Introduction to Logic

Fall 2012

# Phly 171: P100 (2607)

# Monday, Wednesday and Friday

# 9:00–9:50, SC208

“It is wrong always, everywhere, and for anyone to believe anything upon insufficient evidence”

–W.K. Clifford, “The Ethics of Belief” (1877)

The best way to contact me.

# Professor: Rob Loftis

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| Email: jloftis@lorainccc.edu Office Phone: 440-366-7139Home Phone: 440-331-3375 | Office: HS111J1Office Hours: 10–11AM M–F, or by appointment. |

Email is the best way to contact me. I promise to respond to all emails within 36 hrs, and generally respond within 24. **Contents**

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# Course Information

## Important Announcements

* Please turn off all cell phones and pagers during class.
* If you have a disability and need special accommodation, please see me early in the semester.
* Read this syllabus carefully! Although it is long, it contains everything you need to know for all the major assignments
* Important announcements for this course will be sent by email. Please check your email regularly.
* Tutoring is available through the Academic Support Center. 1-800-955-9222 (ext. 4057) or (440) 366-4057. See www.lorainccc.edu/tutoring+and+testing+center/

## Course Text

Magnus, P.D. and J. Robert Loftis. 2011. *For All X*. *(Lorain County Remix)* Available at the bookstore and on Angel.

The text we are using for this course was originally written by P.D. Magnus and distributed under Creative Commons license (attribution-share-alike 3.0), which means that anyone is free to use it or alter it as long as they don’t sell it and give Magnus proper credit. Magnus’s original text isn’t quite appropriate for Lorain County students, so I am in the process of creating *For All* X *(Lorain County Remix).* This is still very much a work in progress, and am grateful for your patience while I create this resource to save students money.

## Course Description

Logic is the study of arguments, the chains of reasoning we use to convince others, or sometimes ourselves, that something is true. In logic we set aside the specific issue being argued about, and focus on the way it is argued for. To a large extent, our paradigm of a good argument will be a mathematical proof, and much of what we will study in the course will have the same puzzle solving character that one finds in mathematics.

 The primary focus of the course will be *formal* logic. Formal logic is a way of setting aside the subject matter of an argument by looking only at the *form* of the sentences used in the argument. For instance, suppose a detective argues that Mr. Mustard committed the murder with a candlestick in the kitchen by saying, “We know that if Mr. Mustard’s fingerprints were found on the candlestick, then he must be the killer. Now the police have found Mr. Mustard’s fingerprints on the candlestick. Therefore he must be the killer.” For the logician, the important features of this argument are the fact that the first sentence is an if-then statement, and the second sentence is an assertion that matches the first half of the first sentence. Formal logic develops various means of symbolizing these important features of sentences, and then defines valid ways of arguing in terms of these symbols. The argument we just saw would be symbolized (P → Q), P ∴ Q, which is the form of the valid argument called Modus Ponens.By the end of the semester, you should be able to symbolize many different sorts of sentences, and construct valid arguments using those symbolizations.

As our system for symbolizing arguments grows more complicated, it will form into its own language. More precisely, we will develop two symbolic languages in the course, SL and QL. These artificial languages are designed to be completely logical and unambiguous. Learning them will be like learning regular languages in that it will require a certain amount of straight memorization of basic vocabulary and syntax. Fortunately, the language is all about being logical, so there is nothing like irregular verbs to learn. But be careful: the course begins by introducing lots of little simple things, so the course will seem easy, but quickly the little simple things build up into one big complex thing. The trick is to practice the little simple things over and over so that you will be ready when they combine into bigger, scarier things. Its like practicing basketball: you have to spend a lot of time drilling the fundamentals like layups and passing before you can really play the game.

## Course Expectations

This course meets twice a week for 75 minutes a session. As with most college courses it is assumed you will do two hours of homework for every fifty minutes of class time, so you should allow for about six hours of homework a week. For most of this class, that will mean six hours a week *practicing logic problems.* This is very much a skills-based course, and the only way to acquire these skills is to practice, practice, practice. Your individual time spent on homework will vary depending upon how naturally you take to the material in this course. For some people, the kind of symbolic puzzles we will be presenting will come naturally, for other people, it may take more time to get adjusted to this way of thinking. No matter what, I encourage all of you to stick with it. This is a style of thinking that everyone is capable of doing and benefiting from.

