PHIL 170: Introduction to Logic

Instructor:	Eric Pacuit (pacuit.org)
Semester:	Fall 2017
Email:	epacuit@umd.edu
Course Website:	myelms.umd.edu/courses/1230805
Office:	Skinner 1103A
Office Hours:	Tuesdays, 10:30am - noon
Class Times:	MW 11:00am - 11:50am
Class Location:	Edward St. John Center (ESJ) 0202

Teaching Staff

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Course Description

This course is focused on two logical systems: Propositional Logic and First Order Logic. For each logical system, we discuss the syntax (what it means to construct a well formed sentence in the logic), the semantics (how one decides whether or not a sentence in the logic is true), a proof theory (how, if you know some true things, you can figure out what else is true), and how to translate between the logics and natural language.

The course format consists of weekly lectures (two 50 minute lectures on Mondays and Wednesdays, 11:00 - 11:50am) and one session with a TA. The textbook is completely online (students

can print out a pdf of each chapter, if desired). In addition, most of the assignments (quizzes, midterms and problem sets) will be graded by the OLI system. There will be two in-class written exams and the final exam will be a written in-class exam. Except for lectures during which some aspect interactive textbook is being demonstrated, ***students are strongly encouraged to put their laptops and other devices away during the lecture***.

Course Goals

The objective of this course is to become proficient at "elementary" formal reasoning involving propositional/first-order logic and the probability calculus. By the end of the semester students will be able to analyze arguments using sentential or first-order logic; interpret formulas and proofs in propositional/first-order logic and the probability calculus; use basic propositional/first order logic and probability calculations in their reasoning; and will be proficient with basic logical concepts.

Sections

Sections are a chance for you to review and discuss the material for the week, clear up any confusions that you may have about the material, and ask for help on the assignments for that week. Sections will be run by the TAs. Attendance at your section is required. Please consult Testudo for the time and locations of your section.

Textbook

The text book is **Logic & Proofs** developed by Wilfred Sieg and Dawn McLaughlin as part of the *Open Learning Initiative* at Carnegie Mellon University. The cost is $80. To access the online textbook:

1. Logon to the ELMS course website: myelms.umd.edu/courses/1230805
2. The homepage contains a list of modules. Open the "Online Textbook" module and click on the "Logic & Proofs" link.
3. Follow the instructions to register and pay for the course. The course key is **umd-f17**.
4. Important notes about the OLI site:
    - Make sure you register for the course through the ELMS site.
    - Since students are graded by the online system, each student must purchase their own version of the book.
    - The browsers that are supported include Chrome and Firefox (other browser work, but Chrome and Firefox are the ones that are supported).
    - You can rent laptops from the library (`http://www.lib.umd.edu/tlc/equipment`).
    - Contact me or one of the TAs right away if you have any problems accessing the course website.

The last two weeks will discuss material not in the textbook. For that part of the course, we will use *Probability and Inductive Logic*, Chapter 2 of **Choice and Chance** by Brian Skyrms. This will be available on ELMS.

Additional Readings.

Consult the following texts and online courses for additional readings about topics that will be discussed in the course. The additional readings are provided for people that would like to explore different perspectives on the topics discussed in the course.

- logicinaction.org: Free online textbook providing a general introduction to logic.
- *Language, Proof and Logic* by Dave Barker-Plummer, Jon Barwise and John Etchemendy. There is an associated online course with Coursera.
- *Logical labyrinths* and *A Beginner's Guide to Mathematical Logic* by Raymond Smullyan
- Hong Kong University online logic course:
  `http://philosophy.hku.hk/think/logic/whatislogic.php`
- *Symbolic Logic: A First Course* by Gary Hardegree (website)
- *Logic: An Introduction* by Greg Restall
- *Choice and Chance* by Brian Skyrms (especially Chapter 2: Probability and Inductive Logic)

Communication about this Course

The teaching staff use email to convey important information, and students are responsible for keeping their email address up to date, and must ensure that forwarding to another address functions properly. Failure to check email, errors in forwarding, and returned email are the responsibility of the student, and do not constitute an excuse for missing announcements or deadlines.

