Metalogic

Place: TBD **Time:** TBD

Instructor: Eric de Araujo **Office:** TBD

Email: dearaujo.3@osu.edu **Office Hours:** TBD

Texts & Materials

Required Textbooks:

- *An Introduction to Metalogic,* Aladdin M. Yaqub

Any additional materials will be made available on Carmen.

Course Description

This course is an introduction reasoning about logic. It relies on familiarity with first-order predicate logic, though we will spend some time reviewing it at the beginning. We then introduce the technical tools we will use to reason about logic. We will apply these tools to prove metatheoretical results like Soundness, Completeness, Compactness, the Löwenheim-Skolem Theorem, and Incompleteness of Arithmetic.

Course Goals & Objectives

By completing this course, students will be able to:

A. Reason about the syntactic and semantic features of a formal system by

1. distinguishing between syntactic and semantic properties of a formal system,
2. proving relationships between syntactic and semantic features, and
3. discussing relationships between syntax and semantics in natural language.

B. Use technical tools to prove metatheoretical results by

4. distinguishing between the object language and metalanguage,
5. reasoning about about sets and their cardinality, and
6. using mathematical induction in proofs.

C. Begin reasoning about logic by

3. discussing relationships between syntax and semantics in natural language.

7. discussing the philosophical import of metatheoretical results.

Schedule

Here is the schedule we hope to follow. The first table lists the topics and associated readings. You should read the material before the first day of discussion. Reading quizzes are due the day of the assigned reading. The second table lists when major assignments are due and when exams will occur. The schedule is subject to change as the course progresses.

Topic Structure

We will progress through each topic using the same structure. Each topic begins with the reading and an entry quiz, has a mid-point quiz, and ends with an exit quiz. These are explained in **Course Mechanics** below. Here is what that will look like for each topic:

Component	Due Date	Venue	Includes Discussion
Reading	First Day of Topic		No
Entry Quiz		Online	
Mid-Point Quiz	Third Day of Topic	Online	Yes
Exit Quiz	1 class after End of Topic	In-Class	Yes

Schedule of Topics

Chapter	Topic	Reading	Day Start	Day End	Goals
1	PL	1.1–1.4	2	5	A
2	Metatheory	2.1–2.4	6	9	B
3	Soundness and Completeness	3.1–3.6	10	17	B, C
4	Computability	4.1–4.4	19	22	B, C
5	Incompleteness Theorems	5.1–5.7	24	28	B, C

Schedule of Assignments and Exams

Day	Topic	Quiz
2	1. PL	Entry Quiz
4		Mid Quiz
6		Exit Quiz
6	2. Metatheory	Entry Quiz
7		Mid Quiz
10		Exit Quiz
10	3. Soundness & Completeness	Entry Quiz
12		Mid Quiz
19		Exit Quiz
18	**Exam 1 (Chapters 1–2)**	
19	4. Computability	Entry Quiz
20		Mid Quiz
24		Exit Quiz
23	**Exam 2 (Chapter 3)**	
24	5. Incompleteness Theorems	Entry Quiz
26		Mid Quiz
28		Exit Quiz
Exam Week	**Exam 3 (Chapter 4–5)**	

Grading

Quizzes	***45%***
Entry Quizzes	*10%*
Mid Quizzes	*15%*
Exit Quizzes	*20%*
Participation	***10%***

Exams	***45%***
Exam 1	*15%*
Exam 2	*15%*
Exam 3	*15%*

Course Mechanics

Here is how I plan to accomplish the goals of the course:

Quizzes

Each topic has an entry, mid, and exit quiz. These quizzes are designed to give you progressively more practice with the content we are covering in each topic. Here is an explanation of each type of quiz:

- Entry Quiz
  These quizzes are intended to test your comprehension of our reading and give you an indication of what you will be able to do by the end of each topic. These quizzes are mostly graded on completion and completed online:
  - Completion = $^2/_3$
  - Accuracy = $^1/_3$
- Mid Quiz
  These quizzes are intended to prepare you to perform well on the exit quiz. These quizzes are mostly graded on accuracy, completed online, and have an accompanying discussion forum:
  - Completion = $^1/_3$
  - Accuracy = $^2/_3$
- Exit Quiz
  By the end of each topic, you should be able to perform well on the exit quiz. These quizzes are representative of what you will be tested on in the exams. They are done on paper and turned in class. They have an accompanying discussion forum.

Discussions

We will have two forums to discuss what we are learning: during class and online.

Classes will be used to review what we are learning, clarify misconceptions, ask questions, model skills, and practice. Coming to class having tried the entry and mid quizzes will position you to take advantage of class discussions. You will know what to ask questions about and how to get help from myself and your peers.

We will have online discussion forums where you will talk about the mid and exit quizzes with your classmates. I will assign you a group to discuss each topic with. Individual group members will be assigned questions from the quiz to discuss in the forum. You are expected to state your answer and how you arrived at it. Then you will reply to your group members with a discussion of their answers. You are allowed to utilize the answers and rationales your group comes up with as long as you are contributing to the discussion yourself.

Exams

There will be three exams throughout the course. Exam 1 will cover chapters 1–2. Exam 2 will cover chapter 3. Exam 3 will cover chapters 4–5.

Th e exit quizzes will be a good guide for what to expect on the exams. I will also provide you with a study guide that states what concepts and skills you should know for each exam.

Office Hours

Office hours tend to be an underutilized resource (unless something is due soon). You are welcome to come and chat about anything related to the course or even philosophy in general. Office hours can be a good way to clear up misconceptions and better understand how you are doing in the course. I will make an effort to find a time to meet if you cannot make it to the scheduled times.

Policies

[I aim to keep policies consistent across courses. See the syllabi for previously taught courses for a list of my policies.]