

Syllabus for PHIL 202 – Introduction to Logic  
Taught by Justin Kalef, Rutgers University, Fall 2014

**This course satisfies Core Curriculum Goal**

**‘x’: Apply effective and efficient mathematical or other formal processes to reason and to solve problems.**

**Contact information:** The easiest way to contact me outside of class is by email, at [jkalef@philosophy.rutgers.edu](mailto:jkalef@philosophy.rutgers.edu)

**Recitations:** In addition to our scheduled lectures in Scott 123, all students will attend weekly recitation sections with a teaching assistant. Unlike other courses you may have taken, logic is much more a matter of *skills* for you to *master* than a *material* for you to *learn*. The lectures and text will explain and demonstrate these skills; the recitation sections will give you the opportunity for questions and feedback on your progress toward mastery.

**Office hours:** TBA

**Text:** Readings will come from two sources:

- 1) *Essentials of Symbolic Logic, 3<sup>rd</sup> Edition* by R. L. Simpson, and
- 2) Various handouts.

The text is required and available in the bookstore. Students who do not secure a copy of the Simpson text early on should not expect to pass the course.

**Topic and purpose of course:** This course aims to provide students with a background in formal logic. Students who complete the course with a high grade will leave with greatly enhanced powers of logical reasoning, and will also find themselves in a strong position to thrive on the LSAT, in more advanced logic courses, and in advanced philosophy courses in all core areas.

**Assessment:** The most important thing to keep in mind is that, unlike other courses you may have taken, **this is a course that you can fail even if you attend all the classes and complete all the assignments.** Your grade will not be based on attendance or effort to any extent at all: 100% of your grade will be based on your performance on the exams.

There will be four exams in the course, each of which can be retaken one or more times. Students may only write the Level One exam after having signed off on their Statement of Understanding after submitted a perfect worksheet; to write any other exam, students must have already passed the exam of the previous level. Students who pass the level four

exam will receive an A; students who pass the level three exam but not the level four exam will receive a B (or, if their score on the level three exam is perfect, a B+); students who pass the level two exam but not the level three exam will receive a C (or, if their score on the level two exam is perfect, a C+); students who pass the level one exam but not the level two exam will receive a D; and students who never pass the level one exam will receive an F.

Each exam will consist of five sections. To pass an exam, you must achieve **both** of the following: a) an average (mean) score of 75% or higher overall, **and** b) a score of 60% or higher on each section.

**Makeup Exams Policy:** There will be no makeup exams offered. There are already six more opportunities to take exams than any student needs. You are advised to take responsibility and plan for all contingencies, and in particular not to leave themselves in a position where some necessary absences may hurt them. If you pass exams before you need to in order to reach your goals, you will leave yourself room for unforeseen emergencies. If you choose not to do this, you must deal with the consequences.

### **Cheating:**

**Anyone caught cheating in any way on any exam, or aiding anyone else in cheating, will receive an automatic F for the course and be referred to the appropriate authorities for further measures to be taken. These further measures may include suspension or expulsion.**

**Disruptive Behavior:** You are welcome to do as much or as little work as you like in my course, so long as you are mindful of the consequences; but I will not permit any student to disrupt the class environment by distracting me or any other students from our work.

In particular, please note that none of the following disruptive activities are permitted:

- a) Engaging in private conversations during lecture components of the class;
- b) Using electronics in class; or
- c) Engaging in discussions unrelated to the course during group work time.

If you cannot adhere to this code of conduct on a particular day, please don't attend class on that day.

If you do attend class and engage in any of the above behaviors, I will publicly call you out for doing so and add your name to the list of disruptive students. The first three times you are added to the list, you will receive a warning. **Every second time thereafter, you will forfeit half a letter grade of your final score (that is, for instance, the distance from an A to a B+ or from a B+ to a B).** In other words: someone who is added to the list four times will lose half a letter grade; six times, a full letter grade; eight times, one

and a half letter grades; ten times, two letter grades; twelve times, two and a half letter grades; and fourteen times, three letter grades. After the sixteenth occasion, the student will receive an automatic F for the course (though students who would otherwise earn less than an A will reach that point after fewer disruptions).

### **Requests for special dispensation on grades or for easier grading standards**

In my role of assessor, it is of great concern to me to treat all students *fairly*. Therefore, I promise that I will give no special dispensation to any students, nor will I allow my evaluation of a course to be influenced by the willingness of an entire class of students to whimper when other classes I've taught did not compromise their dignity in that way and were graded fairly by the standards outlined here.