## Catalogue Course Description & Prerequisites

An investigation of principles of sound thinking through a study of basic rules and systems of formal logic. *Humanities core course, Prerequisites: none.*

## Course Outcomes

This course will give you…

* The ability to recognize, analyze and evaluate rational arguments.
* The ability to translate these arguments into two formal languages, SL and QL
* The ability to evaluate arguments in SL and QL using truth tables and systems of natural deduction.
* An appreciation of the importance of the rational study of reason itself, particularly using formal methods.

# Assignments

## Overview

|  |  |
| --- | --- |
| 10% Attendance10% Classroom Participation | 20% Homework Exercises 60% Short Tests |

Individual assignments are graded on a 100 point scale. Your total grade for the semester is also computed on a 100 point scale. Only when I turn in final grades is anything converted to LCCC’s letter system. The final conversion is done using the standard scale 0–59: F, 60–69: D, 70–79: C, 80–89: B, 90–100 A.

I keep my gradebook on Angel, so you can access your grades anytime. A summary of your grades can be seen in the “syllabus/resource” tab of Angel. Clicking on that summary will take you to the reports page, where you can get more detailed information, including your attendance.

## Attendance

There will be a sign in sheet every day. Attendance is graded by dividing the number of classes you signed in for by the total number of classes, to get a grade on a hundred point scale. Thus in a term with 30 classes, each unexcused absence costs you ~3.3 points on your attendance grade. It is your responsibility to sign the attendance sheet each class. Attendance is 10% of the total grade

The best way to be sure that an absence is excused is to email me before the class to let me know you will absent. Absences can be excused if you are sick, a child or other dependent is sick, a family member or loved one passes away or is close to passing away, you or a loved one gives gets married or gives birth to a child, or you have *unexpected* transportation problems. If you know you will be absent far in advance, please let me know far in advance. I do not require documentation for an absence if you contact me in advance and have three absences or fewer.

Audio for each class session will be posted on Itunes U within 24 hours of the class.

Attendance records are kept on Angel as a part of the gradebook. To access the gradebook, go to “reports” then select “Learner Profile” in the drop down field under “Category” and “gradebook grades” in the drop down field under “Report” and then click “Run.” Attendance for the individual classes are marked as “Class 1,” “Class 2,” etc. If you have a 100, you have credit for attending the class. If you have a 0, you have an unexcused absence. If the field is grayed out or blank, either you have an excused absence or the grade has not been entered yet.

## Classroom Participation

*Logic is not a spectator sport*. Going to a critical thinking class is like going to a gym. The instructor is there to show you what exercises to do and how to do them, but in the end, you are the one who has to do the push-ups and the sit-ups. Often during class I will call on students to present homework exercises on the board. During other classes I might ask someone to work through a problem you have never seen before or engage in some group exercise. Sometimes there will just be free discussion of philosophical topics. I will keep track of how much people participate in all these activities and use that record to determine your participation grade, which is 10% of your total grade. If you wish to know how you are doing for classroom participation at any point in the course, feel free to ask.

## Homework Exercises

I am assigning 16 problem sets, generally due Mondays.I encourage you to start working on each assignment early. Each problem set is worth 6 points, with 4 freebie points for a total of 100 points. Your total problem set grade will be 20% of your course grade. You do not have to get the homework problems right to get credit for the assignment, you only have to show that you made an honest effort to solve the problems. Homework may be handwritten, but I always prefer typing.

