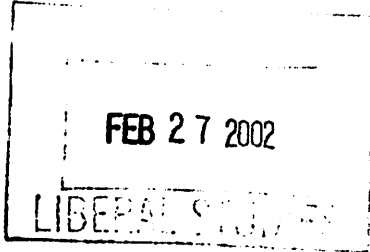


LSC Use Only
Number:
Submission Date:
Action-Date:

235



UWUCC USE Only
Number:
Submission Date:
Action-Date:

01-626

UWUCC App 4/19/02
Senate App 5/7/02

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Gerald Buriok Phone 7 2608
Department Mathematics

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE MATH 110 Elementary Functions
Suggested 20 character title

____ **New Course*** _____
Course Number and Full Title

Course Revision MATH 110 Elementary Functions
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 MATH 110 Elementary Functions
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)

Harry Staniel 10/1/01
Department Curriculum Committee

Gerald Buriok 10/1/01
Department Chair

[Signature] 02/26/02
College Curriculum Committee

[Signature] 2/27/02
College Dean

[Signature] 4-18-02
+ Director of Liberal Studies (where applicable)

*Provost (where applicable)

Part II. Description of Curriculum Change

1. New syllabus of record. (Attached.)
2. Summary of proposed revisions.

The proposed change is in the prerequisite and in the wording of the catalog description. MATH 110 currently has no prerequisite listed. The note and catalog description are reworded for better sentence structure, and to emphasize the course is for mathematics and science majors.

a. New catalog description:

MATH 110 Elementary Functions

3c-01-3sh

Prerequisite: MATH 100 or appropriate Placement Test Score or permission of the Mathematics Department Chairperson.

Note: Students may not take MATH 110 after successfully completing a calculus course without the written approval of the Mathematics Department Chairperson.

Prepares mathematics and science students for the study of calculus. Topics include detailed study of polynomial, exponential, logarithmic, and trigonometric functions.

b. Old catalog description:

MATH 110 Elementary Functions

3c-01-3sh

Note: May not take MATH 110 after successfully completing a calculus course without the written approval of the mathematics department chairperson.

For students not prepared to begin the study of calculus; topics include polynomial, exponential, logarithmic, and trigonometric functions.

3. Justification/rationale for the change.

Although there is currently no prerequisite for MATH 110 in the catalog, adequate high school preparation is needed to succeed in this course. However, high school mathematics classes vary in depth and quality and a list of courses doesn't provide reliable information. With the implementation of Banner, it is possible for the computer to check to see if a student's Placement Test Score in mathematics is appropriate for enrollment in MATH 110. The Placement Test Score provides a way of measuring high school preparation, and Banner will enforce this prerequisite. Students lacking adequate preparation are directed to MATH 100 for remediation.

The Mathematics Department offers two calculus sequences and a one-semester calculus course, MATH 115, for business students. Students needing MATH121/122 Calculus I and II for Business, Natural, and Social Sciences or MATH 115 Applied Mathematics for Business are advised to take MATH 105 if they are not adequately prepared. Students needing MATH123/124 Calculus I and II for Mathematics, Physics, and Chemistry are advised to take MATH 110 if they are not adequately prepared for these courses. MATH 110 is more rigorous, faster paced, and, in addition to topics covered in MATH 105, deals with trigonometric functions. Rewording the catalog description of MATH 110 should help eliminate confusion among students about whether MATH 105 or MATH 110 is the appropriate course.

4. Old Syllabus of record. (Attached.)
5. Liberal Studies course approval form and checklist. (Attached.)

Part III. Letters of Support (Attached.)

I. Catalog Description

MATH 110 Elementary Functions

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

Prerequisite: MATH 100 or appropriate Placement Test score or permission of the Mathematics Department Chairperson.

Note: Students may not take MATH 110 after successfully completing a calculus course without the written approval of the Mathematics Department Chairperson.

Prepares mathematics and science students for the study of calculus. Topics include detailed study of polynomial, exponential, logarithmic, and trigonometric functions.

II. Course Objectives

1. Students will understand and take advantage of pattern recognition in the study of mathematics.
2. Students will make a careful study of functions and their application to science.
3. Students will understand how to interpret functions expressed analytically and graphically.
4. Students will be able to calculate the rate of change of a function and interpret its meaning
5. Students will leave the course with a solid set of skills and a conceptual framework to equip the students for the future study of calculus and science.

