

# Formal Logic I

## Fall 2009

Instructor: Tom Trelogan  
*tom.trelogan@unco.edu*

Office: McKee 323

Office Hours: MWF 12:20–1:10 p.m.\*

Messages: 351-1561

### Course Objectives

The aim of this course and its sequel is to provide a thorough introduction to the basic principles and methods of formal logic. During the first semester, you'll become familiar with (1) the nature of arguments and the basic principles of argument evaluation (which might well be review for some of you), (2) the nature of calculi (or formal systems or logistic systems, as these are also sometimes called), (3) the rationale for the use of formalized artificial languages in the study of deductive logic, (4) the general method of constructing a logistic system (standardly referred to as the logistic method), (5) a propositional calculus, and (6) a formalized language of the sort standardly used for the study of first order logic by means of the logistic method. During the second semester you'll learn how the formalized language introduced toward the end of the first semester can be made into a full-blown logical calculus—a predicate calculus—by means of the addition of a system of inference rules for first order logic, and how a metatheory can then be developed for the logical calculus that results. A study of systems of first-order logic with identity and terms and their use in constructing formalized theories will round out the second semester.

While formal logic used to be required of philosophy majors at UNC, it no longer is, and the requirement can be waived for anyone still under an edition of the *Catalog* in which it is required.

### Texts

The main text for this semester and next—Mates's *Elementary Logic*—is available at The Book Stop and, perhaps, at the Barnes and Noble in the UC as well. *Basic Symbolic Skills* is available as a .pdf file on Blackboard and at <http://www.unco.edu/philosophy/current/240-007.html>.

Mates, Benson. *Elementary Logic*. 2<sup>nd</sup> ed. New York: Oxford UP, 1972. ISBN: 019501491X.  
Trelogan, Thomas K. *Basic Symbolic Skills*. 2<sup>nd</sup> ed. Greeley, CO, 1994.

### Assignments and Grades

There will be regular homework assignments, a variety of quizzes, two midterm examinations (on Oct. 2 and Oct. 30), and a comprehensive final examination (on Tuesday, Dec. 8, from 1:30 to 4:00 p.m.).

Your grade for the course will be determined by your performance on the homework, on the quizzes, and on the three examinations. Your performance on the homework will be worth 30% of your final grade, your performance on the quizzes will be worth 10%, and your performance on each of the examinations will be worth 20% of your final grade. I do not curve grades. Extra credit options, however, will be available, and I reserve the right under certain circumstances to assign grades higher than the ones earned by way of semester averages—to students, for example, who have shown marked improvement during the course of the semester. (See p. 4 below for more information about the grading scale used in this course.)

---

\*And, of course, by appointment.

To receive credit for the course, you must complete all work assigned (except for quizzes; you'll not be allowed to make up missed quizzes, which will be recorded as zeros—the moral: make sure you don't miss the quizzes). The penalty for late submission of homework will be a recorded grade of zero for each late assignment—which you will still have to complete in any case in order to receive credit for the course. Extensions will be given on homework assignments only in the most extraordinary of circumstances.

### What It'll Take to Pass This Course

What it will take to pass this course is good old hard work. You'll have to memorize and learn to apply a great many definitions and rules—not just get the gist or general drift of them, but grasp them with great precision—and, in addition, you'll have to master a sizable number of techniques for the production of calculations in the calculi we'll be studying this semester. If you're diligent about doing both these things throughout the term, the reward will be the joy of being able to work in the calculi we study and of being able to really understand all our discussions of them. If you fail to do them, the punishment will be the pain of ineffectuality and incomprehension. So complete all the reading assignments on time, making sure you cover the material really thoroughly and commit to memory as soon as you encounter them all the rules and definitions the assignments contain, and do the homework carefully and without fail: it'll give you the practice you'll need to master both the techniques of calculation you'll be learning and the application of all those definitions and rules. If you do both these things assiduously, you're almost sure to do just fine in this course. But you are going to find that the work required to do all this is both hard and time-consuming. The fact is that formal logic stands to philosophy roughly as organic chemistry stands to chemistry: it's a challenge. Arrange your life accordingly.

### Availability of Help

This is a course in which you can't afford to fall behind. I'm more than willing to help you master all the things you'll need to learn, so as soon as you think you need any help, let me know. Come see me during my office hours or post questions to the class's discussion forum *via* our Web site at <http://www.unco.edu/philosophy/current/240-007.html>.

### WFF 'N PROOF: The Game of Modern Logic

The most complicated calculus you'll work with extensively this semester is a propositional (or sentential) calculus—a calculus that can be used to determine for any proposition (or sentence) (1) whether or not it's a tautology (*i.e.*, a logical truth of a certain sort), and (2) whether or not it's a tautological consequence (*i.e.*, a certain kind of *logical* consequence) of any given set of premises. (If you have no idea at all of what this means, don't worry: if you already knew what it meant, there'd be no point in your taking the course.) A good way to get practice in working with this calculus is by playing a game—the game of WFF 'N PROOF—and so during the course of the semester, I'll teach you how to play it. Starting the third full week of the semester, I'll hold regular weekly WFF 'N PROOF sessions. These won't be optional sessions; attendance at them is mandatory. Why? Well, because really good WFF 'N PROOF players are invariably really good at constructing calculations in the propositional calculus we'll be studying, and that's one of the main things I want you to be really good at by the end of the semester.

