– course syllabus –

Philosophy 109
Introduction to Formal Reasoning and Decision Making (Online)
WINTER TERM 2018

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Introduction

Hello! If you are reading this it means you have enrolled for Philosophy 109: Introduction to Formal Reasoning and Decision Making. This is a lower-division, undergraduate course and it is an online course. Being an introductory course, it aims to introduce students to the fundamentals of logical thinking, both deductive and inductive forms, and to the basic principles of decision theory. The course has no prerequisites: it is designed to familiarize students with basic logical principles and techniques that can be applied to real-world quantitative reasoning problems. As such, it does presuppose any significant formal (or mathematical) background on behalf of the student. The idea is to make the material as simple and fundamental as possible.

Disclaimer about the online course

It is my goal to create a learning environment that is both accessible and fosters self-sufficiency and autodidactic skills in this course. However, there are many challenges inherent to taking courses online, and in this case, you will face some additional demands: **First**, I will be teaching this course from abroad (I currently reside outside New Jersey), which means that I cannot provide face-to-face meetings on campus or host an introduction workshop to meet you. **Second**, being a Winter Term course, you are expected to do the work of a full-term course in a *very short* amount of time—five weeks to be exact. This means you will be working at a highly accelerated rate and will have a substantial workload each week. It is important that you understand what is expected of you by enrolling in this course.

In addition to the information provided in this syllabus, I have attached a schedule—see below—that specifies a reading and assignment workflow. This schedule includes by a brief description of the lesson plan for each week. Please familiarize yourself with this schedule immediately. Your success in this course depends on your being up-to-date on the reading and assignments.

Course website

This course uses the ***Sakai*** learning platform. For those of you who've not used this platform, it is user-friendly and easy to navigate. All course materials (except for your books) will be made available on Sakai. Likewise, all assignments and exams will be **distributed** and **graded** via Sakai. For information about how to access and submit assignments and exams on Sakai, see below.

All information pertaining to the course curriculum will be available starting December 21st, 2018. You can locate this information in the **RESOURCES** tab on the home page of Sakai. (It is on the left-hand side of the landing page). In the resources tab you will find separate folders labeled 'Curriculum', 'Lectures', 'Assignments', 'Exams', and "Answer keys". The curriculum folder contains a semester plan which lists weekly readings and assignment, as well as the final exam schedule.

Textbooks and instructional Materials

A Concise Introduction to Logic (13th edition), by **Patrick Hurley**
Choices: An Introduction to Decision Theory, by **Michael Resnik**

In addition to the main texts, I will provide instruction in the form of:

- Lecture notes
- Video tutorials
- Skype meetings (upon request)

Availability and Office Hours

I do not have official "office hours" as I am not located on campus. I am, however, available by email and skype on weekdays. I will do my best to reply to emails quickly if they are sent between **9 am - 6 pm** (EST). (Skype meetings need to be scheduled in advance). Given that this is an accelerated course, I will strive to be available on weekends for additional support. My Skype name is james.d.grayot.

*** Please note: james.grayot@gmail.com is my primary email address. If you send emails to my Rutgers address, I may not reply quickly.

Assignments and Final Exam

- There will be 5 weekly assignments worth 20 points each: they are worth 40 % of your grade.

All assignments can be found in the **ASSIGNMENTS** tab on Sakai, which is where you will submit them. There are two ways to upload assignments: as an attachment or as an inline submission. Each assignment is "open" by default, which means that you can access and complete the assignment anytime up until the deadline, at which point the assignment window expires and you can no longer submit it. You must submit your assignment before the deadline, which is listed in the **WEEKLY READING AND ASSIGNMENT SCHEDULE**. You can find a copy of it in the resources tab in the 'curriculum' folder. There you will also find an overview of the Winter Term called "calendar at a glance".

The weekly assignments are not scored for accuracy—they are graded on a 'pass' or 'fail' basis. To pass, you must attempt every question in the assignment. If any questions are left blank or unanswered, this can result in you receiving a fail. (If you receive a fail, you are permitted to resubmit the assignment for half-credit). Given that it is graded on a pass/fail basis, it is up to you to check your own answers, which you can do by reviewing the **ANSWER KEY** for each assignment. I will post the answer keys to Sakai following each assignment's deadline. The answer keys can also be found in the resources tab.

Each assignment will be paired with **LECTURE NOTES** which will help you along the way. These lecture notes are not a substitute for the primary texts; though they may help to simplify and reiterate the learning objectives and concepts discussed in the texts. It may be helpful to look over the lecture notes prior to starting each set of weekly readings to become oriented with the material.

- There will be one final examination worth 150 points. It is worth 60% of your grade.

The final exam will be cumulative, and will test your understanding of central issues and themes from each of the 5 assignments. The exam will be undertaken using Sakai's assessment tool, which is located in the **TESTS AND QUIZZES** tab. The final examination will take place between **January 16 – 17,** so save the dates now. More information about the final exam will be circulated over the course of the term.

