80-212 Logic and Argument Analysis

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ALL SUBJECT TO REVISION...

1   Course Description

What counts as a "successful" argument? Is it one based on evidence? If so, what counts as "good" evidence? Suppose we could answer this question - is that enough? What does it mean to "base" an argument on evidence? Surely there are incorrect ways to deploy even very good evidence. Can we categorize them?

Questions such as the above form the basis of the branch of philosophy known as "epistemology". Epistemology is the study of "reasoning". It answers questions both concerning how we ought to properly reason, but also how we tend to reason in practice. Broadly speaking, this course is focused on exploring epistemology. We will be focused on different ways of understanding what counts as a "successful" argument. We hope to be able to not only identify and distinguish such arguments from unsuccessful ones, but to understand the myriad and complex ways in which such arguments work.

This course will also take an even narrower approach. Epistemology is (literally) an ancient discipline, but massive strides have been made in the last 100-150 years, particularly connecting concepts in epistemology up to those in formal mathematics. This is a branch of mathematical modeling, or applied mathematics, known as "formal epistemology". These different mathematical models have made exploring the nuances of argumentation more feasible than ever before.

However, our purposes are more applied. The limitations of a semester mean that we only have so much time to delve into the nuances of formal epistemology. So, the course aims to introduce a handful of the most basic and universal formal epistemic tools, namely those of Boolean logic and probability theory. With these in hand, the second half of the course is dedicated to the application of these tools. It would be quite frustrating and disappointing of these formal tools did not, in fact, help us to understand more day to day arguments, but instead remained abstract tools. So the second half of this course is dedicated to applying what we learn in the first half towards arguments made in first natural science, and then political science. The hope is that these formal tools will let us not only understand how rich and complex some of these arguments are, but they will help us to more subtly and carefully evaluate these arguments, understand where some succeed, and where others fail.

2   Course Objectives

This course has two primary objectives, which map on to the two halves of the course. The first objective is to be able to understand and successfully deploy various formal tools in epistemology. In particular, the students should be able to identify successful from unsuccessful syllogisms, perform Boolean deductions, use truth tables to evaluate the validity of logical sentences, and correctly calculate probabilities both of individual and sequential events. All of these tasks constitute the "formal" portion of the course, which is the first half of the course.

The second objective is the successful application of these formal tools to informal arguments. In particular, the students should be able to break down and identify argumentative structure in informal arguments, and evaluate their successfulness by application of their formal tools. This task constitutes the second portion of the course, where we will read papers and arguments from natural science and political science, with an eye to the arguments they are making. Students should be able to determine the conclusion of these arguments, the assumptions, and the steps of the argument, and then where appropriate deploy their formal tools to evaluate whether or not the steps of these arguments are successful.

Through both of these objectives, the hope is to help you to discover and sharpen your own opinions on some of the more difficult topics in the second half of the course. Many of the arguments we explore in the second half of the course are controversial. Some are arguably downright reprehensible, even. All of you will come to this course with prior opinions and intuitions about many of the questions we shall explore. By learning about argumentative structure, and learning the details of how arguments work, you will be able to refine and hone your own position in the discourse.

3 Course Structure

This course meets five days a week. During the first half of the course, Monday through Thursday will be "Interactive Lectures" - don't let this freak you out! By this, all I mean is that I will be lecturing and will often ask questions of you, or do small activities. To that end it's imperative you look at the course notes ahead of class!

Friday will be an opportunity to review what we covered Monday through Thursday. Here you can ask questions about your weekly assignment as well, and we can review problems together as necessary. Time permitting, I will also talk about some relevant history and some more of the "philosophy" relevant to whatever we have discussed that week.

The second half of the course is itself broken down into two halves, the first half dedicated to readings in Natural Science, specifically Evolution by Natural Selection, and the second half is dedicated to readings in Political Science, with a focus on political economy and economics itself. Each of these halves will have 3-4 readings, so 6-8 readings total. This syllabus will be updated soon with the specifics as they are worked out.

This course has 5 assignments: three problem sets and two essays. Each of these will be worth 20 points. Your final grade is therefore out of 100 points. For the first half of the course, the problem sets are due on Saturday at Midnight. They will be turned in with a Canvas upload. These assignments are designed to be completed over the course of the week, with each day's lecture allowing you to complete more of the assignment as you go. It is strongly recommended that you not put these assignments off until Friday or Saturday, as they are quite lengthy!

The essays will be the assignments during the second half of the course. Each of these will be 3-5 pages, and will be based on a prompt. The goal of the prompt is to show understanding of the subtleties of the arguments we've been reading and how they interact. Where appropriate, the prompt may ask you to connect some of what you're reading up to material from the first half of the course. A more detailed rubric will be provided later in the semester.

