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CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

LSC Use Only
Number <u>151</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 330 Philosophy of Science
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. Bouffard
Department Curriculum Committee

Joel Mark (11-30-90)
Department Chairperson

Rebel
College Curriculum Committee

Jorge
College Dean*

Chad [Signature]
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 _____
to UWUCC _____

Semester/Year to be
implemented _____

Date to be published
in Catalog _____

Revised 5/88

[Attach remaining parts of
proposal to this form.]

COURSE SYLLABUS

I. CATALOG DESCRIPTION

PH330 Philosophy of Science

3 credits

An investigation into the nature of formal and empirical sciences; structure of scientific thought and its dependence upon or independence of theory; the logical and metaphysical status of scientific "laws" and theoretical concepts; reductionism in science; the concept of causality; the logic of explanation; problems in confirmation theory; science and value. No special background required. Recommended for math and science majors.

II. COURSE OBJECTIVES

1. Students will learn the nature of scientific reasoning from an "informed citizen" perspective; students will be led to understand, challenge, and criticize scientific reports on the basis of the logic of scientific justification. Students are brought to realize that this skill requires no special scientific expertise or knowledge.
2. Students will investigate a variety of special topics concerning the relationships between science and society.
3. Students will explore some fundamental philosophical questions about the nature of science.
4. Students will become acquainted with philosophical implications of the sciences about human nature.

III. TYPICAL COURSE OUTLINE (may vary with instructor)

- A. The nature of scientific reasoning
 1. Basic reasoning concepts
 2. Theories and hypotheses
 3. Testing theoretical hypotheses
- B. Science and religion
- C. Science and human nature
- D. Scientific Methodology
- E. Scientific Explanation
- F. Science and values
- G. Science and society

IV. EVALUATION METHODS

Actual evaluation methods may vary from instructor to instructor, but the instructor who has traditionally taught this course is seeking approval to teach writing-intensive courses and believes this course would be ideal for that purpose.

V. REQUIRED TEXTBOOKS

Ronald N. Giere, Understanding Scientific Reasoning, Holt, Rinehart and Winston, 1984.

Frederick E. Mosedale, Philosophy and Science, Prentice-Hall, 1979.

James D. Watson, The Double Helix, Atheneum, 1968.

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)? PH 221 Symbolic Logic I

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) X
- 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 330 Philosophy of Science

PART I. Please see items checked.

PART II. Liberal Studies Goals

A. Intellectual Skills and Modes of Thinking

The primary intellectual skills the course addresses are logical criticism and scientific inquiry. First, the course introduces students to some basic logical concepts, which are then used to explain the nature of scientific reasoning. Second, the students are given a great deal of practice in evaluating reports of scientific research to critically assess whether or not the research meets certain standards of scientific reasoning. Third, the course explores a number of topics leading to a better understanding of scientific inquiry: induction, paradigm-shifts, paradoxes of confirmation, the nature of explanation, etc. Because of the range of controversial views about science, students become aware that science itself is a subject of inquiry, and are thereby encouraged to give up any superficial views about the nature of science they may have held.

A secondary goal of the course is "understanding numerical data". Various examples of scientific theories and research used in the course involve mathematics. Thus, some reinforcement of these skills occurs.

Another secondary goal is "values". There are a number of ethical concerns in the sciences, and one part of the course is devoted to those concerns. The general notion of science being "value-neutral" is challenged, and other issues in ethical theory are addressed, such as moral relativism. Specific ethical concerns such as the use of animal and human experimental subjects are also examined.

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

A primary goal of the course is to make students "science-literate" in a very important way. By examining the fundamental nature of how scientists justify their research claims to each other and to the wider community, students become critical thinkers of scientific claims. This is an essential skill for all citizens to have in a modern, technologically-complex, and science-dominated society. Students should emerge from the course with a demythologized and demystified view of science. Moreover, the other issues touched upon in the course should also increase a student's

science literacy.

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 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

One of the issues to be addressed in the course is sexism and racism in science. Ways in which science may be misused to justify ethnic, racial, or gender discrimination will also be examined. 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 books, The Double Helix, is a delightful and exciting journey through one of the most dramatic events in the history of science. Students will be required to read the book; appropriate references will be made to it in discussions throughout the semester.

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 not primarily aimed at our majors. While the course does treat most of the subjects traditionally covered in a philosophy of science course, there is no assumption that students have any background in science or philosophy. The course is an approved General Education regular-substitute for PH 221 with an audience of students from all over the university seeking to satisfy that requirement. The topics and issues covered should be of broad concern to any educated citizen.

E. Six ways of Contributing to Students' Abilities

1. Students will encounter profound challenges to the thesis that science is in some way "value-neutral". They will discover other ways in which science has serious implications for ethical and social issues, and learn that merely by being "scientific", one is not absolved from responsibility and ethical demands.
2. Students will learn to read all reports of scientific research with a critical eye, not from the standpoint of an expert scientist, but from the standpoint of an ordinary citizen who knows what standards justified claims must meet and who is able to evaluate the research accordingly.
3. When the course was taught in the past, students were not given only objective tests, but had to write evaluations of scientific reports. Also, a paper was an option. If the course is taught as a writing-intensive course, this will even more thoroughly enhance student communication skills.
4. While the course will not especially improve creativity, the issue of creativity in the sciences is discussed. Thus, students will at least understand creative processes better.
5. It is hoped that this course will contribute greatly to life-long learning. An improved understanding of science and a skill of evaluating scientific reasoning should be constantly challenged in our science-intensive society.
6. Efforts are made throughout the course to make examples as current as possible, and to use other topical issues to illuminate points covered in the course.

PART IV. Specific Criteria for the Curriculum Category

It is hoped that the syllabus makes it clear enough that breadth is important to the course. However, depth matters too, at least for some of the central issues. Scientific methodology and explanation are two important categories which receive considerable attention. Also, the initial skill of evaluating scientific reasoning requires a great deal of course time. The major issues, methods of inquiry, and vocabulary are introduced on a number of occasions in connection with disparate issues. Also, as mentioned earlier in the proposal, there is some use of mathematical and writing skills in the course.

It is explained above (Part III) how the course meets the "General Criteria". Moreover, it was also mentioned above (III.D.) that the course is not designed or taught as a narrow course for Philosophy majors.