Philosophy 240: Symbolic Logic Hamilton College
Fall 2014 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 on the course website.

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_F14/Course_Home.html

The course website includes an html syllabus and schedule, homework solutions, 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.

Office Hours

My office hours for the Fall 2014, term are 11am - noon, Monday through Friday. My office is 202 College Hill Road, Room 210.

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. You will need to provide Allen Harrison, Associate Dean of Students (Elihu Root House; 315-859-4021) with appropriate documentation.

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 eight 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 may not need to be written out fully, but solutions must be.

Sample solutions to all homework problems are in the solutions manual, available on line. Acceptable solutions to most problems vary. You are expected to have completed the homework and looked at the sample solutions before the beginning of class. We will begin most classes with time to review a few homework questions. Mark any changes you make to your original solutions in a different-colored writing utensil so I can see where you may need help. Come to class prepared to ask questions which remain unanswered.

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 the final exam will be longer than the rest and cover the most difficult material in the course.

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. **Papers are due on December 5**, though they may be submitted at any time during the course. More details about the papers will be distributed in class.

The Hamilton College Honor Code will be strictly enforced.

Schedule:

Class	Date	Topic Name	Homework to Prepare for Class
1	Friday August 29	Arguments Validity and Soundness	
2	Monday September 1	Translation using Propositional Logic; Wffs	Problem Set #1
3	Wednesday September 3	Truth Functions	Problem Set #2
4	Friday September 5	**Philosophy Friday #1**: Conditionals	Read §4.3: Conditionals
5	Monday September 8	Truth Tables for Propositions	Problem Set #3 Read §4.2: Disjunction, Unless, and the Sixteen Truth Tables
6	Wednesday September 10	Truth Tables for Arguments	Problem Set # 4
7	Friday September 12	**Philosophy Friday #2**: Adequate Sets of Connectives	Read §4.4: Adequacy
8	Monday September 15	Invalidity and Inconsistency: Indirect Truth Tables	Problem Set #5
9	Wednesday September 17	Rules of Inference I	Problem Set #6
10	Friday September 19	**Test #1**: Chapter 1	Prepare for Test #1
11	Monday September 22	Rules of Inference II	Problem Set #7
12	Wednesday September 24	Rules of Equivalence I	Problem Set #8
13	Friday September 26	**Philosophy Friday #3**: Logic and the Philosophy of Religion	Read §5.5: The Ontological Argument and the Problem of Evil
14	Monday September 29	Rules of Equivalence II	Problem Set #9
15	Wednesday October 1	The Biconditional; Practice with Proofs	Problem Set #10
16	Friday October 3	**Test #2**: Derivations	Prepare for Test #2
17	Monday October 6	Conditional Proof Logical Truths	Problem Set #11 Read §4.1: The Laws of Logic and Their Bearers
18	Wednesday October 8	Indirect Proof	Problem Set #12

Class	Date	Topic Name	Homework to Prepare for Class
19	Friday October 10	**Philosophy Friday #4**: Logic and Science	Read §5.4: Scientific Explanation and Confirmation
20	Monday October 13	More on Proofs	Problem Set #13
21	Wednesday October 15	**Test #3**: Conditional and Indirect Methods	Prepare for Test #3
	October 17	**Fall Break**	
22	Monday October 20	Predicate Logic, Translation I	
23	Wednesday October 22	Predicate Logic, Translation II	Problem Set #14
24	Friday October 24	Derivations in Predicate Logic	Problem Set #15
25	Monday October 27	**Test #4**: Predicate Logic Translation	Prepare for Test #4
26	Wednesday October 29	Quantifier Exchange	Problem Set #16
27	Friday October 31	**Philosophy Friday #5**: Modal Logic	Read §4.8: Modal Logics Problem Set #17
28	Monday November 3	Conditional and Indirect Proof in Predicate Logic	Problem Set #18
29	Wednesday November 5	Semantics for Predicate Logic	Problem Set #19
30	Friday November 7	**Philosophy Friday #6**: Quantification and Ontological Commitment	Read §5.8: Quantification and Ontological Commitment
31	Monday November 10	Invalidity in Predicate Logic	Problem Set #20
32	Wednesday November 12	Translation Using Relational Predicates	Problem Set #21
33	Friday November 14	**Test #5**: Predicate Logic Derivations and Invalidity	Prepare for Test #5
34	Monday November 17	Rules of Passage	Problem Set #22
35	Wednesday November 19	Derivations Using Relational Predicates	Problem Set #23
36	Friday November 21	**Philosophy Friday #7**: Color Incompatibility	Read §5.11: Color Incompatibility
	Thanksgiving	**Break**	

