Philosophy 240: Symbolic Logic Hamilton College
Fall 2015 Russell Marcus
Mondays, Wednesdays, Fridays: 10am–10:50am rmarcus1@hamilton.edu

Syllabus

Course Description and Overview

Philosophy has one technical tool: logic. Logic is the study of inferences. Formal logic, the subject of this course, is the study of inferences in artificial languages designed to maximize precision. Philosophy 240 is a standard introduction to elementary formal logic, covering propositional logic and predicate logic, including identity theory, functions, and second-order quantification. The central goal of this course is to provide you with technical methods for deciding what follows from what.

The two main techniques we will study are translation and derivation. We will establish a formal definition of valid inference using logical operators and truth functions. We will translate sentences of English into the formal languages of propositional and predicate logic and back. We will use a proof system to infer new claims from given ones, following prescribed rules of inference and proof strategies.

Thirty of the forty-two class meetings will be devoted to learning logical techniques. There will be seven Philosophy Fridays during which we will examine some philosophical questions about logic. Some of these questions concern the status of logic and its relation to the rest of our knowledge. Some of these questions concern how best to construct logical systems. The remaining five classes, and the final exam period, will be used for tests. You will be asked to write one essay on philosophical issues concerning logic.

Texts

The current draft of my logic book in progress, *What Follows*, is the main text for the course. Both the text and the solutions manual will be available in a Dropbox folder which I will share.

Other readings will also be available on the course website. These will be especially important for your essay assignment.

On-Line Resources

The website for this course is:

http://www.thatmarcusfamily.org/philosophy/Course_Websites/Logic_F15/Course_Home.html

The course website includes an html syllabus and schedule, class notes, course bibliography, other readings and handouts, and links to websites specifically selected for this course. Limited material, other than your grades, will be available on the Blackboard course pages. The Blackboard page will contain a link to the course website.

Accessibility

We learn in different ways and the organization of any course will accommodate each student differently. Some people process information best by speaking and listening, others by reading. Some folks learn best in groups; others focus best in solitude. Your success in this class is important to me, so please talk to me as soon as you can about your individual learning needs and how this course can best accommodate them. If there are circumstances that adversely affect your performance in this class, please let me know as soon as possible so that we can work together to develop strategies for adapting assignments to meet your needs and the course requirements. Hamilton College and I will make reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation and would

like to make a request for this course, please discuss it with me during the first two weeks of class and provide Allen Harrison, Associate Dean of Students (Elihu Root House; 315-859-4021) with appropriate documentation.

Office Hours

My office hours for the Fall 2015, term are 11am–noon, Monday through Friday. My office is 202 College Hill Road, Room 210.

Assignments and Grading

Your responsibilities this course include the following, with their contributions to your grade calculation in parentheses:

Attendance
Homework (8%)
Six Tests (72%, 12% each)
One four-to-six page paper (20%)

Attendance

Classes are for your edification. It will be useful for you to attend class. There is no direct penalty for missing class. Some students pick up on the technical material quickly. If you do miss a class, you should arrange to drop off your homework, if you have homework due.

Homework

Homework assignments and their due dates are listed on the schedule below. Most homework assignments are problem sets from Chapters 1–3. Other homework assignments are readings from Chapters 4 and 5, mainly in preparation for Philosophy Fridays.

All students will be expected to hand in the **first six problem sets**, those which are due before the first exam, and the **final five problem sets**, those which are due after the fifth exam. Between Test #1 and Test #5, if you receive less than an 85% on any exam, you must hand in all problem sets which are due before the next exam. If you receive an 85% or higher on the most recent exam, you may hand in your homework but it is not required. Submitted homework assignments must be neat and presentable. There should be no ripped or crumpled pages and problems should be clearly delimited. Questions need not be written out fully, but solutions must be.

Sample solutions to all homework problems are in the solutions manual, available in our shared Dropbox folder. Complete your homework and check your solutions against the sample solutions before the beginning of class. Acceptable solutions to most problems vary. Come to class prepared to ask questions which remain unanswered after looking at the solutions manual. We will begin most classes with time to review a few homework exercises. Mark any changes you make to your original solutions in a different-colored writing utensil. Feel free to write questions or comments on the homework you submit.

Homework will be checked by me or our course assistant, Spencer Livingstone. In checking the homework, we are looking for questions you have raised or recurring problems. We will not be grading your homework, but monitoring your progress and looking for ways to help you.

The homework assignments on the schedule are minimal. If, upon completing the assignment, you are still struggling with the material, do more problems.

Tests

All six tests are mandatory. Dates for the tests are given on the schedule below. No make-ups will be allowed for missed tests. If you are unable to take a test, you must request an arrangement from me in advance. The final exam will be of the same type as each of the first five tests. Be prepared: the work gets progressively harder and very difficult in the end.

