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CURRICULUM PROPOSAL COVER SHEET  
University-Wide Undergraduate Curriculum Committee

LSC Use Only
Number <u>153</u>
Action <u>Approved</u>
Date <u>1-31-91</u>

UWUCC Use Only
Number _____
Action _____
Date _____

I. TITLE/AUTHOR OF CHANGE

COURSE/PROGRAM TITLE PH 321 Symbolic Logic II  
DEPARTMENT Philosophy & Religious Studies  
CONTACT PERSON Dr. Dan Boone

II. THIS COURSE IS BEING PROPOSED FOR:

- Course Approval Only  
 Course Approval and Liberal Studies Approval  
 Liberal Studies Approval only (course previously has been approved by the University Senate)

III. APPROVALS

Albert E. Bayfield  
Department Curriculum Committee

Joel Meach (11-30-90)  
Department Chairperson

Rachel  
College Curriculum Committee

Jordy  
College Dean\*

Charles D. ...  
Director of Liberal Studies  
(where applicable)

\_\_\_\_\_  
Provost  
(where applicable)

\*College Dean must consult with Provost before approving curriculum changes. Approval by College Dean indicates that the proposed change is consistent with long range planning documents, that all requests for resources made as part of the proposal can be met, and that the proposal has the support of the university administration.

IV. TIMETABLE

Date Submitted to LSC _____	Semester/Year to be implemented _____	Date to be published in Catalog _____
to UWUCC _____		

Revised 5/88

[Attach remaining parts of proposal to this form.]

## COURSE SYLLABUS

### I. CATALOG DESCRIPTION

PH 321 Symbolic Logic II 3 credits

Prerequisite: PH 221 or permission of instructor

A continuation of Symbolic Logic I designed to enable students to evaluate consistency of statements, validity of arguments, soundness and completeness of formal systems. Focus on quantificational calculus and inductive logic.

### II. COURSE OBJECTIVES

1. Students learn to perform higher-level logical skills, such as proofs, translations, and semantic trees.
2. Students learn about the special properties of formal systems, such as completeness and consistency.
3. Students are introduced to some of the historical origins of modern deductive logic.
4. Students get to explore some of the perplexing issues in philosophical logic.

### III. TYPICAL COURSE OUTLINE: may vary somewhat with instructor

- A. Review of basic ideas in beginning symbolic logic.
- B. Exploration of the concept of a truth function.
- C. Natural Deduction Proofs--Sentence Logic
  1. More sophisticated introduction to the nature and purpose of proofs.
  2. The nature of substitutions.
  3. Special rules: conditional and indirect proofs.
  4. Alternative proof systems: intelim rules.
  5. Validity tests: short-cut truth tables and semantic trees.
  6. Incompleteness proof of basic rules.
- D. Predicate Logic
  1. General introduction to quantifiers.
  2. Proofs in Predicate Logic.
  3. Proving invalidity in Predicate Logic.
  4. Relational predicates.
  5. Arguments and proofs with relational predicates.
  6. Attributes of relational predicates.
  7. The identity predicate; definite descriptions.
  8. Second-order predicates.
- E. Axiomatic Development of the Sentence Logic
  1. Object language and Metalanguage.
  2. Introduction of the axioms.
  3. Independence of the axioms.
  4. Development of the system; proofs of theorems.
  5. Deductive completeness of the system.
- F. Philosophical Reflections on Logic
  1. Many-valued logics, modal logics, other special logics.

2. Alternative interpretations of quantifiers.
3. Problems with identity and reference.
4. Logical paradoxes.
5. Goedel's theorem.

#### IV. EVALUATION METHODS

Actual methods of evaluation will vary from instructor to instructor, but the method which has always been used with the course thus far is a competency-approach (PSI or Keller plan; see attached sample individual syllabus).

#### V. REQUIRED TEXTBOOKS

Will vary from instructor to instructor. Standard texts used thus far are:

Irving Copi, Symbolic Logic, 5th ed., Macmillan, 1979  
Susan Haack, Philosophy of Logics, Cambridge, 1978

PH 321 Symbolic Logic II  
Dr. Dan Boone  
Sutton 438  
357-2310

Fall, 1987

TEXTS:

Symbolic Logic (5th ed.), I. M. Copi  
Philosophy of Logics, Susan Haack

REQUIREMENTS:

The course is a continuation of PH 221 Symbolic Logic I, including the method of competency testing. There are two retests possible for each of the following competencies.