Class	Date	Topic Name	Homework to Prepare for Class
37	Monday December 1	Translation Using Identity I	Problem Set #24
38	Wednesday December 3	Translation Using Identity II	Problem Set #25 Read §5.10: Names and Definite Descriptions
39	Friday December 5	Derivations Using Identity **Papers are due**.	Problem Set #26 Finish Paper
40	Monday December 8	Functions	Problem Set #27
41	Wednesday December 10	Second-Order Logic	Problem Set #28 Read §5.12: Second-Order Logic and Set Theory
42	Friday December 12	Catch-Up	Problem Set #29
	Thursday December 18 9am - noon	**Test #6 (Final)**: Relations, Identity Theory, Functions, and Second-Order Logic Plus, Compensatory Material	Prepare for Test #6

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.

Problem Sets

1	§1.1: 1, 3, 22, 27, 33, 35, 39 §1.2: 1-3, 12-15, 36-38, 41-43
2	§1.3a: 11-20 §1.3b: 6-10 §1.3c: 6-10 §1.4: 1-5, 11-13, 24-26
3	§1.3c: 26-30 §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	§1.6a: 3, 8, 13, 22, 35, 41, 46, 48 §1.6b: 6, 12, 25, 43 §1.6c: 3, 6, 26, 30, 33
5	§1.7: 3, 4, 6, 22, 28,
6	§1.8a: 3-5, 12-15, 20-23 §1.8b: 1, 3, 5, 17-19
7	§2.1a: 1-3, 6-8, 16-18, 24 §2.1b: 4, 5, 8, 10
8	§2.2a: 1-12 §2.2b: 1-3, 10-15, 22, 24 §2.2c: 5, 7, 8
9	§2.3a: 1-4, 7, 10-12, 16, 19, 24, 25 §2.3b: 4, 7, 8, 10
10	§2.4a: 2, 4-8, 12-14, 20, 25, 26 §2.4b: 2, 3, 8
11	§2.5a: 1-5 §2.5b: 5-7, 10
12	§2.6a: 1-4, 14, 15, 17, 19 §2.6b: 4-7 §2.7a: 1, 4, 8, 10 §2.7b: 2, 6, 7
13	§2.8a: 1-3, 5, 7, 16, 17 §2.8b: 4, 6-10 §2.8c: 1, 4-6
14	§3.1a: 5, 6, 9, 10 §3.1b: 2-4, 12, 13, 16-19 §3.1c: 1-5, 8-10
15	§3.1c: 17-20, 26-30, 39-43, 48, 51, 52 §3.1d: 1-7 §3.2: 2, 9, 12
16	§3.3: 3, 4, 6, 8, 13, 18, 19, 23, 24, 31
17	§3.3: 9, 16, 17, 22, 25
18	§3.4: 1, 2, 4, 8, 10, 13, 17, 22, 24
19	§3.5: 1, 3, 5, 8, 11, 14, 19, 20, 22
20	§3.3: 38, 39, 42 §3.4: 9, 16, 18 §3.5: 10, 15 §3.6: 1, 2
21	§3.7: 2-4, 8, 12, 15, 19, 20, 21, 33
22	§3.8b: 1-15, 21-23, 32-37 §3.8d: 1-12
23	§3.8c: 5-9, 15-18, 21, 27-31 §3.9a: 1-6 §3.9b: 4-9
24	§3.10a: 3, 5, 8, 9, 11, 13, 20, 24 §3.10b: 3, 7, 10 §3.10c: 3, 5, 6
25	§3.11: 8-13, 22-26, 34-38
26	§3.11: 4, 7, 14, 15, 27-31, 39-41, 43-45, 47
27	§3.12a: 3, 4, 8, 10, 11, 15, 19 §3.12b: 2, 6, 8, 10
28	§3.13a: 1-8 §3.13b: 2, 4, 5, 7, 8, 9
29	§3.14: 1-10, 12-14, 16, 18