## Course Outline

*Although the following outline is not etched in stone, I plan to do my best to follow it.*

- Aug. M 24 Preliminaries on Arguments and the Evaluation of Arguments.  
 W 26 More on the Same Subject: Definitions of Basic Terms and Strategies for Assessing Arguments.  
 F 28 More on Argument Assessment. Additional Explanations and Examples. *Add Deadline*  
 M 31 The Subject of the Course: Logic in General; Deductive Logic in Particular.
- Sept. W 2 *Elementary Logic*, Chapter 1, §§1-3. Deductive Logic as the Study of the Consequence Relation.  
 F 4 *EL*, Chapter 1, §4. Truth and the “Bearers” of Truth. *Drop Deadline*  
 M 7 *No class* *Labor Day*  
 W 9 *EL*, Chapter 1, §§5-6. Formal Logic and Logical Form.  
 F 11 Formal Logic and the Logistic Method.  
 M 14 *Basic Symbolic Skills*, front matter, Chapter I, §§1-2. Symbols, Symbol-Arrays, and Derivation.  
 W 16 *BSS*, Chapter I, §§3-4. Calculi and Games. An Example: System T.  
 F 18 —  
 M 21 *BSS*, Chapter I, §5A. Use, Mention, and Display.  
 W 23 *BSS*, Chapter I, §5B. Variables, Matrices, and Quantifiers.  
 F 25 —  
 M 28 *BSS*, Chapter I, §6. More Sample Calculi: Systems  $W$  and  $W'$ .  
 W 30 —
- Oct. F 2 Test. *First Midterm*  
 M 5 *BSS*, Chapter II, §1-2. Logic and Artificial Languages.  
 W 7 *BSS*, Chapter II, §3-4. The Syntax and Semantics of Artificial Languages. An Example:  $L_1$ .  
 F 9 —  
 M 12 *BSS*, Chapter II, §5. Interpretations of  $L_1$ .  
 W 14 *BSS*, Chapter II, §6. Sets—A First Look. *Withdrawal Deadline*  
 F 16 —  
 M 19 *BSS*, Chapter II, §7. Final Statement of the Semantic Rules for  $L_1$ .  
 W 21 *BSS*, Chapter II, §8. Logical Truth and Logical Consequence in  $L_1$ .  
 F 23 —  
 M 26 Review.  
 W 28 —  
 F 30 Test. *Second Midterm*
- Nov. M 2 *BSS*, Chapter III, §1-2. The Logistic Method. Example: Constructing a Deductive Apparatus for  $L_1$ .  
 W 4 *BSS*, Chapter III, §3. The New System: System I.  
 F 6 —  
 M 9 *EL*, Chapter 3, A Formalized Language for the Study of First-Order Logic. Mates’s  $\mathcal{Q}$  and its Syntax.  
 W 11 *EL*, Chapter 4, §§1-2. The Semantics of  $\mathcal{Q}$ : Interpretations of  $\mathcal{Q}$  and Truth under an Interpretation.  
 F 13 —  
 M 16 *EL*, Chapter 2, §5. More on the Semantics of  $\mathcal{Q}$  and More on Sets.  
 W 18 *EL*, Chapter 4, §3. Still More on Semantics: Consistency, Consequence, and Logical Truth.  
 F 20 *EL*, Chapter 5, §1. English,  $\mathcal{Q}$ , and the Question of Translatability. Introductory Reflections.  
 M 26 *EL*, Chapter 2, §§2-4; Chapter 5, §2. Extensionality and Non-Extensional Contexts.  
 W 28 *no class* *Fall Break*  
 F 30 *no class* *Fall Break*
- Dec. M 3 Translation Relative to Interpretations and to Interpretations Given in Various Ways.  
 W 5 More on Translating English into  $\mathcal{Q}$ .  
 F 7 Derivation Rules for First-Order Logic? One Way: We Can Use What We’ve Got: System WHY?  
 M 10 Final Exam: 8:00-10:30 *Final Examination*

### Grading Scale

Any letter grades given on assignments will be converted to numerical grades (percentages) as follows: A+ = 98; A = 95; A- = 92; A-/B+ = 90; B+ = 88; B = 85; B- = 82; B-/C+ = 80; C+ = 78; C = 75; C- = 72; C-/D+ = 70; D+ = 68; D = 65; D- = 62; D-/F = 60; F = 55. The grading scale used in the class to convert numerical averages to letter grades at the end of the semester will be as follows: 93–100 = A; 90–92 = A-; 87–89 = B+; 83–86 = B; 80–82 = B-; 77–79 = C+; 73–76 = C; 70–72 = C-; 67–69 = D+; 63–66 = D; 60–62 = D-; 0–59 = F. I reserve the right to assign semester grades higher than those dictated by students' overall mathematical averages, but except in cases involving academic dishonesty, no one will be assigned a grade lower than that dictated by his or her overall mathematical average.

### Policy on Academic Dishonesty

Standards of academic conduct are set forth in the University's *Student Handbook* (see [http://www.unco.edu/dos/handbook/academic\\_expectations.html](http://www.unco.edu/dos/handbook/academic_expectations.html)). Violations of those policies and/or the *UNC Honor Code* (see below) will *not* be overlooked. Honesty is a cornerstone of the academic community. Penalties for academic dishonesty on quizzes and/or plagiarism (*i.e.*, copying either the ideas and/or the words of another without proper attribution) in any of your other work will be severe and may result in a failing grade for the course. See the *Student Code of Conduct* ([http://www.unco.edu/dos/student\\_code\\_conduct/](http://www.unco.edu/dos/student_code_conduct/)).

### The UNC Honor Code

All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

### Accommodations for Students with Disabilities

Students who believe that they may need accommodations in this class are encouraged to contact Disability Support Services at (970) 351-2289 as soon as possible to ensure that accommodations are implemented in a timely way.

### Disclaimer

I will stick to this syllabus as closely as I can, but I reserve the right to make revisions if necessary. Changes will be announced in class and posted on Blackboard.