 I will accept late assignments for all problem sets. Answer sheets will be given out in class and are also set to appear on this course’s Angel page at 6 PM on the day they are due. For this reason, any late assignment must do the alternate set of problems. If you have missed class on Monday and have a documented excuse, you can do the alternative late assignment with no penalty. All others may do the alternative late assignment for half credit.

|  |  |  |
| --- | --- | --- |
| Problem set | Assignment | Alternate Late Assignment |
|  | Pages 8–9, parts A & C Pages 13–14, part APages 21–23, parts A, C, E, and G | Pages 8–9, parts B and DPages 14–15, part BPages 21–23, parts B, D, F, and H |
|  | Pages 42–44, parts A, C, and D | Pages 42–44, parts B, E, F, and G. |
|  | Pages 50–51, parts A, C, and EPages 54–56, parts A, C, E and G | Pages 50–51, parts B, D, and FPages 54–56, parts B, D, F and H |
|  | Pages 59–62, odd numbered problems in all sets. | Pages 59–62, even numbered problems in all sets. |
|  | Pages 66–78, odd numbered problems in all sets. | Pages 66–78, even numbered problems in all sets. |
|  | Pages 74–77, odd numbered problems in all sets. | Pages 74–77, even numbered problems in all sets. |
|  | Pages 82–83, odd numbered problems in all sets. | Pages 82–83, even numbered problems in all sets. |
|  | Pages 87–90, odd numbered problems in all sets. | Pages 87–90, even numbered problems in all sets. |
|  | Pages 93–94, odd numbered problems in all sets. | Pages 93–94, even numbered problems in all sets. |
|  | Page 96, part A | Page 96, Part B |
|  | Page 97, odd numbered problems. | Page 97, even numbered problems. |
|  | Page 102, odd numbered problems. | Page 102, even numbered problems. |
|  | Pages 109–110 All.Pages 119–121 All. | Handout |
|  | Pages 124–125 odd numbered problems in all sets.Pages 130–132, parts A, B and C.Pages 138–139, parts A and B | Pages 124–125 even numbered problems in all sets.Pages 130–132, parts D, E, and F.Pages 138–139, Part C.  |
|  | Pages 145–146, odd numbered problems in all sets. | Pages 145–146, even numbered problems in all sets. |
|  | Pages 151–152, odd numbered problems in all sets. | Pages 151–152, even numbered problems in all sets. |
|  | Pages 158–161, parts A, B, C, and E | Pages 158–161, parts D, F, and G. |
|  | Pages 158–161, parts H, I and J. Page 163, Part A | Handout |

## Short tests

Sixty percentof your grade will come from 10 short tests. The tests will only cover the material from the readings since the last test; however sometimes understanding that material will require understanding earlier material, so there is an important sense in which the tests are cumulative. If you do poorly on a test, fear not! In place of a final exam, you will have theopportunityto make up any three tests. The make-ups are included because your grade for the course should reflect your comprehension at the end of the course. During the final exam period, you will also have the chance to make up any tests you missed because of an excused absence, in addition to the two make-ups you already have.

# Schedule

## Notes

Assignments are due on the day they are listed across from. Major assignments are in **boldface**.

The schedule for in-class activities is more tentative than the homework schedule. In class activities can change without notice. Homework assignments will only change if there is a major problem, in which case you will receive a new schedule.

