

Phil 2310: Introduction to Deductive Logic

Fall 2011, Cornell University

Time:	10:10am-11:25am, Tuesday & Thursday
Place:	Uris Hall 202
Website:	Blackboard
Professor:	Dr. William Starr (will.starr@cornell.edu)
Office:	Goldwin Smith Hall, Office 237
Office Hours:	Thursdays 3:40-4:40; by appointment

Course Description:

What makes one claim follow from others? If you claim ‘Someone was happy’ it follows from this claim that not everyone was sad. Why is that? What is it for one claim to follow from another? Logic aims to address these questions. Formal Logic approaches these questions using some mathematical techniques that we will meet and begin to master in this course. In particular, we will study a powerful artificial language called **First-Order Logic** (FOL) that will allow us to precisely formulate the concepts of proof, truth and valid deductive inference. FOL has been of immense foundational importance to mathematics, philosophy, computer science, linguistics and artificial intelligence, and so through FOL we will be encountering ideas of interest to all of these disciplines. Our study of FOL will focus on using it to represent and evaluate the inferences we normally express in ordinary English. This will also force you to examine those inferences in detail and improve your understanding of how they do and don’t work. Throughout the course we will rely heavily on the interactive computer software included with the textbook to solidify the understanding of logic that can be achieved by studying FOL.

Textbook:

The text/software package *Language, Proof and Logic* by Jon Barwise & John Etchemendy ([Barwise & Etchemendy 2003](#))

- The text has a webpage that is likely to be useful throughout the course: <http://ggweb.stanford.edu/lpl>
- It is available at the Cornell Bookstore and from [Amazon](#)
Beware: it *cannot* be purchased used. The software requires a license that can only be used for one person and cannot be transferred. We will be using the software extensively.
- If you do not have regular access to a computer that you can run the software on, please contact me immediately and we will consider various options. You can run the software directly from the CD so you can use it on a computer without installing anything; e.g. in campus labs.
- In order to be successful in this course, you will have to do the assigned reading and play with the software until you feel comfortable using it.

Grading:

- **40%:** 2 Exams (Midterm: 15%, Final 25%)
- **54%:** 12 Short, Weekly Homework Assignments (4.5% each)
- **6%:** Attendance & Participation

- We will do in-class group exercises. I will randomly call on students to present their group's solution. If you aren't here when I call your name, you lose participation points. To excuse such an absence, you are required to provide a documented excuse, e.g. a doctor's note, or a note from guardian in case of family emergency.

Schedule

Date	Homework Exercises	Reading	Topics
<i>Week 1</i> 08.25	Class Cancelled	Class Cancelled	<i>Introduction</i> Class Cancelled
<i>Week 2</i> 08.30 09.01		1.1-1.4 2.1, 2.2	<i>Introduction</i> Atomic Sentences & Tarski's World Logical Consequence, Proof
<i>Week 3</i> 09.06 09.08		2.3-2.5 3.1-3.7	<i>The Concepts of Logic</i> Proof, Fitch Meet the Booleans: \wedge, \vee, \neg
<i>Week 4</i> 09.13 09.15	HW1 & HW2 Due	4.1 4.2-4.4	<i>Boolean Logic</i> Tautologies, Logical Truths Consequence & Equivalence
<i>Week 5</i> 09.20 09.22	HW3 Due	5.1-5.2 5.3-5.4	<i>Boolean Logic & Proofs</i> Informal Boolean Proofs Indirect Proof
<i>Week 6</i> 09.27 09.29	HW4 Due	6.1, 6.2 6.3-6.5	<i>Boolean Proofs</i> Conjunction, Disjunction Negation, Subproofs
<i>Week 7</i> 10.04 10.06	HW5 Due	7.1-7.3,7.5 8.1, 8.2, 8.4	<i>More Proofs & Conditionals</i> Conditionals Conditional Proofs
<i>Week 8</i> 10.11 10.13	HW6 Due		<i>Review, Midterm</i> Review of Ch.'s 1-8 Midterm
<i>Week 9</i> 10.18 10.20		9.1-9.3 9.3, 9.4	<i>Midterm, Quantification</i> Basics of Quantification Basics of Quantification
<i>Week 10</i> 10.25 10.27	HW7 Due	9.5, 9.6 10.1-10.4	<i>Intro to Quantification</i> Translation Taut, Cons, Equiv