### **Student Absences:**

Students are expected to attend all classes. I will not lower your grade for missing classes, but absences, particularly more than one or two over the term, will likely have a harmful effect on your learning and hence on your final grade.

Please note: My policy for missed labs and missed exams is that students who miss classes are responsible for finding out **from other students** what they missed. I advise and encourage all students to exchange contact information with at least five other students in class for that purpose, and to make further contacts in the event that any of these five or more students drops the course.

### **Workload for the Course:**

The time it will take students to master the material for this course will vary greatly from student to student. However, I expect that the **average** student will be able to achieve an "outstanding" grade (that is, an A) by putting in **three hours of home preparation for every hour of class time** (which works out to **eight hours' focused, undistracted outside work on an average week**). However, I must be emphatic that **this is no guarantee of success**. If earning a top grade is important to you, please watch your progress carefully and be prepared to adjust your workload if you fall behind in your schedule.

## **Overview of all four levels**

### **Level I**

**Must be completed successfully to achieve:** a passing grade.

**Requirement for writing this exam:** A signed and completed worksheet, with all questions answered correctly.

**Approximate home study time required (for an average student): 20 hours.**

### **Level I Exam Components:**

- a) Miscellaneous problems: you must be able to provide **and demonstrate** the correct answer to all the problems in the ‘Miscellaneous problems’ handout. You will be asked two of the above-mentioned questions, verbatim.
- b) Translations: On the exam, you will be given three new passages to translate from the formal language of propositional logic into English. In preparation for this component, you will need to do all the readings and try all the exercises in Simpson pp.1-30 and pp.55-65.
- c) Truth tables: You will be required to reproduce the material from Simpson, pp.31-34 in a single table.
- d) Truth trees/tableaux: You will need to reproduce the material from Simpson, p.280.
- e) Derivations: On the exam, you will need to perform two new derivations that can be completed using the six rules you have learned in Simpson, pp. 55-98.

## **Level II**

**Must be completed successfully to achieve:** a C grade.

**Requirement for writing this exam:** A passing grade on the Level I exam.

**Approximate home study time required (for an average student): 32 hours.**

### **Level II Exam Components:**

- a) Liars and truth-tellers: You will be given two *new* problems to solve. Both problems will involve liars/truth tellers (as seen in the ‘Simple Liars and Truth-Tellers’ handout), and will be similar to those problems. You must show your proof of the answer in both cases.
- b) Translations: On the exam, you will be given three passages to translate *into* the formal language of propositional logic. In preparation for this component, you will need to review the same material as under b) in Level I. The translations will be more complex than those in Level I.
- c) Truth tables: You will be given two new arguments in propositional logic: one valid, and one invalid. You will have to demonstrate which is which by creating one truth table for each argument. To prepare for this component, you will need to do all the readings and exercises in Simpson pp. 35-54.
- d) Truth trees: You will need to prove, again, the validity and invalidity of the two arguments from Section c) above, this time using truth trees. I will teach this material in class.

- e) Derivations: You will need to prove the validity of the valid argument from Section c) again, this time using the derivation method. Following this, you will be given a new truth-functionally true formula, which you will need to categorically derive. To prepare for this component, you will need to do all the readings and exercises in Simpson pp. 98-150. Please note: the questions on the Level II exam will not require you to perform disjunction introduction or indirect proof.

### **Level III**

**Must be completed successfully to achieve:** a B grade.

**Requirement for writing this exam:** A passing grade on the Level II exam.

**Approximate home study time required (for an average student):** 20 hours.

#### **Level III Exam Components:**

- a) Liars and truth-tellers: You will be given two new problems to solve. Both will involve more complex liars and truth-tellers (as seen in the 'More Complex Liars and Truth-Tellers' handout). One of the two problems must be solved using the Nelson Goodman principle (as taught in class).
- b) Translations: This time, you will need to translate five English sentences into quantifier logic. To prepare for this component, you will need to do all the readings and exercises in Simpson, pp.158-177.
- c) Truth Tables: You will be given two new arguments in propositional logic: one valid, and one invalid. You will have to demonstrate which is which by creating one truth table for each argument. To prepare for this component, you will need to review the readings and exercises in Simpson pp. 35-54.
- d) Truth trees: You will need to prove the correctness of your answers in c), this time using two truth trees.
- e) Derivations: You will need to prove the validity of the valid argument from Section c) again, this time using the derivation method. Following this, you will be given a new formula, which you will need to categorically derive. This time, you will need to be able to perform disjunction introduction and indirect proof.