III. Course Outline

A. Fundamentals (3 hours)

1. Inequalities (includes nonlinear inequalities)
2. Coordinate Geometry
3. Graphing Calculators and Computers
4. Lines

B. Functions (8 hours)

1. What is a Function?
2. Graphs of Functions
3. Applied Functions
4. Transformations of Functions
5. Extreme Values of Functions
6. Combining Functions
7. One to One Functions and Their Inverses

C. Polynomials and Rational Functions (5 hours)

1. Polynomial Functions and Their Graphs
2. Real Zeros of Polynomials
3. Remainder and Factor Theorems, and Upper and Lower Bound Theorem only
4. Rational Functions

Note : Oblique asymptotes are optional

D. Exponential and Logarithmic Functions (8 hours)

1. Exponential Functions
2. The Natural Exponential Function
3. Logarithmic Functions
4. Laws of Logarithms
5. Exponential and Logarithmic Equations
6. Applications of Exponential/Logarithmic Functions

E. Trigonometric Functions of Real Numbers (5 hours)

1. The Unit Circle
2. Trigonometric Functions of Real Numbers
3. Trigonometric Graphs
4. More Trigonometric Graphs (Optional)

F. Trigonometric Functions of Angles (4 hours)

1. Angle Measure
2. Trigonometry of Right Angles
3. Trigonometric Functions of Angles
4. The Law of Sines (Optional)
5. The Law of Cosines (Optional)

G. Analytic Trigonometry (5 hours)

1. Trigonometric Identities
2. Addition and Subtraction Formulas
3. Double-Angle, Half-Angle and Product-Sum Formulas
4. Inverse Trigonometric Functions
5. Trigonometric Equations

This syllabus covers 38 hours, leaving 4 hours for testing and/or review.

IV. Evaluation Methods

The final grade for the course will be determined as follows:

50% Tests. Tests will include problems on basic competency and critical thinking.

20% Final Examination. The final examination will be comprehensive and cover both basic competency and critical thinking.

30% Homework, Quizzes, and Projects. These will cover textbook assignments and applications to business and economics.

Grades will be assigned as follows:

A: 90%-100%

B: 80%-89%

C: 70%-79%

D: 60-69%

F: 0%-59%

V. Required Textbook

Stewart, James, Lothar Redlin, and Saleem Watson. Precalculus: Mathematics for Calculus. Upper Saddle River, NJ: Prentice-Hall, Inc., 2002.

VI. Special Resource Requirements

Some instructors may require students to purchase a graphing calculator.

VII. Bibliography

Committee on the Mathematical Sciences in the Year 2000. Everybody Counts: A Report to the Nation on the Future of Mathematics Education. Washington, DC : National Academy Press, 1989.

Connally, Eric, et al. Functions Modeling Change. New York: John Wiley & Sons, Inc., 2000.

Edwards, C. Henry and David E. Penney. Calculus with Analytic Geometry. Upper Saddle River, NJ: Prentice Hall, 1998.

Hughes-Hallet, Deborah, et al. Applied Calculus. New York: John Wiley & Sons, Inc., 1999.

Mathematics Department
Indiana University of Pennsylvania
Indiana, PA 15705

Course Number: MA 110

Course Title: Elementary Functions

Credits: 3 semester hours

Prerequisites: student may not have successfully completed a calculus course

Textbook: *Mathematics for Calculus*, 2nd ed.
by Stewart, Redlin, Watson
Brooks/Cole

Revised: 8/93

Catalog Description:

For students not prepared to begin the study of calculus; topics include polynomial, exponential, logarithmic, and trigonometric functions.

Course Outline/Time Schedule*:

1. Fundamentals

1.9 Coordinate Geometry

Note: Try to avoid using x,y charts when plotting points; have the students write ordered pairs instead.

1.10 Lines

Principles of Problem Solving

2. Functions

2.1 Functions

2.2 Graphs of Functions

2.4 Applied Functions

2.5 Transformations of Functions

2.6 Quadratic Functions and Their Extreme Values

Note: Distinguish between an extreme value and where it occurs.

2.8 Combining Functions

2.9 Composition of Functions

2.10 One-to-One Functions and Their Inverses

Focus on Problem Solving : Pattern Recognition

3. Polynomials and Rational Functions
 - 3.1 Polynomial Functions and Their Graphs

Note: Cover graphing factored polynomials (i.e. $(x-3)(x+2)^2(x-1)$) though it is not in the text.
 - 3.3 Dividing Polynomials
 - 3.4 Rational Roots

Note: Only the Rational Root Theorem
 - 3.5 Irrational Roots
 - 3.9 Rational Functions

Note: Oblique asymptotes are optional
 - 3.11 Polynomial and Rational Inequalities
4. Exponential and Logarithmic Functions
 - 4.1 Exponential Functions
 - 4.2 Application: Exponential Growth and Decay
 - 4.3 Logarithmic Functions
 - 4.4 Laws of Logarithms
 - 4.5 Applications of Logarithms
5. Trigonometric Functions of Real Numbers
 - 5.1 The Unit Circle
 - 5.2 Trigonometric Functions of Real Numbers
 - 5.3 Trigonometric Graphs
 - 5.4 More Trigonometric Graphs
6. Trigonometric Functions of Angles
 - 6.1 Angle Measure
 - 6.2 Trigonometry of Right Angles
 - 6.3 Trigonometric Functions of Angles

Note: Omit area of a triangle formulas.
 - 6.4 The Law of Sines (**OPTIONAL**)
 - 6.5 The Law of Cosines (**OPTIONAL**)

*This syllabus covers 30 sections in the text. If you cover one section per hour, this leaves 4 hours for tests, 4 hours for review, and 4 free days to cover optional topics or to devote extra time to topics that may give your students difficulty.