Date	Homework Exercises	Reading	Topics
<i>Week 11</i> 11.01 11.03	HW8 Due	11.1-11.3 11.4, 11.5, 11.8	<i>Logic of Quantification</i> Multiple, Mixed Quant.'s More Translation
<i>Week 12</i> 11.08 11.10	HW9 Due	12.1, 12.2 12.3	<i>Translation, Proofs</i> Steps, Existential Instantiation General Proofs
<i>Week 13</i> 11.15 11.17	HW10 Due	12.4 13.1	<i>Quantifiers in Proofs</i> Mixed Proofs \forall Rules
<i>Week 14</i> 11.22 11.24	HW11 Due No Class	13.2 No Class	<i>Formal Proofs</i> \exists Rules Thanksgiving Break
<i>Week 15</i> 11.29 12.01	HW12 Due	13.3 13.5	<i>Formal Proofs, Review</i> Strategy & Tactics Review
12.06 12.08	No Class No Class	No Class No Class	Study Period Exams
12.12 (Mon)	Take-Home Final Due		Final Exam, 9-11:30am

Homework

Homework assignments are given out on Tuesdays and due **by the beginning of class** on the following Tuesday. Many exercises will be submitted electronically. This means that you must submit these exercises **before** class. Each assignment is worth 100 points and consists of 5 problems, each worth 20 points. Partial credit **is** given. A list of the assignments and a **rough** break down of the grading scale is given below.

Homework Assignments

<i>HW1</i> : 1.1-4, 2.1, 2.2, 2.6, 2.8	<i>HW2</i> : 2.20, 2.25, 3.6, 3.9, 3.23,
<i>HW3</i> : 4.2, 4.7, 4.12, 4.22, 4.23	<i>HW4</i> : 5.5, 5.8, 5.10, 5.17, 5.20
<i>HW5</i> : 6.2, 6.6, 6.7, 6.22, 6.26	<i>HW6</i> : 7.12, 7.13, 8.17, Practice Midterm
<i>HW7</i> : 9.1, 9.2, 9.3, 9.5, 9.6,	<i>HW8</i> : 9.16, 9.17, 10.9, 10.14, 10.18
<i>HW9</i> : 11.8, 11.9, 11.17, 11.24, 11.39	<i>HW10</i> : 12.4, 12.5, 12.7, 12.8, 12.9
<i>HW11</i> : 12.11, 12.16, 12.23, 13.3, 13.8	<i>HW12</i> : 13.10, 13.11, Practice Final

Homework Grading Scale

- A: 100-95: 0-1 minor errors, 94-90: 1-2 minor errors
- B+: 89-85: 3-4 minor errors
- B: 84-80: 5-6 minor errors or 1 major error
- C+: 79-75: 6-7 minor errors or 1 major & 1-2 major errors
- C: 74-70: 8-9 minor errors or 1 major & 3-4 minor errors
- D: 69-60: 10-11 minor errors or 2 major errors
- F: 59-0: 12-13 minor errors or 3 major errors

There is clearly a bit of art to classifying mistakes as major or minor, and even to counting mistakes for that matter. If you disagree with or are confused about the grade on your assignments, please bring the graded assignment to my office hours.

As for **late homework**, here is the official policy.

Late Homework Policy

- With a documented excuse, you can turn in homework late without being penalized
- *1-3 Days Late*: 10 point penalty (i.e. one letter grade)
- *4-6 Days Late*: 20 point penalty (i.e. two letter grades)
- And so on, with 10 points every 3 days

Academic Integrity:

In this course we will strictly adhere to the University Policy on Academic Integrity. If you are not familiar with it, view it at: <http://cuinfo.cornell.edu/Academic/AIC.html> ANY VIOLATION OF THIS POLICY WILL BE REPORTED IMMEDIATELY. Violations will, at the very least, result in an F on the assignment in question, but may also to lead to an F in the class, suspension, being expelled and other penalties.

Exams

If you miss an exam you will need a documented excuse to make it up.

References

BARWISE, J. & ETCEMENDY, J. (2003). *Language, Proof, and Logic*. New edn., Stanford, California: CSLI Publications. <http://www-csli.stanford.edu/LPL/>