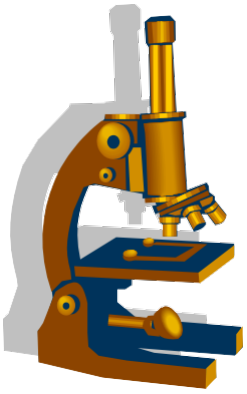

January 2020

Course Syllabus

Philosophy 4 (Section 6100) Introduction to Symbolic Logic
Instructor: Dr. Crowell, Tues, Thursday 9:00-10:30 Emeritus
1509
Office Hours, Tuesday & Thursday 7:00-730;10:30- 12;30 Phone 527-4946
Voice Mail; 527-4999,
extension 5121. E-mail:
ecrowell@santarosa.edu
Web Page: http://www.santarosa.edu/~tcrowell and https://profiles.santarosa.edu/edward-crowell

Text: *Understanding Symbolic Logic*, Virginia Klenk

Primary Objectives: To introduce the elements of modern symbolic logic. To become familiar with standard notation and methods of symbolization. Develop techniques for translating ordinary English expressions into a commonly used symbolic notation. To become familiar with special terms and concepts used in logical theories and develop proof strategies using symbolic notation.

Secondary Goals: To achieve a general understanding of the development of logical systems from early Greek to contemporary attempts. To understand the motives behind the evolution from these early systems to more recent systems.

The course will be of interest to the following students:

Students interested in Philosophy, especially epistemology, philosophy of language, logic and analytic philosophy

Students interested in Mathematics, especially number theory, foundations, set theory and formal systems

Students interested in Computer Science, especially programming languages, operating systems and data base management

Students interested in Rhetoric, especially argument structure and uses of

language. Students who are intending to continue in the legal profession.

The approach will be a mixture of lecture, discussion and lab exercises. When appropriate, the Thursday class will be a lab day. Problems and exercises will be completed. Material covered during the week will be reviewed. Specific projects will be worked on with the instructor acting as a lab assistant. However, one student will be asked to serve as lab guide. (Everyone will get a chance to be "it" at least once. It is the guide's responsibility to set out the problems, assign classmates to solve problems, formulate questions, pose problems and possibly offer solutions. Lab problems will be from problems sets in the book and will be turned in on the appropriate Thursday. Solutions to the problems in the text are on reserve in the SRJC Library.

**Grading:** There will be two midterms worth 25% each. The lab exercises will be worth a total of 25% (There will be approximately 16 lab exercises. In addition, there will be a final on during final week (May 16-22). It is worth 25%. The nature of the final will be determined during the latter part of the course.

In order to prepare for the lab assignments, the home work must be completed before each session. This home work will be collected and graded as part of the 25% for the lab exercises. It may not be correct, but the grade will be based on effort only. In addition, bonus points will be available for work and participation of high quality and beyond usual expectations. Bonus points can be redeemed at the end of the semester and assigned to the other graded activities.

**Absences and Attendance:** Attendance is not specifically graded but will be reflected in the quizzes. However, I will drop students who miss the first week of class or who have not participated in any of the graded assignments (quizzes and exams). It is the student's responsibility to initiate a drop procedure in any other circumstance.

Although this material is frequently thought to be dry and abstract, a final objective is to have some (intellectual) fun.

First Week, January 14. Read text, Unit 1. Topics: Introduction to Symbolic Logic. What is Logic? Some historical perspectives, the Greek contribution. The Aristotelian syllogism, early propositional logic of the Stoics, brief comparison of the syllogism and propositional logic. The concept of an argument, argument form. Read text, Unit 1.

Lab: From Unit 1 in the text. Discussion topics 6, 7 & 8 on page 17. Exercises page 18 #s a-o Argument identification, form recognition, definition of technical terms.

Second Week; January 21, Tuesday, Department Activities—**No Class.** For Thursday, Read Text, Unit 2 & 3.Introduction to propositional logic. The Truth Table (Not Truthiness)

Third Week, January 28. Topics: Statement (propositional) logic. Atomic and compound statements. Statement connectives. Truth table definition and techniques.