You will have an opportunity, at the time of the final, to take a compensatory version of up to two of the first five tests. I will average the grade on the compensatory exam with your original grade. If you miss a test during the term without a proper arrangement with me, the compensatory exam will be averaged with a 0. Practice problems for each test will be available on the course website.

Paper

Each student will write a short paper on a topic in logic, philosophy of logic, or the application of logic to philosophy or other areas of study. Philosophy Fridays will be devoted to such topics. Readings come from Chapters 4 and 5 of *What Follows*. I expect you to do further research for your papers; suggestions are included in the text. Papers may be mainly expository, especially those covering technical topics. The best papers will philosophical, and will defend a thesis. I will suggest topics and readings through the term. **Paper proposals are due on Monday, November 16**. Proposals should be two-three paragraphs, describing your topic and citing, properly, sources. Failure to submit a satisfactory proposal on time will result in a deduction of your paper grade. **Papers are due on December 4**, though they may be submitted at any time during the course. More details about the papers will be distributed in class.

On Grades

Grades on assignments will be posted on Blackboard, along with a running total, which I call your grade calculation. Your grade calculation is a guide for me to use in assigning you a final grade. There are no rules binding how I translate your grade calculation, which will appear in Blackboard as a percentage, into a letter grade. In particular, the Hamilton College key for translating your letter grades into percentages, used for graduate school admissions, is not a tool for calculating your final grade. I welcome further discussion of the purposes and methods of grading, as well as my own grading policies.

The Hamilton College Honor Code will be strictly enforced.

Schedule

Class	Date	Topic Name	Homework to Prepare for Class
1	Friday August 28	Arguments Validity and Soundness	Read §5.1: Deduction and Induction
2	Monday August 31	Translation using Propositional Logic; Wffs	Problem Set #1
3	Wednesday September 2	Truth Functions	Problem Set #2
4	Friday September 4	**Philosophy Friday #1**: Conditionals	Read §4.3: Conditionals
5	Monday September 7	Truth Tables for Propositions	Problem Set #3 Read §4.1: Laws of Logic
6	Wednesday September 9	Truth Tables for Arguments	Problem Set # 4 Read §4.2: Notes on Translation with **PL**

Class	Date	Topic Name	Homework to Prepare for Class
7	Friday September 11	**Philosophy Friday #2**: Religion and Argumentation	Read §5.5: Logic and the Philosophy of Religion
8	Monday September 14	Invalidity and Inconsistency: Indirect Truth Tables	Problem Set #5
9	Wednesday September 16	Rules of Inference I	Problem Set #6
10	Friday September 18	**Test #1**: Chapter 1	Prepare for Test #1
11	Monday September 21	Rules of Inference II	Problem Set #7
12	Wednesday September 23	Rules of Equivalence I	Problem Set #8
13	Friday September 25	**Philosophy Friday #3**: Modal Logic	Read §4.8: Modal Logics
14	Monday September 28	Rules of Equivalence II	Problem Set #9
15	Wednesday September 30	The Biconditional Practice with Proofs	Problem Set #10
16	Friday October 2	**Test #2**: Derivations	Prepare for Test #2
17	Monday October 5	Conditional Proof Logical Truths	Problem Set #11 Read §4.6: Logical Truth, Analyticity, and Modality
18	Wednesday October 7	Indirect Proof	Problem Set #12
19	Friday October 9	**Philosophy Friday #4**: Logic and Science	Read §5.4: Logic and Science
20	Monday October 12	More on Proofs	Problem Set #13 Read §4.7: Metalogic
21	Wednesday October 14	**Test #3**: Conditional and Indirect Methods of Proof	Prepare for Test #3
	October 16	**Fall**	**Break**
22	Monday October 19	Predicate Logic, Translation I	
23	Wednesday October 21	Predicate Logic, Translation II	Problem Set #14
24	Friday October 23	**Philosophy Friday #5**: Infinity	Read §5.6: Infinity
25	Monday October 26	Derivations in Predicate Logic	Problem Set #15