## Calendar

|  | **Date** | **Assignment Due** | **In Class activities** |
| --- | --- | --- | --- |
|  | Mon., Aug. 27 |  | Introduction to arguments.  |
|  | Wed., Aug. 29. | Read chapter 1; do problem set 1 | Present homework answers on the board. Practice quiz. |
|  | Fri., Aug. 31 |  | Preview SL. **Quiz 1, over chapter 1** |
| *Mon., Jan 17. Labor Day, no class.* |
|  | Wed., Sept. 5 | Read chapter 2; do problem set 2 | Present homework answers on the board. |
|  | Fri., Sept. 7 |  | Preview truth tables. **Quiz 2, over chapter 2.** |
|  | Mon., Sept. 10 | Read Chapter 3, do problem set 3 | Present homework answers on the board. |
|  | Wed., Sept. 12 | Do problem set 4. | Present homework answers on the board. |
|  | Fri., Sept. 14 |  | Preview derivations. **Quiz 3, over all of chapter 3** |
|  | Mon., Sept. 17 | Read 4.1, do problem set 5. | Present homework answers on the board.  |
|  | Wed., Sept. 19 | Read 4.2, do problem set 6. | Present homework answers on the board. |
|  | Fri., Sept. 21 |  | Preview conditional proof. **Quiz 4 over 4.1 & 4.2** |
|  | Mon., Sept. 24 | Read 4.3, do problem set 7. | Present homework answers on the board.  |
|  | Wed., Sept. 26 |  | Practice problems |
|  | Fri., Sept 28 |  | Practice problems |
|  | Mon., Oct. 1 | Read 4.4, do problem set 8.  | Present homework answers on the board.  |
|  | Wed., Oct. 3 |  | Practice test |
|  | Fri., Oct. 5 |  | Preview of derived rules **Quiz 5 over 4.3 & 4.4** |
|  | Mon., Oct. 8 | Read 4.5, do problem set 9. | Present homework answers on the board.  |
|  | Wed., Oct. 10 |  | Practice problems |
|  | Fri., Oct. 12 |  | Practice problems |
|  | Mon., Oct. 15 | Read 4.6, do problem set 10. | Present homework answers on the board. |
|  | Wed., Oct. 17 |  | Practice test |
|  | Fri., Oct. 19 |  | Preview of proof theoretic concepts and truth tables. **Quiz 6 over 4.5 & 4.6** |
|  | Mon., Oct. 22 | Read 4.7, do problem set 11. | Present homework answers on the board.  |
|  | Wed., Oct. 24 | Read 4.8, do problem set 12. | Present homework answers on the board. |
|  | Friday., Oct. 26 |  | Preview of QL. **Quiz 7 over 4.7 & 4.8** |
|  | Mon., Oct. 19 | Read 5.1–5.4, do problem set 13. | Present homework answers on the board. |
|  | Wed., Oct. 31 |  | Practice problems |
|  | Fri., Nov. 2 |  | Practice problems |
|  | Mon., Nov. 5 | Read 5.5–5.7, do problem set 14. | Present homework answers on the board. |
| *Tuesday, November 6. Election Day. Go vote.* |
|  | Wed., Nov. 7 |  | Practice test |
|  | Fri., Nov. 9 |  | **Quiz 8 over Chapter 5** |
|  | Mon., Nov. 12 | Read section 6.1 and do problem set 15 | Present homework answers on the board. |
|  | Wed. Nov. 14 |  | Practice problems |
|  | Fri., Nov. 16 | Read section 6.2 and do problem set 16 | Present homework problems on the board. |
| *Friday, November 16: Last day to withdraw from class without documented extenuating circumstances.* |
|  | Mon., Nov. 19 |  | Practice test |
|  | Wed., Nov. 21 |  | **Quiz 9 over Chapter 6** |
| *Thursday, November 22–Sunday, November 25. Thanksgiving Break. Go eat.*  |
|  | Mon., Nov. 26 | Read 7.1, do problem set 17. | Present homework answers on the board.  |
|  | Wed., Nov. 28 |  | More practice exercises |
|  | Fri., Nov. 30 |  | More practice exercises |
|  | Mon., Dec. 3 | Read.7.2, do problem set 18. | Present homework answers on the board.  |
|  | Wed., Dec. 5 |  | More practice exercises |
|  | Fri., Dec. 7  |  | **Quiz 10 over Chapter 7** |
| Monday, Dec. 10, 8-9:50 AM: Final exam: Retake any three quizzes. |

# Online Resources

## Angel

The Angel pages for this course contain the additional readings and an online gradebook. Answer sheets will be posted there at 6:00 PM the day homework is due.

## For All X Homepage

The original textbook homepage: <http://www.fecundity.com/logic/>

The page for this remix: <http://forallxremix.org>.

## Assorted Logic Links

<http://www.sandiego.edu/LogicSlave/online.html>

# Online Resources

Complete course policies are available on Angel, in the last link under the lessons tab. There you can find information on the following:

* Making-Up and Retaking Quizzes
* Respectful Conversation and Instructor Neutrality
* My Rights Regarding Your Written Work
* Document Retention Policy
* LCCC Policy on Students with Special Needs
* LCCC Withdrawal Guidelines