

## **Philosophy 230**

### **Introduction to Formal Logic**

#### **CONTACT INFORMATION:**

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#### **COURSE DESCRIPTION:**

This course satisfies the “Critical Reasoning” (A-2) section of the General Education Program, which recognizes critical reasoning as a fundamental competence. Courses in this section of General Education take reasoning itself as their focus. Their goals are to provide students with criteria and methods for distinguishing good reasoning from bad and to help students develop basic reasoning skills that they can apply both within a broad range of academic disciplines and outside the academic environment. Students are expected to acquire skill in recognizing the logical structure of statements and arguments, the ability to distinguish rational from non-rational means of persuasion, skill in applying the principles of sound reasoning in the construction and evaluation of arguments, and an appreciation of the value of critical reasoning skills in the pursuit of knowledge.

To satisfy this requirement we will cover a natural deduction system of elementary symbolic logic (first-order logic), including both sentential logic and predicate logic. Equal attention will be given to translations and proofs. We will also discuss philosophical aspects of symbolic logic when appropriate.

#### **REQUIRED TEXT:**

*Logic and Philosophy: A Modern Introduction*, Alan Hausman, Howard Kahane and Paul Tidman, 11th edition.

#### **GOALS:**

Students will analyze information and ideas carefully and logically from multiple perspectives and develop reasoned solutions to problems.

**STUDENT LEARNING OUTCOMES:**

1. Explain and apply the basic concepts essential to critical examination and evaluation of argumentative discourse;
2. Use investigative and analytical thinking skills to examine alternative, explore complex questions and solve challenging problems;
3. Synthesize information in order to arrive at reasoned conclusions;
4. Evaluate the logic and validity of arguments, and the relevance of data and information;
5. Recognize and avoid common logical and rhetorical fallacies.

**COURSE OBJECTIVES:**

1. Students will recognize and produce definitions of basic concepts essential to a critical examination and evaluation of argumentative discourse, e.g., *argument*, *premise*, *conclusion*, *deductive validity*, *deductive soundness*, *truth-functional validity*, *quantificational validity*.
2. Students will recognize and make competent use of important logical operations such as *negation*, *conjunction*, *disjunction*, *conditional*, and *quantification*.
3. Students will translate English sentences into two basic languages used in formal logic, viz., the language of truth-functional logic, and the language of quantificational logic.
4. Students will apply standard techniques of truth table and natural deduction for truth-functional logic, involving important inference rules (e.g., *modus ponens*, *modus tollens*, *reductio ad absurdum*, *disjunctive syllogism*) to determine important truth-functional logical properties and relations: e.g., *truth-functional validity*, *truth-functional consistency*, *truth-functional equivalence*.
5. Students will apply standard techniques of natural deduction for quantificational logic, involving important inference rules (e.g., *universal instantiation*, *existential elimination*) to determine important quantificational logical properties and relations: e.g., *quantificational validity*, *quantificational consistency*, *quantificational equivalence*.
6. Students will construct examples to show important truth-functional logical properties and relations or their absence: examples to show *truth-functional consistency* and counterexamples to show failures of *truth-functional validity* and *truth-functional equivalence*
7. Students will construct examples to show important quantificational logical properties and relations or their absence: examples to show *quantification consistency*, and counterexamples to show failures of *quantificational validity* and *quantificational equivalence*

8. Students will recognize and avoid common logical fallacies: *affirming the consequent*, *denying the antecedent*, *confusing 'only if' with 'if and only if'*, and *confusing 'some' with 'some but not all.'*

The Student Learning Outcomes (SLOs) are achieved through the Course Objectives (COs). Each SLO is targeted by one or more COs, and each CO targets one or more SLOs. The course activities are designed to meet specific COs, and the student performance during these activities is monitored and assessed. The activities include lectures, tests, quizzes, and examinations. Additional activities such as recitations, critiques, and other comparable occurrences may be included. They are effective means of meeting the COs, hence achieving the SLOs through the COs.

The SLOs are targeted by the corresponding COs as follows:

|     |         |         |             |         |         |
|-----|---------|---------|-------------|---------|---------|
|     | SLO 1   | SLO 2   | SLO 3       | SLO 4   | SLO 5   |
| COs | (1)-(5) | (3)-(7) | (2),(4)-(7) | (2)-(7) | (2)-(8) |

### **COURSE REQUIREMENTS:**

1. Two Exams—60% of final grade. The first exam will be roughly at the 8<sup>th</sup> week of term, and the second exam will be on the last day of class, 8 December.
2. Quizzes—20% of final grade. There are approximately 4 - 6 quizzes. You are allowed to drop the lowest quiz grade. The remainder will be averaged. Quizzes provide continuous feedback on the course material and prepare you for the exams.
3. Participation/Attendance/Punctuality--10% of final grade. Attendance and punctuality will be noted at each class session. Participation will be judged on the basis of your willingness to take an active role in the class, e.g., response to exercises and discussion of lecture material.
4. Homework—10% of final grade. Exercises will be assigned for almost every class session. When taken up, they will be graded for completion rather than accuracy.