Class	Date	Topic Name	Homework to Prepare for Class
26	Wednesday October 28	Quantifier Exchange	Problem Set #16
27	Friday October 30	**Philosophy Friday #6**: Truth	Read §5.9: Truth and Liars Problem Set #17
28	Monday November 2	Conditional and Indirect Proof in Predicate Logic	Problem Set #18
29	Wednesday November 4	Semantics for Predicate Logic	Problem Set #19 Read §4.9: Notes on Translation with **M**
30	Friday November 6	**Test #4**: Translation and Inference in **M**	Prepare for Test #4
31	Monday November 9	Invalidity in Predicate Logic	Problem Set #20
32	Wednesday November 11	Translation Using Relational Predicates	Problem Set #21
33	Friday November 13	**Philosophy Friday #7**: Quantification and Ontological Commitment	Read §5.8: Quantification and Ontological Commitment
34	Monday November 16	Semantics for **F** Derivations Using Relational Predicates **Paper Proposal is due.**	Problem Set #22 Paper Proposal
35	Wednesday November 18	More Derivations with **F**	Problem Set #23
36	Friday November 20	**Test #5**: Validity and Invalidity in **F**	Prepare for Test #5
		Thanksgiving	**Break**
37	Monday November 30	Translation Using Identity I	
38	Wednesday December 2	Translation Using Identity II	Problem Set #24 Read §5.10: Names and Definite Descriptions
39	Friday December 4	Derivations Using Identity **Papers are due**.	Problem Set #25 Finish Paper
40	Monday December 7	Functions	Problem Set #26
41	Wednesday December 9	Second-Order Logic	Problem Set #27 Read §5.12: Second-Order Logic and Set Theory
42	Friday December 11	Catch-Up	Problem Set #28
	Monday December 14 7pm–10pm	**Test #6 (Final)**: Relations, Identity Theory, Functions, and Second-Order Logic Plus, Compensatory Material	Prepare for Test #6

Problem Sets

In addition to these problem sets, there are assigned readings for many classes, listed on the schedule above.

Set Number	Due	Exercises
1	M 8/31	§1.1: 1, 3, 22, 27, 33, 35, 39 §1.2: 1–3, 12–15, 36–38, 41–43
2	W 9/2	§1.3a: 11–20 §1.3b: 1–5 §1.3c: 11–15 §1.4: 1–5, 11–13, 24–26
3	M 9/7	§1.3b: 61–65 §1.5a: 1–4, 9–11, 17, 18 §1.5b: 1, 2, 4, 5, 23–25, 31, 32 §1.5c: 4, 5, 15, 16
4	W 9/9	§1.6a: 8, 13, 22, 35, 41, 48 §1.7a: 6, 12, 25, 43 §1.7b: 3, 6, 26, 30, 33
5	M 9/14	§1.8: 3, 4, 6, 22, 28,
6	W 9/16	§1.9a: 3–5, 12–15, 20–23 §1.9b: 1, 3, 5, 17–19
7	M 9/21	§2.1a: 4–6, 21–23, 32–34, 47 §2.1b: 4, 8, 11, 15
8	W 9/23	§2.2a: 1–20 §2.2b: 3–5, 27–29, 39–40, 48 §2.2c: 9, 10, 16
9	M 9/28	§2.3a: 1–4, 7, 10–12, 16, 19, 24, 25 §2.3b: 4, 7, 14, 15
10	W 9/30	§2.4a: 1–30 §2.4b: 1–3, 7–9, 24, 33–35 §2.4c: 4, 10, 13
11	M 10/5	§2.5a: 1–5, 30–33 §2.6a: 3, 6, 8 §2.6b: 5–7, 10 §2.6c: 8, 9, 15, 20
12	W 10/7	§2.7a: 1–4, 14, 15, 17, 19 §2.7b: 4–7 §2.8a: 1, 4, 8, 10 §2.8b: 2, 6, 7
13	M 10/12	§2.9a: 1–3, 5, 7, 16, 17 §2.9b: 4, 6–10 §2.9c: 1, 4–6
14	W 10/21	§3.1a: 5, 6, 9, 10 §3.1b: 2–4, 12, 13, 16–19 §3.1c: 1–5, 8–10
15	F 10/23	§3.1c: 17–20, 26–30, 48, 51, 52, 67–70 §3.1d: 1–7 §3.2: 2, 9, 12
16	W 10/28	§3.3a 3, 4, 6, 8, 13, 18, 19, 23, 24, 31
17	F 10/30	§3.3a 9, 16, 17, 22, 25
18	M 11/2	§3.4: 1, 2, 4, 8, 10, 13, 17, 22, 24
19	W 11/4	§3.3a 38, 39, 42 §3.4: 9, 16, 18 §3.5: 1, 3, 5, 8, 11, 14, 19, 20, 22
20	M 11/9	§3.6a: 1, 2, 3
21	W 11/11	§3.7: 2–4, 8, 12, 15, 19, 20, 21, 33
22	M 11/16	§3.8b: 1–15, 21–23, 32–37 §3.8c: 5–9, 15–18, 21, 23, 24, 27–31 §3.8d: 1–12
23	W 11/18	§3.10a: 3, 5, 8, 9, 11, 13, 20, 24 §3.10b: 3, 7, 10 §3.10c: 3, 5, 6
24	W 12/2	§3.11: 8–13, 22–26, 34–38
25	F 12/4	§3.11: 4, 7, 14, 15, 27–31, 39–41, 43–45, 47
26	M 12/7	§3.12a: 3, 4, 8, 10, 11, 15, 19 §3.12b: 2, 6, 8, 10
27	W 12/9	§3.13a: 9–16 §3.13b: 2, 4, 5, 7, 8, 9
28	F 12/11	§3.14: 1–10, 12–14, 16, 18