My latework policy is to remove 20% of your final grade for each day an assignment is late. That said, please feel free to request an extension if you require one - I will generally grant them, but for the sake of getting things graded promptly, please try to request extensions before assignments are due.

4 Schedule

- Week 1: Informal Argument

  - M: Introduction/Informal Argument
  - T: Argument Diagrams/Kinds of Argument
  - W: Fallacies/Syllogism
  - R: Syllogism
  - F: Review, Assignment 1 Due at Midnight on Saturday

- Week 2: Boolean Logic

  - M: Sentences, $\wedge$, $\neg$, and $\bot$.
  - T: $\rightarrow$, Truth Tables
  - W: $\vee$, Excluded Middle
  - R: No Class, Independence Day
  - F: Review, Assignment 2 Due at Midnight on Saturday

- Week 3: Probability Theory

  - M: Sets
  - T: Probability Trees
  - W: Independent/Dependent Events, Binomial Theorem

- R: Conditional Probability/Bayes' Theorem
  - F: Review, Assignment 3 Due at Midnight on Saturday

- Week 4: Arguments in Natural Science

  - M: Background
  - T: Darwin Part 1, Darwin Reading Due
  - W: Darwin Part 2
  - R: Galton Part 1, Galton Reading Due
  - F: Galton Part 2

- Week 5: Arguments in Natural Science/Political Science

  - M: Gould Part 1, Gould Reading Due
  - T: Gould Part 2, Essay 1 due at Midnight
  - W: Scene Setting and Sowell
  - R: Hayek Part 1, Sowell Reading Due
  - F: Hayek Part 2, Hayek Reading Due

- Week 6: Arguments in Political Science

  - M: Sen Part 1, Sen 1 Reading Due
  - T: Sen Part 2
  - W: Sen Part 3, Sen 2 Reading Due
  - R: Sen Part 4
  - F: Recap and Review, Essay 2 due at Midnight

5 Invitation for Students with Disabilities

If you have a learning disability that could impair your progress in this course, please contact Equal Opportunity Services on campus (http://hr.web.cmu.edu/dsrg/students.htm). We can arrange to accommodate your learning style based on EOS recommendations. Please notify me at the semester's beginning of your learning needs—do not wait until the semester becomes overwhelming to acknowledge the problem.

6 CMU Philosophy Department Statement on Citing and Plagiarism

"The straightforward disclosure of the sources used in completing course work is essential to the integrity of the educational process. In that way one acknowledges the ideas of others and helps to highlight what is distinctive of one's own contribution to a topic. It also enables instructors to be more effective teachers by providing an accurate sense of the student's grasp of course material.

Students are expected to use proper methods for citing sources; such methods can be found in style guides like the Chicago Manual of Style, or the most recent MLA Handbook. In general, an acceptable method of citation provides enough information to allow a reader to track down the original sources. You should consult your professor, if you have any questions about which method to use, or which kinds of collaboration or assistance to disclose.

Failure to acknowledge the ideas of others is a serious violation of intellectual integrity and community standards. It is the individual student's responsibility to be aware of university policies on academic integrity, including the policies on cheating and plagiarism. This is available online at: `http://www.cmu.edu/policies/documents/Academic%20Integrity.htm` and in the section on "University Policies" in the most recent edition of The Word: Undergraduate Student Handbook.

Students who cheat or plagiarize face serious sanctions at both the course level, and the university level. At the course level, faculty at Carnegie Mellon University have significant discretion to determine the sanctions that are appropriate to individual cases of cheating and plagiarism. Within the Philosophy Department, it is customary to give plagiarized assignments a failing grade and, where appropriate, to fail students for the course. Additionally, a letter is sent to the Dean of Students indicating that the student in question has submitted plagiarized material and received a course-level sanction. Plagiarism is also a violation of the community standards of Carnegie Mellon University. As such, allegations of plagiarism may be brought before a University Academic Review Board which will determine whether a violation of community standards has taken place and level additional sanctions if appropriate. Although this body also has signifcant discretion over the sanctions that it levels, plagiarism can result in academic probation, suspension, and even expulsion."[1]

To add to this, I am entirely comfortable with you using AI to help you complete your assignments this semester. If you choose to avail yourself of these tools, however, I have one request. Please clearly denote which sections of your assignments have been generated with AI. This is not only necessary and honest citation (and so failure to do so may be counted as plagiarism) but furthermore, knowing when and how you are using AI will help both myself and the TA give you more thorough and specific feedback.

This syllabus borrows from elements of Dr. Joel Smith's syllabus for "Scientific Revolutions" and Dr. Francesca Zaffora Blando's syllabus for "Nature of Reason".

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[1] https://www.cmu.edu/dietrich/philosophy/graduate/ta-handbook/academic-honesty.html