- Competency 7: Proofs in Copi without CP/IP (SL).
- Competency 8: Translation and proofs in PL.
- Competency 9: Translation and proofs in PL + Identity.
- Competency 10: Proofs in axiomatized systems.
- Competency 11: Short-essay questions on Haack text.

GRADING:

- D = 7,8
- C = 7-9
- B = 7-10
- A = 7-11

PH 321 Symbolic Logic II

Assignments:

- p. 14 II evens
  - p. 18 III evens
  - p. 26 III 11-15 - use short cut method - not truth tables.
  - p. 31 I & II evens
  - p. 37 IV 6-9
  - pp. 45-48 IV evens (except #24)
  - p. 49 6,7
  - p. 52 "Exercises"
  - p. 54 odds
- Additional p. 54 2  
p. 61 3
- p. 56 I 12, 14, 16  
II 2, 4, 6
  - p. 61 evens
  - pp. 69-71 evens
  - pp. 76-78 I evens after 6  
II evens
  - pp. 82 I 2, 6
  - pp. 88-89 evens
  - p. 92 I
  - pp. 100-101 evens
  - pp. 103-105 I & II evens
  - p. 108 #2
  - p. 115 evens
  - pp. 127-130 I evens  
II all
  - pp. 149 Translate only odds
  - p. 155 I all

Axiomatic Proofs in R.S.

pp. 243 ff Th. 7, 8 & Th 7, COR. & all other Theorems, Derived Rules, and Corollaries through p. 250.

# LIBERAL STUDIES COURSE APPROVAL FORM

**About this form:** Use this form only if you wish to have a course included for Liberal Studies credit. The form is intended to assist you in developing your course to meet the university's Criteria for Liberal Studies, and to arrange your proposal in a standard order for consideration by the LSC and the UWUCC. If you have questions, contact the Liberal Studies Office, 353 Sutton Hall; telephone, 357-5715.

**Do not** use this form for technical, professional, or pre-professional courses or for remedial courses, none of which is eligible for Liberal Studies. **Do not** use this form for sections of the synthesis course or for writing-intensive sections; different forms will be available for those.

## PART I. BASIC INFORMATION

**A. For which category(ies) are you proposing the course? Check all that apply.**

### LEARNING SKILLS

- First English Composition Course
- Second English Composition Course
- Mathematics

### KNOWLEDGE AREAS

- Humanities: History
- Humanities: Philosophy/Religious Studies
- Humanities: Literature
- Fine Arts
- Natural Sciences: Laboratory Course
- Natural Sciences: Non-laboratory Course
- Social Sciences
- Health and Wellness
- Non-Western Cultures
- Liberal Studies Elective

**B. Are you requesting regular or provisional approval for this course?**

- Regular       Provisional (limitations apply, see instructions)

**C. During the transition from General Education to Liberal Studies, should this course be listed as an approved substitute for a current General Education course, thus allowing it to meet any remaining General Education needs?       yes       no**

**If so, which General Education course(s)? \_\_\_\_\_**

**PART II. WHICH LIBERAL STUDIES GOALS WILL YOUR COURSE MEET? Check all that apply and attach an explanation.**

All Liberal Studies courses must contribute to at least one of these goals; most will meet more than one. As you check them off, please indicate whether you consider them to be primary or secondary goals of the course. [For example, a history course might assume "historical consciousness" and "acquiring a body of knowledge" as its primary goals, but it might also enhance inquiry skills or literacy or library skills.] Keep in mind that no single course is expected to shoulder all by itself the responsibility for meeting these goals; our work is supported and enhanced by that of our colleagues teaching other courses.

