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LIBERAL STUDIES

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Number: 97-35i
Submission Date: _____
Action-Date: App. 12/16/97
Senate app. 2/3/98

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Gerald Buriok Phone 2608

Department Mathematics

II. PROPOSAL TYPE (Check All Appropriate Lines)

X COURSE — MA 427 Intro to Topology
Suggested 20 character title

____ New Course* _____
Course Number and Full Title

X Course Revision — MA 427 Introduction to Topology
Course Number and Full Title

____ Liberal Studies Approval ÷ for new or existing course _____
Course Number and Full Title

____ Course Deletion _____
Course Number and Full Title

____ Number and/or Title Change _____
Old Number and/or Full Old Title

_____
New Number and/or Full New Title

____ Course or Catalog Description Change _____
Course Number and Full Title

____ PROGRAM: ____ Major ____ Minor ____ Track

____ New Program* _____
Program Name

____ Program Revision* _____
Program Name

____ Program Deletion* _____
Program Name

____ Title Change _____
Old Program Name

_____
New Program Name

III. Approvals (signatures and date)

David A. Buriok 9/14/97
Department Curriculum Committee

Duane Bruck 9/14/97
Department Chair

[signature] 10/15/97
College Curriculum Committee

John D. Eck 10/15/97
College Dean

_____
÷Director of Liberal Studies (where ap

_____
Provost (where applicable)

Part II. Description of Curriculum Change.

1. New syllabus of record - attached.

2. A summary of the proposed revision:

The current prerequisite for MA427 Introduction to Topology is "C or higher in MA271." The proposed revision would change the prerequisite to "C or higher in MA272."

3. Justification/rationale for the revision:

The Mathematics Department is proposing a change in the core for all three undergraduate programs offered by the department, namely Mathematics, Applied Mathematics, and Secondary Mathematics Education. One aspect of this change is to extend MA271 Algebraic Structures to a two semester sequence, MA271 and MA272. MA271 will be renamed MA271 Introduction to Mathematical Proofs I, while the second course will be titled MA272 Introduction to Mathematical Proofs II. The prerequisite of MA421 will be changed to "C or higher in MA272." Faculty of the Mathematics Department have determined that the background in mathematical proofs that students acquire in MA271 is inadequate for upper level mathematics courses. Extending MA271 to a two semester sequence will provide an opportunity for students to gain a stronger background before being exposed to upper level theory oriented mathematics courses where there is an emphasis on proofs. The prerequisite change for MA427 will ensure students have the background necessary for succeeding in this course.

4. Old syllabus of record - attached.

5. Liberal Studies course approval form and checklist.

Not applicable.

Part III. Letters of Support.

No other department is affected by this change.

I. Catalog Description

MA 427/527 Introduction to Topology

3 credits
3 lecture hours
(3c-0l-3sh)

Prerequisites: MA 272 with a C or better grade.

Study of sets, functions, continuity, compactness, the separation axioms, and metric spaces; application of topology to analysis is demonstrated.

II. Course Objectives

1. Students will review and extend their knowledge of set theory and functions and of proofs involving these topics.
2. Students will prove results about limits and continuity in the setting of general metric spaces.
3. Students will learn the definition of a topological space.
4. Students will learn the generalizations of limits and continuity in topological spaces and prove results in this more abstract setting.
5. Students will study connectedness in order to prove the Intemediate Value Theorem (seen without proof in calculus).
6. Students will study compactness in order to prove the Extreme Value Theorem (seen without proof in calculus).

III. Course Outline/Time Schedule

A. Theory of Sets (2 weeks)

1. Sets and Subsets
2. Set Operations: Union, Intersection, and Complement
3. Indexed Families of Sets
4. Products of Sets
5. Functions
6. Relations

B. Metric Spaces (5 weeks)

1. Metric Spaces: Definition and Examples
2. Continuity
3. Open Balls and Neighborhoods
4. Limits
5. Open Sets and Closed Sets
6. Subspaces and Equivalence of Metric Spaces

C. Topological Spaces (5 weeks)

1. Topological Spaces: Definition and Examples
2. Neighborhoods
3. Closure, Interior, Boundary
4. Continuous Functions and Homeomorphisms
5. Subspaces
6. Product Spaces

D. Connectedness (1 week)

E. Compactness (1 week)

IV. Evaluation Methods

A typical weighting for determining final grades is:
30% for hand-in assignments emphasizing the writing of proofs
15% for each of 3 tests
25% for a comprehensive final examination.

The suggested grading scale is:

90–100%	A
80–89%	B
70–79%	C
60–69%	D.
below 60	F

V. Required Textbook

Mendelson, Bert: *Introduction to Topology*, 3rd ed., Dover Publications, 1990.

VI. Special Resource Requirements: None.

VII. Bibliography: These books could also serve as the required textbook.

Croom, Fred H.: *Principles of Topology*, Saunders College Publishing, 1989.

Munkres, James R.: *Topology: A First Course*, Prentice-Hall, 1975.

Mathematics Department
Indiana University of Pennsylvania
Indiana, PA 15705

Course Number: MA 427 or MA 527

Course Title: Introduction to Topology

Credits: 3 semester hours

Prerequisites: MA 271 with a grade of C or better

Textbook: Introduction to Topology, 3rd. Ed.
By Mendelson
Dover Publishing Company

Revised: 9/96

Catalog Description:
Study of sets, functions, continuity, compactness, the separation axioms, and metric spaces; application of topology to analysis is demonstrated.

Course Outline/Time Schedule:

I. Theory of Sets (2 weeks)
- A. Sets and Subsets
- B. Set Operations: Union, Intersection, and Complement
- C. Indexed Families of Sets
- D. Products of Sets
- E. Functions
- F. Relations

II. Metric Spaces (5 weeks)
- A. Metric Spaces
- B. Continuity
- C. Open Balls and Neighborhoods
- D. Limits
- E. Open Sets and Closed Sets
- F. Subspaces and Equivalence of Metric Spaces

III. Topological Spaces (5 weeks)
- A. Introduction
- B. Topological Spaces
- C. Neighborhoods and Neighborhood Spaces
- D. Closure, Interior, Boundary
- E. Functions, Continuity, Homemorphism
- F. Subspaces
- G. Products

IV. Connectedness (1 week)

V. Compactness (1 week)