METHODS OF REASONING

Methods of Reasoning (200 level). .

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Course Overview

Arguably the most important philosophical skill is the ability to reason and formulate arguments. Sound arguments and good reasoning methods allow us to effectively search for the truth of any philosophical question. In this class, we will consider the reasoning methods used in everyday language, mathematics, and the sciences. We will consider how successful these methods are and how they are able to produce knowledge and understanding. We will discuss the difference between inductive and deductive reasoning, common argument forms, how rigor and intuition play a role in mathematical proof, the aim of the sciences, and common methods for prediction and experimentation in the sciences.

By the end of the course students will:

- have knowledge of what constitutes a good argument and will be able to identify good arguments.
- have knowledge of what reasoning methods play a role in gaining knowledge and understanding in mathematics and the sciences.
- be able to contribute to rigorous philosophical discussion and clearly present philosophical ideas in written form.

Texts. The course will not rely on a single text. The readings for the course will be a mixture of notes written by me and philosophy articles. All readings will be made available on Sakai.

Assignment

Paper/Project. For each section students will have to turn in a paper or project assignment. At the beginning of each section I will distribute a list of prompts for this paper or project assignment and students will choose a prompt and complete it by the end of the section. The goal of this assignment is for students to extend their thinking about the

course material past class discussion. Paper or project prompts will ask students to develop their own thoughts about the topics we discussed in the section.

Quizzes. There will be three quizzes throughout the course of the semester, one at the end of each section. The quizzes will be a mix of true/false, short answer, and essay questions. Study guides will be distributed a week prior to each quiz.

Final Paper. The final assignment for this course is a 5-8 page paper that engages with and develops new ideas about one of the topics covered during the semester. The final paper should demonstrate that the student has genuinely engaged with the course material and has developed their own thoughts about the topics covered. This assignment consists of three parts: a paper proposal for my approval, a first draft, and the final draft.

Grading. Overall grades for the course will be determined in the following way:

Papers/Homework: 30%
Quizzes: 30%
Final Project: 30%
Participation: 10%

The grading scale is as follows:

A	94+	**A-**	90-93	**B+**	87-89
B	83-86	**B-**	80-82	**C+**	77-79
C	73-76	**C-**	70-72	**D**	60-69
F	59-				

Attendance and Classroom Policies. Attendance is mandatory and will factor into the participation grade. A large portion of each class will be discussion and so to better the environment for discussion I ask that you do not bring any laptops or technology to class. Each student is expected to be an active participant in discussion.

Academic Integrity. Each student is expected to complete their own work for each of the assignments listed above. Any instances of plagiarism will be taken seriously and appropriate action will be taken in accordance with the academic honor code. More information about this honor code can be found at the following website: `https://honorcode.nd.edu/` If you have any questions or concerns about the honor code, you should talk to me.

Tentative Course Schedule

Week	**Topic**	**Reading**
Week 1	Introduction to the Course	
Logic and Language		
Week 2	Arguments	Notes
	And/Or	Notes
Week 3	Negation	Notes
	Conditionals	Notes
Week 4	Translating Logic into Language	Notes
	Logic in Language (Material v Indicative)	Edgington
Week 5	Logic in Language (Modal Notions)	Papineau, ch 5
	Paradoxes and Fallacies	Notes & TBD
Week 6	Section Quiz	
Mathematical Reasoning		
Week 6	Mathematical Proof	Dawson, ch 1&2
Week 7	Mathematical Proof	Brown, ch 10
	Rigor and Intuition	TBD
Week 8	Mathematical Progress	Thurston?
	Visualization	Giaquinto:"Visualizing in Mathematics"
Week 9	Diagrammatic Reasoning	Manders: "Diagram Based Geometric Practice"
	Infinity	TBD
Week 10	Mathematical Induction	Notes
	Section Quiz	
Scientific Reasoning		
Week 11	Mathematical Applications	Wigner?
	Experimentation:Method	Steinlie?
Week 12	Experimentation: Discovery	Waters: Exploratory Experimentation
	Probabilistic Methods	TBD
Week 13	Probabilistic Methods	TBD
	Modeling: Structure	TBD
Week 14	Modeling: Idealization	Potochnik
	The Aims of the Sciences	TBD
Week 15	Section Quiz	
Finals Week	Final Project Due	