**Primary      Secondary**

**A. Intellectual Skills and Modes of Thinking:**

- 1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.        X        \_\_\_\_\_
- 2. Literacy--writing, reading, speaking, listening      \_\_\_\_\_      \_\_\_\_\_
- 3. Understanding numerical data        X        \_\_\_\_\_
- 4. Historical consciousness      \_\_\_\_\_      \_\_\_\_\_
- 5. Scientific inquiry      \_\_\_\_\_        X
- 6. Values (ethical mode of thinking or application of ethical perception)      \_\_\_\_\_      \_\_\_\_\_
- 7. Aesthetic mode of thinking      \_\_\_\_\_      \_\_\_\_\_

**B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person**      \_\_\_\_\_        X  

**C. Understanding the Physical Nature of Human Beings**      \_\_\_\_\_      \_\_\_\_\_

**D. Certain Collateral Skills:**

- 1. Use of the library      \_\_\_\_\_      \_\_\_\_\_
- 2. Use of computing technology      \_\_\_\_\_      \_\_\_\_\_

E. The Liberal Studies Criteria indicate six ways in which all courses should contribute to students' abilities. **To which of the six will your course contribute? Check all that apply and attach an explanation.**

- 1. Confront the major ethical issues which pertain to the subject matter; realize that although "suspended judgment" is a necessity of intellectual inquiry, one cannot live forever in suspension; and make ethical choices and take responsibility for them.
- 2. Define and analyze problems, frame questions, evaluate available solutions, and make choices
- 3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.
- 4. Recognize creativity and engage in creative thinking.
- 5. Continue learning even after the completion of their formal education.
- 6. Recognize relationships between what is being studied and current issues, thoughts, institutions, and/or events.

**PART IV. DOES YOUR COURSE MEET THE CRITERIA FOR THE CURRICULUM CATEGORY IN WHICH IT IS TO BE LISTED?**

Each curriculum category has its own set of specific criteria in addition to those generally applicable. The LSC provides copies of these criteria arranged in a convenient, check-list format which you can mark off appropriately and include with your proposal. **The attached syllabus should indicate how your course meets each criterion you check. If it does not do so explicitly, please attach an explanation.**



# CHECK LIST -- LIBERAL STUDIES ELECTIVES

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## Knowledge Area Criteria which the course must meet:

- Treat concepts, themes, and events in sufficient depth to enable students to appreciate the complexity, history, and current implications of what is being studied; and not be merely cursory coverages of lists of topics.
- Suggest the major intellectual questions/problems which interest practitioners of a discipline and explore critically the important theories and principles presented by the discipline.
- Allow students to understand and apply the methods of inquiry and vocabulary commonly used in the discipline.
- Encourage students to use and enhance, wherever possible, the composition and mathematics skills built in the Skill Areas of Liberal Studies.

## Liberal Studies Elective Criteria which the course must meet:

- Meet the "General Criteria Which Apply to All Liberal Studies Courses."
- Not be a technical, professional, or pre-professional course.

**Explanation:** Appropriate courses are to be characterized by learning in its broad, liberal sense rather than in the sense of technique or professional proficiency. For instance, assuming it met all the other criteria for Liberal Studies, a course in "Theater History" might be appropriate, while one in "The Craft of Set Construction" probably would not; or, a course in "Modern American Poetry" might be appropriate, while one in "New Techniques for Teaching Writing in the Secondary Schools" probably would not; or, a course on "Mass Media and American Society" might be appropriate, while one in "Television Production Skills" probably would not; or, a course in "Human Anatomy" might be appropriate, while one in "Strategies for Biological Field Work" probably would not; or, a course in "Beginning French" might be appropriate, while one in "Practical Methods for Professional Translators" probably would not.

Liberal Studies Course Approval Form Explanations  
PH 321 Symbolic Logic II

Part I. Please see items checked.

Part II. Liberal Studies Goals.

A. Intellectual Skills and Modes of Thinking

One primary goal to be met is category 1. Symbolic Logic addresses the essential nature of "abstract logical thinking" and the underlying formal structures of "critical analysis." This and other logic courses offered by our department are the courses in which to learn these fundamental processes of logical thought. Another primary goal is category 3: Since mathematics often teaches logical principles in its courses, and logical theory is often regarded as part of mathematics, this course is also helpful in "understanding numerical data," at least to the extent of exploring the fundamental nature of formal and mathematical systems. Furthermore, much of logical theory is applicable to areas of computer science; again, investigating the fundamental nature of formal systems may have extensive application to computer science.