All announcements (e.g., changes to the schedule, hints about the assignments or quizzes) about the course will be posted on the ELMS announcement page.

`https://myelms.umd.edu/courses/1230805/announcements`

Please make sure that you check this page regularly and/or receive the email notifications from ELMS when the page is updated.

Grading Policy

The course requirements are:

- participation (10%),
- online quizzes (20%),
- problem sets (20%),

- two online and one in-class exams (30%), and
- final exam (20%).

I will grade on a curve (this means that, for example, a final average of 90% may turn out to be an A rather than an $A-$). See the undergraduate catalogue for the official description of grades, e.g., A+, A, A-, etc.: `http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1534`.

Participation: Throughout the semester, we will give short in-class quizzes. These in-class quizzes will generally not be announced and could take place in sections or during the main lectures. The purpose of these in-class quizzes is to encourage participation and to test basic comprehension of the material. An in-class quiz may occur at the beginning or end of the lectures/sections.

Although attendance will not be recorded at lectures, it will be recorded in the sections. ***Attendance is mandatory***. Students that do no regularly attend lectures and sections will have a much harder time in the course. Each student will receive 50 points towards their participation grade for attendance. The attendance score will be adjusted as follows:

0-2 missed sections:	50 points
3-4 missed sections:	45 points
5-6 missed sections:	40 points
7-8 missed sections:	30 points
9-10 missed sections:	25 points
11+ missed sections:	10 points

Quizzes: There will be approximately 10 online quizzes. The quizzes will be submitted via the OLI website or through ELMS. The lowest quiz score will be dropped. Late quizzes will not be accepted.

Problem Sets: There will be 8 problem sets. The problem sets will be submitted through ELMS or the OLI website. The due dates for the problem sets are available on the syllabus and on the Course Website.

Exams: There will be two online exams and one in-class exams during the semester. The online midterms consist of a quiz (multiple choice/true-false/fill in the blank questions) and labs. The due dates for the midterms:

- Online Midterm Exam #1: Quiz (9/29/2017, 11:59pm), Truth-Table Lab (9/29/2017, 11:59pm), Truth-Trees Lab (9/29/2017, 11:59pm)
- Online Midterm Exam #2 (11/20/2017, 11:59pm)

The deadline for the midterm quizzes and labs are strict.

The time for the in-class exam is:

- In-Class Exam #1: October 25, 2017 at 11:00 - 11:50am, EJS 0202

Make-up exams will not be scheduled after the exam date (except for emergencies such as illness or death in the family).

Final Exam: The final will be an in-class exam given during finals week. It will be a cumulative exam covering all the topics discussed throughout the semester (a review sheet will be provided towards the end of the semester).

Final exam week is **December 13 - 19**. According to the standard final exam schedule: `http://www.registrar.umd.edu/current/registration/exam%20tables%20fall.html`,

the final exam is on **Friday, December 15, 8:00-10:00am**.

The official final exam schedule is not available until mid-semester. Consult

`https://ntst.umd.edu/soc/exam/search?courseId=&sectionId=&termId=201708`

for the Fall 2017 exam schedule.

A student may seek to reschedule final examinations so that he or she has no more than three (3) examinations on any given day. It is the responsibility of the student to initiate the rescheduling or be responsible for taking the examination as originally scheduled. If requesting to reschedule the exam, please notify the instructor at least 2 weeks before the scheduled exam date (**December 1, 2017**).

Course Schedule

Below is a tentative schedule for the semester (consult the ELMS course site for the most up-to-date information about due dates for the assignments).

Part I: Basic Logical Vocabulary and Concepts

Dates: August 28 - September 8

Readings: Logic & Proofs, Chapters 1 and 2, supplemental material from the slides.