Lab: Unit 3, Exercises page 49 odd. Page 50 even. Basic Truth table techniques.

First Census Day, February 3.

Fourth Week, February 4. Read Text, Unit 4 & 5. Topics: Statement logic continued. English translation to statement logic. Expansion of truth tables. Valuation, Validity, Tautology and Contingencies.

Lab: Truth tables techniques for validity, tautology and contingency. Unit 4, Exercises page 69, 70 m-t
#2 a-j #6 a-n. Unit 5 Study question #6 page 91 Exercises #1 page 92 a-j, #3 a-i

Fifth Week, February 11. February 13: PDA day, **No classes**. Read Text, Unit 6. Topics: Shortcut truth tables, truth trees.

Sixth Week, Class February 18 Read Text, Unit 7. Topics: Rules of inference and resolution. Lab: Shortcut truth table and truth tree techniques. Exercises page 109 #2 a-k, #3 a-j Lab: Using rules of inference to show validity, resolution techniques.

Seventh Week. February 25. Continuation of previous week's assignment. The Natural Deduction System. Basic rules and derived rules of inference. Conclusion of first segment. Tuesday's class will prepare for first test on Statement Logic, Units 1-6.

Eighth Week. March 4. First Test. Read Text, Unit 7 & 8. Topic: Derivation proofs.

Ninth Week. March 11. Return and review of first test. Read Text, Unit 8 & 9 Topics: Derivation and Replacement Rules

March 16-22 Spring Break

Tenth Week. Topics: March 25. Part 2, Read Text; Unit 10 & 11. Monadic Predicate

Logic. Lab: Exercises in determination of validity.

Eleventh Week April 1. Read Units 13 & 14. Quantification continued. Restricted rules of Quantifier Elimination and Introduction Read Units 15. Proof in Quantified Logic Quantification continued.
Restricted rules of Quantifier Elimination and Introduction Quantification continued. Restricted rules of Quantifier Elimination and Introduction.

Twelfth Week. April 8. Skolem functions. Loenwenheim's Theorem. Read Text, Unit 7, 7.1 7.3 omit
7.2. Topics: Truth trees and Predicate

logic. Lab: Truth tree techniques

Thirteenth Week, April 15. Read Text, Unit 7, 7.4. Topics: Method of validity continued. Lab: Validity techniques.

Fourteenth Week. April 29. Review text Units 5-7. Topics: Review of Predicate Logic. Prepare for second test. **May 2. Second Test**.

Fifteenth Week. May 6. Return and review of Second Test. Instructor Prepared material. Extension of Predicate Logic to Identity Theory and Introduction to Axiomatic Sets. Unit 8, 8.1, 8.2. Unit 2, 2.3.
Topics: Introduction to relation between logic and computer systems. Historical connection. Boolean systems, Venn diagrams

Lab: Exercises 2.3

Seventeenth Week. May 13. Read Unit 8, 8.3. Topics: Boolean systems

continued. Lab: Boolean exercises Topics: Course review.
Course review. Final lab in preparation for final

**Final Exam; May 21; 7:00-9:45**

What follows is from the official course of record

1. Distinguish arguments from non-arguments in ordinary language.
2. Examine ordinary statements for ambiguity, equivocation and clarity.
3. Generate translations from ordinary language into symbolic notations.
4. Distinguish valid from invalid argument forms.
5. Analyze complex expression into simple forms.
6. Determine truth values for complex expressions.
7. Deduce valid conclusions using proof strategies and rules.
8. Develop first-order predicate logic as an attempt to provide a method of analysis and as a possible foundation for mathematics
9. Evaluate recent analytic philosophical positions using symbolic notations.
10. Describe the relation between modern symbolic notations and other formal systems, for example, computer languages.
11. Trace the historical development of modern symbolic logic and show the attempt to base mathematics on the foundation of the extended predicate logic.
12. Translate English statements with "or" "and" "if, then" "not" into the statement logic notation