A secondary goal is a better appreciation of scientific inquiry, especially in the formal, mathematical sciences. Gaining an appreciation of the basic properties of formal systems will greatly enrich the student's understanding of that part of science. Realizing that there are major areas of controversy and disagreement, and examining the philosophical issues concerning logical systems will disabuse the student of the notion that formal systems are "cut-and-dried".

B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person

As a secondary goal, the course will contribute to a student's knowledge of the nature of human reasoning, and provide insight to the extent that human thought processes are or are not "logical". Further, the course will contribute to an understanding of the historical development of logical theory. Most importantly, the course will give the student substantial insight into the exciting developments in the field of logic occurring in the 20th Century. These developments have had far-reaching consequences in our understanding of mathematics and in the evolution of computer science, areas increasingly important for an educated citizen in a computer-dominated culture.

PART III. General Criteria

A. Basic Equivalency

Basic equivalency of all sections of this course would be assured by the following process. All instructors who have taught this

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course or intend to teach the course the following academic year will meet and review this document, including the generic syllabus. They will exchange individual syllabi and then will discuss whether or not they are adequately meeting the specific goals and criteria approved for this course and outline herein. Any problems or conflicts would be brought to the attention of the entire department for resolution.

B. Perspectives and Contributions of Ethnic and Racial Minorities and of Women

It is likely that the instructor may choose a textbook authored by a woman (see titles on syllabus). Coverage of the history of modern logic will make clear the contributions of minorities and women. Nonsexist and nonracist language will be used throughout the course, or pointed out and criticized when met with in examples.

C. Required Readings

One of the required texts (Haack, Philosophical Logics) is a substantial scholarly investigation into the nature of logic. This is required reading, and is used extensively for class discussion. Any future offerings of the course will include a comparable reading requirement.

D. How This Course Differs From an Introductory Majors Course

First of all, there is no special course in our department designed to introduce our majors into the discipline. But even if there were, this proposed course would differ from such a course because it is an upper-level course designed to introduce students to the foundations and philosophical issues of formal logic. Thus it only covers one narrow area within the field of Philosophy, and actually has broader ramifications outside the field.

E. Six Ways of Contributing to Students' Abilities

1. Students will learn that even within such an abstract discipline as formal logic, there exist controversies, frustrations, limits to human understanding, and choices.

2. Students will learn a number of important techniques for the analysis and clarification of language. Learning to do proofs reinforces the student's confidence of dealing with and solving formal, quantitative problems.

3. Through discussion of the philosophical issues raised, and through writing about them, students will improve communication skills. Also, certain logical skills covered in the course are totally unforgiving with respect to mistakes or errors. Students will be encouraged to develop careful, precise symbol-manipulation abilities.

4. Logical problem-solving, such as doing proofs, is a highly creative process. Students must learn to apply knowledge in a creative way to generate a proof.

5. Students will learn a basis of understanding the nature of formal systems which will help them in later life when confronted with issues pertaining to the nature of mathematics and formal systems. Without such a basis, these areas will remain totally mysterious and misunderstood.

6. Should students encounter questions in other courses or in other reading about the nature of formal knowledge, or developments in computer science, they will be in a much better position to understand what they are confronting.

PART IV. Specific Criteria for the Curriculum Category

Knowledge Area Criteria which the course must meet:

The course is an investigation of one of the most exciting chapters in 20th Century thought. Bringing students to appreciate this is a difficult task, but especially in the latter part of the course, the philosophical issues underlying formal logic are explored extensively. Thus, students become aware of the complexity and implications of the issues. The historical development of important ideas in formal logic introduces students to critical comparisons in controversies between major figures.

In the first part of the course, students are thoroughly grounded in the methods and vocabulary of formal logic. Furthermore, the mathematics skills in the Skill Area of LS is enhanced to the extent that those math courses introduce students to basic logical principles. In this course, those principles are greatly elaborated.