### **Level IV**

**Must be completed successfully to achieve:** an A grade.

**Requirement for writing this exam:** A passing grade on the Level III exam.

**Approximate home study time required (for an average student):** 40 hours.

#### **Level IV Exam Components:**

- a) Liars and truth-tellers: You will need to solve a new metapuzzle (or perhaps a meta-meta-puzzle or meta-meta-meta-puzzle, etc.) to solve. The puzzle will be similar to those found in the 'Metapuzzles' handout.
- b) Translations: You will need to translate five sentences into quantifier logic. These sentences will be more difficult than those in Level III. To prepare for this component, you will need to do all the readings and exercises in Simpson, pp.178-197.
- c) Interpretations: You will be given four problems, verbatim, from Simpson, pp.206-208: one each from Parts a, b, c, and d. To prepare for this component, you will need to do all the readings and exercises in Simpson, pp.198-208.
- d) Truth trees: You will be given two new arguments in quantifier logic: one valid, the other invalid. You will have to prove which is which by using two truth trees.
- e) Derivations: You will need to prove the validity of the valid argument from Section d) again, this time using the derivation method. Following this, you will be given a new quantificational truth, which you will need to categorically derive. To prepare for this component, you will need to do all the readings and exercises in Simpson pp. 213-260.

## **A strategy for earning the grade you need:**

If you need an A grade, pass Level 1 at the first exam, Level 2 at the third exam, Level 3 at the fifth exam, and Level 4 at the seventh exam.

If you need a B grade, try to pass Level 1 at the second exam, Level 2 at the fifth exam, and Level 3 at the seventh exam.

If you need a C grade, try to pass Level 1 at the third exam and Level 2 at the sixth exam.

If you need a D grade, try to pass Level 1 at the fourth exam.

## **Schedule:**

**Wednesday, September 3<sup>rd</sup>**: Introduction to the course.

**Friday, September 5<sup>th</sup>**: Breaking things down; beginnings in formal logic. (1)  
*Homework for this class: Complete your worksheet (to be submitted at the start of class).*

**Wednesday, September 10<sup>th</sup>**: Translations, truth trees, and truth tables; finding the main operator. (1)

**Friday, September 12<sup>th</sup>:** FIRST EXAM

**Wednesday, September 17<sup>th</sup>:** Derivations in simplified propositional logic, Part I. (1)

**Friday, September 19<sup>th</sup>:** Derivations in simplified propositional logic, Part II. (1)

**Wednesday, September 24<sup>th</sup>:** SECOND EXAM

**Friday, September 26<sup>th</sup>:** Proofs using truth tables. (2)

**Wednesday, October 1<sup>st</sup>:** Proofs using truth trees. (2)

**Friday, October 3<sup>rd</sup>:** THIRD EXAM

**Wednesday, October 8<sup>th</sup>:** Liars and truth-tellers; some basic paradoxes. (2)

**Friday, October 10<sup>th</sup>:** Techniques for derivations with scope lines. (2)

**Wednesday, October 15<sup>th</sup>:** FOURTH EXAM

**Friday, October 17<sup>th</sup>:** Translation techniques; more paradoxes (2)

**Wednesday, October 22<sup>nd</sup>:** A complete guide to propositional logic derivations. (3)

**Friday, October 24<sup>th</sup>:** FIFTH EXAM

**Wednesday, October 29<sup>th</sup>:** Solving more complicated liar/truth-teller problems; translating liar/truth-teller problems into PL; the Nelson Goodman principle. (3)

**Friday, October 31<sup>st</sup>:** Predicate and quantifier logic, introduced; translations into quantifier logic. (3)

**Wednesday, November 5<sup>th</sup>:** SIXTH EXAM

**Friday, November 7<sup>th</sup>:** More advanced translations: identity. (4)

**Wednesday, November 12<sup>th</sup>:** Translations with quantifiers and identity. Also: interpretations. (4)

**Friday, November 14<sup>th</sup>:** SEVENTH EXAM

**Wednesday, November 19<sup>th</sup>:** Derivations in quantifier logic. (4)

**Friday, November 21<sup>st</sup>:** A complete method for quantifier logic derivations. (4)

**Wednesday, November 26<sup>th</sup>:** EIGHTH EXAM

**Friday, November 28<sup>th</sup>:** *Class cancelled for Thanksgiving.*

**Wednesday, December 3<sup>rd</sup>:** Truth tree proofs for quantifier logic; metapuzzles. (4)

**Friday, December 5<sup>th</sup>:** NINTH EXAM

**Wednesday, December 10<sup>th</sup>:** An interesting knight/knave paradox; the basics of Gödel's incompleteness theorem. (Looking forward)

**TBA (final exam period):** TENTH EXAM