### **GRADING STANDARDS:**

|                     |    |         |         |         |         |         |         |         |         |         |         |    |
|---------------------|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----|
| <b>Final %</b>      | 92 | 90-91.9 | 88-89.9 | 82-87.9 | 80-81.9 | 78-79.9 | 72-77.9 | 70-71.9 | 68-69.9 | 62-67.9 | 60-61.9 | 59 |
| <b>Letter Grade</b> | A  | A-      | B+      | B       | B-      | C+      | C       | C-      | D+      | D       | D-      | F  |

### **STUDENTS WITH DISABILITIES:**

If you have a disability, please identify yourself to me and to the University so that we can

reasonably accommodate your learning and the preparation and evaluation of the work that you must do for this course. Please contact the Center on Disabilities, Student Services Building, Room 110, 818.677.2684 (fax: 818.677.4932; email: [sdr@csun.edu](mailto:sdr@csun.edu)). For more information, visit the COD's website at the following address: <http://www.csun.edu/cod>.

### **CLASS FORMAT:**

Lectures and Homework Exercises. Initially lectures will be given to introduce new material or difficult concepts. The majority of this course will be devoted to detailed examination of homework exercises. Learning symbolic logic is like learning mathematics or a foreign language because it requires daily practice. Students who let the assignments accumulate usually do not do well on exams.

### **CLASS ETIQUETTE AND POLICIES:**

There are no shortcuts to learning logic. The subject demands that students learn in the old-fashioned manner of time-consuming and disciplined study. This means you must spend time reading the text, doing all the exercises, devote your attention to lectures and involve yourself in critical discussion of the material covered.

Violations to the course policies, especially when they result in a disruption to the class, will result in penalties to the student's participation grade.

1. Attendance is necessary but not sufficient to do well in this course. If you do miss any class session, find out before coming to class what you missed and make sure you are prepared for the next class session. Excessive absence will significantly lower your grade and normally results in failure.
2. If attendance alone is not sufficient, another necessary requirement for doing well in the course is *preparation* for each class. As a general rule of thumb, you should spend *at least* two hours outside of class preparing for each hour spent in class, but more will be required of a course of this nature.
3. Punctuality for class is a requirement, not an option. Class starts on time and you are expected to be seated and ready for class. Students who arrive late will be penalized for each violation. Each late arrival will be noted and points will be deducted from the participation/attendance/punctuality grade.
4. Leaving class without prior permission from the instructor will not be permitted, especially after quizzes given at the beginning of the class period. If you have a legitimate reason for leaving class early, ask your instructor for permission before class begins.
5. Eating in class is not permitted.

6. There are no make-up exams for unexcused absences. If an absence is excused, prior notification is required. Do not assume that a make-up exam will be given if you miss class. Make-ups are rare and given only under extreme circumstances. Documentation such as a doctor's note or police report will be required. Moreover do not schedule anything that conflicts with the final exam. You are required to sit the exams during the scheduled time.
7. Cell phones, pagers and any other electronic devices should be turned **off** prior to class sessions. This includes text messaging. "Off" means "off," not vibrate.
8. There will be no extra credit assignments in lieu of failing exams. There will, however, be bonus questions on exams to allow for extra points above 100%.
9. The last day to withdraw from the course is *Friday, September 16*. After that date, withdrawals are not permitted.
10. The instructor is committed to upholding the university's policy regarding academic dishonesty. See the university catalogue, Appendix C, Academic Dishonesty.

#### **TENTATIVE SCHEDULE OF TOPICS:**

##### **Part One: Sentential Logic**

1. Basic Concepts, Truth Functions, Translations  
Chapters, 1 and 2.
2. Truth Tables (Statements, Pairs of Statements and Arguments)  
Chapter 3
3. Formal Proofs of Validity in Propositional Logic  
Chapter 4

##### **EXAM 1 – tentatively 20 October, 2011**

4. Conditional and Indirect Proofs  
Chapter 5

##### **Part Two: Predicate Logic**

5. Predicate Logic-Translations  
Chapter 7, 8
6. Proofs in Predicate Logic  
Chapter 9

**EXAM II – 8 December 2011**