A word of caution: While this is an introductory course, it moves along quickly, and one can quickly get behind if they do not understand each new concept or formal technique. I therefore encourage you to contact me if you are not grasping the material or are having difficulty applying the concepts / techniques.

Point break down:

Assignments 20pts (x 5) = 100 pts
Final exam 150pts (x 1) = 150 pts
Total points: 250

Academic integrity and anonymous grading policy

All students are expected to adhere to Rutgers policies concerning academic integrity. Just because this is an online course does not mean that you are held a different standard than in-person courses. If you have any questions about what the standards of academic integrity are, you can visit the **student conduct** page.

This course employs a blind-grading policy for all exams (not for assignments). This means that exam submissions are anonymous during the grading process. If, for whatever reason, you require me to look over your exam before it is graded (for instance, because you encounter technical issues in Sakai), I will require your permission in the form of a confirmation before disabling the blind-grading system and making the necessary changes.

Weekly reading and assignment schedule:

Assignment 1 | *Introduction to propositional logic 1* – Due Friday December 28th by 11:55 pm

- Required readings: **Hurley Ch. 1**
  - Description: In the first week you will be introduced to the basic terms and concepts of symbolic logic, and will learn how to (i) recognize and define arguments; (ii) determine whether arguments are valid (invalid), sound (unsound), strong (weak), and cogent (not cogent); and (iii) learn how to prove arguments invalid by counter example.

- Required readings: **Hurley Ch. 6.1 and 6.2**
  - Description: Having learned the basic terms and concepts of symbolic logic (Ch 1), you are prepared to begin learning propositional logic. Propositional logic, also known as sentential logic, is a form of symbolic logic that uses *variables* to represent basic propositions and *operators* to express the relationships between them. Here you will learn how to interpret propositions via their variables and logical operators, and you will also learn how to implement these symbols by translating natural language sentences into formal (propositional) statements.

Assignment 2 | *Introduction to propositional logic 2* – Due Friday December 28th by 11:55 pm

- Required readings: **Hurley Ch. 6.3 and 6.4**
  - Description: The next step in developing your understanding of propositional logic is to apply your knowledge of variables, operators, and truth functions to identify all possible truth values of a propositional statement. You will learn to do this by building truth tables. You will also build your translation skills by generating truth tables for natural language statements and classifying them. You will also to build truth tables for arguments (i.e. propositions that represent premises and conclusions)

- Require readings: **Hurley Ch. 6.5 and 6.6**
  - Description: Once you know how to build truth tables and test natural language statements for various truth outputs, you can now test arguments for validity via truth tables. This will allow you to verify whether an argument is (in)valid by virtue of its symbolic form rather than by substitution via the counterexample method. Having developed a good understanding of how arguments work, you can now start to identify arguments forms merely by identifying arrangements of operators that link premises with conclusions.

Assignment 3 | *Natural deduction 1* – Due Friday January 4th by 11:55 pm

- Required readings: **Hurley Ch. 7.1 - 7.4**
  - Description: Now that you know how to identify various argument forms, and also know how to prove whether arguments are valid or invalid, you can test inferences by using different rules of implication and replacement to connect premises to conclusions. In this way, natural deduction in propositional logic works similarly to geometric proofs: you are given a set of premises and a conclusion, and by applying different rules of implication and replacement, you can demonstrate, via a proof, that the conclusion logically follows from the premises. In some cases, you may be able to construct more than one proof.

Assignment 4 | *Natural deduction 2* – Due Friday January 4th by 11:55 pm

- Required readings: **Hurley Ch. 7.5 - 7.6**
  - Description: In addition to proving the validity of arguments via direct means, you can also prove the validity of arguments by conditional assumptions and indirect proofs. Conditional proofs work by assuming what is already given in the premises and using this assumption to derive the conclusion; by contrast, indirect proofs build on the conditional proof method by assuming the negation of conclusion and proving it false.

Assignment 5 | *Introduction to decision theory 1* – Due Friday January 11th by 11:55 pm

- Readings: **Resnik Ch. 1 and 2.1 - 2.4**
  - Description: We now fully immerse ourselves in decision theory and do so by discussing the foundations of rationality and rational choice theory. Here you will learn about framing decision problems, how to talk about and formally represent beliefs and desires via probability and utility functions, and become introduced to the formal framework of von Neumann-Morgenstern expected utility theory

- Readings: **Resnik Ch. 4**
  - Description: Having discussed key concepts of rational choice theory (viz. probability and utility via representation theorems), you are now prepared to understand revealed preference theory and become better acquainted with basic decision axioms, such as consistency and completeness, and other preference ordering technologies (maximin and minimax). You will also learn about the basic differences between cardinal and ordinal utility theories.

FINAL EXAM | January 16th - 17th

- Information TBA