Description: The objective of these first three lectures is to introduce you to the key logical notions that will be used throughout the course: logical form, logical constants, arguments, sentences, valid/in-valid arguments, and sound arguments.

Monday	Tuesday	Wednesday	Thursday	Friday
Aug 28th **Lecture** Introduction	29th	30th **Lecture** Statements and Arguments (Ch 1 L&P)	31st	Sep 1st Introductory Assignment Due: 11:59pm

Monday	Tuesday	Wednesday	Thursday	Friday
4th No Class	5th Online Quiz 1 Due: 11:59pm	6th **Lecture** Basic Logical Concepts, II (Ch 2 L&P)	7th	8th Online Quiz 2 Due 11:59pm

Part II: Sentential Logic - Syntax and Semantics

Dates: September 11 - September 29

Readings: Logic & Proofs, Chapters 3 and 4.

Description: The goal is to introduce the syntax and semantics of sentential logic (also called propositional logic). Topics include: formal syntax of sentential logic, translating natural language sentences into formulas of sentential logic, truth-tables, and truth-trees.

Important Dates: Midterm 1 is due on September 29 at 11:59pm. The midterm is available via the OLI website.

Monday	Tuesday	Wednesday	Thursday	Friday
Sep 11th **Lecture** Chapter 2 & 3 L&P: Syntax and Semantics	12th Online Quiz 3 Due: 11:59pm	13th **Lecture** Chapter 3 L&P Truth-Tables	14th	15th Problem Set 1 Due: 11:59pm
18th **Lecture** Chapter 3 L&P Truth-Trees *Guess lecturer: Away at conference*	19th Online Quiz 4 Due: 11:59pm	20th **Lecture** Chapter 3 L&P Truth-Trees *Guess lecturer: Away at conference*	21st	22nd Problem Set 2 Due: 11:59pm
25th **Lecture** Practice: Truth-Trees and Truth-Tables (Chapter 3 L&P)	26th	27th **Lecture** Review Ch. 1, 2, 3 L&P Basic Logical Concepts, Sentential Logic, Truth-Trees, Truth-Tables	28th	29th **Midterm 1** Midterm 1 Quiz Midterm 1 Lab - Truth-Tables Midterm 1 Lab - Truth-Trees Due: 11:59pm

Part III: Sentential Logic - Derivations

Dates: October 2 - October 30

Readings: Logic & Proofs, Chapters 5, 6 and pgs. 114-115 from Chapter 8. The lab for Chapter 7 can be submitted for extra credit

Description: The goal of this part is to introduce derivations for sentential logic. We will focus on Chapters 5 and 6 and pgs. 114 - 115 from Chapter 8. Students are encouraged to read Chapter 6 (especially the part about strategies), though students will not be tested on material from Chapter 6. The lab for Chapter 7 can be submitted for extra credit. (The extra credit is due on **Tuesday, November 1, 11:59pm**).

Important Dates: Midterm 2 is an in-class exam on October 25.

Monday	Tuesday	Wednesday	Thursday	Friday
Oct 2nd **Lecture** Chapter 4 L&P Derivations	3rd	4th **Lecture** Chapter 4 L&P Derivations	5th	6th Online Quiz 4 - Ch 5 Due: 11:59pm
9th Chapter 4 L&P Derivations	10th	11th Chapter 4 and 5 L&P Derivations	12th	13th Problem Set 3: Lab Ch 4 Due: 11:59pm
16th **Lecture** Chapter 5 L&P Indirect Rules	17th Online Quiz 6 - Ch 5 Due: 11:59pm	18th **Lecture** Chapter 7 L&P pgs. 114-115 Logical Consequence Bi-Conditional	19th	20th Problem Set 4: Lab Ch 5 Due: 11:59pm
23rd **Lecture** Review Derivations for Sentential Logic	24th	25th **Midterm 2** In-Class Exam	26th	27th

Part IV: First Order Logic - Syntax, Semantics and Derivations

Dates: October 31 - November 22

Readings: Logic & Proofs, Chapters 9, 10, and 11. (We will skip truth-trees for first-order logic).

