Con, I strongly advise you not to use Taut Con. This is because Taut Con will never be an acceptable justification for a step in a proof on your [final exam](#).

Neither will FO Con or Ana Con, for that matter. I would also suggest trying to write a proof in F out on paper *before* typing it all up into Fitch, because that simulates the exam conditions better.

Readings and Activities for Wednesday: It's the last day of classes! There are no new readings for today. The main activity aside from our class meeting is to hand in the exercises for this week.

Information About the [Final Exam](#): The [Final Exam](#) is take-home.

 [Course Notes 22](#) Uploaded 10/03/21, 09:53

 [End-of-Term Evaluation](#)



Dive Deeper // Optional Extras

 [Volker Halbach The Logic Manual](#) Uploaded 4/03/21, 11:26


If I were to switch textbooks for this course, I might opt for this one. I especially recommend Chapter 5 on the semantics of predicate logic, for those who are interested in that topic.

 [Exercise Booklet for The Logic Manual](#) Uploaded 4/03/21, 11:34

This is something you might look at if you're looking for additional exercises, especially things to try to prove.

 [First-order Interpreter's Field Manual](#) Uploaded 10/03/21, 10:29

You can use this handy table from class to help you construct first-order interpretations.

 ["Course Summary and What's Next?"](#)

This is the textbook authors' course summary, together with some pointers to logical subjects you might want to study after you've taken this course. I've also included some suggested further readings in the Launchpad block below.

Recordings from Class Meetings

 [Video of the Twenty-Third Meeting](#)

 [Video of the Twenty-Fourth Meeting](#)

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