Description: The goal of this part is to introduce first order logic (syntax, semantics and derivations).

Important Dates: There is a take-home exam due Monday, November 20 (details of the exam will be provided the week before the exam).

Monday	Tuesday	Wednesday	Thursday	Friday
Oct 30th **Lecture** Chapter 8 L&P First-Order Logic	31st	Nov 1st **Lecture** Chs 8, 9 L&P First-Order Logic Extra Credit Lab (Chapter 6) Due, 11:59pm	2nd	3rd Online Quiz 7 - Ch 8 Due: 11:59pm
6th **Lecture** Chapter 9 L&P Semantics (pgs. 131, Skip Truth-Trees)	7th	8th Quiz Ch 9 Due: 11:59pm **Lecture** Chapter 10 L&P Derivations	9th	10th Problem Set 5: Due: 11:59pm
13th **Lecture** Chapter 10 L&P Derivations	14th Online Quiz 8 Due: 11:59pm	15th **Lecture** Chapter 10 L&P Derivations	16th	17th Problem Set 6: Due: 11:59pm
20th **Lecture** Review, Discuss Exam 3 **Exam 3** Due 11:59pm	21st	22nd **No Class - Thanksgiving**	23rd	24th

Part V: Inductive Logic and Probability

Dates: November 27 - December 11

Readings: Probability and Inductive Logic (Chapter 2 of Brian Skyrms's Choice and Chance). This is available on ELMS.

Description: We conclude the course by discussing some broader issues about logic (comparing inductive and deductive logic, basic probability theory and its relation to logic).

Important Dates: The final exam is schedule for Friday, December 15, 8-10am in EJS 020.

Monday	Tuesday	Wednesday	Thursday	Friday
Nov 27th **Lecture** Inductive Logic/Probability	28th Quiz Inductive Logic/Probability (ELMS) Due: 11:59pm	29th **Lecture** Inductive Logic/Probability	30th	Dec 1st
4th **Lecture** Inductive Logic/Probability	5th Quiz Inductive Logic/Probability (ELMS) Due: 11:59pm	6th **Lecture** Inductive Logic/Probability	7th	8th Problem Set 8: Inductive Logic/Probability (ELMS) Due: 11:59pm
11th **Lecture** Concluding Remarks	12th	13th	14th **Review Session**	15th

Class Cancelations

The University may be closed in the event of an emergency, in which case class will be cancelled. To find out if the University is closed you can check its main site (`http://www.umd.edu`), its emergency preparedness site (`http://www.umd.edu/emergencypreparedness/`), or call the "snow phone line" at 301-405-7669 (which covers more than just snow caused closings). If class is cancelled while the University remains open, then there will be an announcement posted on the course ELMS page.

Emergency protocol: In the case of an extended closure to the University (e.g., because of inclement weather), consult the ELMS course page for announcements and changes to any due dates.

Academic Support

You should make sure you are familiar with the rules regarding proper academic conduct as outlined at `http://www.shc.umd.edu/`.

Tutoring. The Academic Achievement Programs offers free tutoring for PHIL170 through the Academic Success and Tutorial Services office. To connect with a complimentary, peer tutor for this course, sign up directly at `https://umdtutoring.mywconline.com/`. For questions, contact Christine Duchouquette, Tutorial Coordinator for the Academic Achievement Programs (AAP) at

cduchou@umd.edu or 301-405-4745.

Accommodations. Students who require special accommodations should inform the instructor at the beginning of the course, and must provide the appropriate documentation from the DSS office (see http://www.counseling.umd.edu/DSS/).

Course Procedures and Policies

Consult the following webpage for the official procedures and policies for this course:

www.ugst.umd.edu/courserelatedpolicies.html