Note : If you wish to use a graphing calculator in this course, you must notify the chairperson of the Service Courses Committee one semester in advance so that a note to this effect can be included on the Course Schedule for students. Someone using graphing calculators may want to add or substitute the sections in the text devoted to the graphing calculator. These sections are clearly marked in the text.

If all the instructors agree, they may want to consider giving a departmental midterm examination and final examination.

LIBERAL STUDIES COURSE APPROVAL, PARTS 1-3: GENERAL INFORMATION CHECK-LIST

I. Please indicate the LS category(ies) for which you are applying:

LEARNING SKILLS:

- First Composition Course Second Composition Course
 Mathematics

KNOWLEDGE AREAS:

- | | |
|---|---|
| <input type="checkbox"/> Humanities: History | <input type="checkbox"/> Fine Arts |
| <input type="checkbox"/> Humanities: Philos/Rel Studies | <input type="checkbox"/> Social Sciences |
| <input type="checkbox"/> Humanities: Literature | <input type="checkbox"/> Non-Western Cultures |
| <input type="checkbox"/> Natural Sci: Laboratory | <input type="checkbox"/> Health & Wellness |
| <input type="checkbox"/> Natural Sci: Non-laboratory | <input type="checkbox"/> Liberal Studies Elective |

II. Please use check marks to indicate which LS goals are primary, secondary, incidental, or not applicable. When you meet with the LSC to discuss the course, you may be asked to explain how these will be achieved.

Prim Sec Incid N/A

- | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A. Intellectual Skills and Modes of Thinking: |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. Literacy--writing, reading, speaking, listening. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. Understanding numerical data. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. Historical consciousness. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. Scientific Inquiry. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 6. Values (Ethical mode of thinking or application of ethical perception). |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. Aesthetic mode of thinking. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | C. Understanding the Physical Nature of Human Beings |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | D. Collateral Skills: |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1. Use of the library. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. Use of computing technology. |

III. The LS criteria indicate six ways that courses should contribute to students' abilities. Please check all that apply. When you meet with the LSC, you may be asked to explain your check marks.

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.

LIBERAL STUDIES COURSE APPROVAL, PART IV:

A. There will be a common syllabus of topics that should be covered by each of the individual instructors teaching this course. The common syllabus will include, but not be limited to, topics which introduce the student to deductive reasoning, develop problem solving skills, enable the student to understand the underlying principles of formulae and extend the student's ability to use and interpret numerical data.

The Mathematics Department has in place a Service Courses Committee, which oversees courses offered by the department as a service for other departments. MATH 110 Elementary Functions will be under the jurisdiction of this committee, which will assure that basic equivalency exists among sections.

B. Whenever appropriate, information will be introduced into the classroom discussion which will reflect the contributions made to mathematics by women and minorities. Particular attention will be given to the following areas as they relate to this topic:

1. The classroom discussion will be sensitive to gender balancing with respect to language;
2. Quizzes, tests, examinations, and any other written information distributed to the students will be sensitive to gender balancing, especially in problem construction, and to minorities whenever possible;
3. Specific names and contributions made by women and other members of minority groups will be discussed in the classroom when the discussion of such is germane to the material being studied.

C. The Mathematics Department requests an exception to the required reading criteria for Liberal Studies courses since the primary purpose of the course is the development of higher level quantitative skills. MATH 110 Elementary Functions is designed to prepare students for MATH 123 Calculus I for Physics, Chemistry and Mathematics.

D. The thrust of MATH 110 is not to be remedial in nature but rather to develop in the student an awareness of, and an appreciation for, the power and usefulness of mathematics and its important role in a technological society. In particular, the course is meant to improve the mathematical maturity of students to the point where they are prepared to enroll in an introductory calculus course. Additionally, this course should enable students to develop confidence in handling numerical problems, present the student with an opportunity to develop an appreciation for mathematic, and allow the introduction to students of graphics calculators and/or mathematical computer software.

CHECK LIST -- MATHEMATICS

(Learning Skills Area)

Mathematics Criteria which the Course must meet:

- Introduce students to deductive reasoning
- Develop in the student problem solving techniques appropriate for the course
- Enable the student to understand the underlying principle of formulas
- Enable the student to use and interpret numerical information

Courses appropriate to the Mathematics Learning Skills Area must be either:

- A. Mathematics courses that develop significant mathematical skills required by a major discipline
- B. Mathematics courses designed for Liberal Studies

Additional criteria which courses in Category B must meet:

- Develop the student's confidence in handling numerical problems and data.
- Be sensitive to the diverse background characteristics of the student
- Include elements on the history or appreciation of mathematics
- Introduce the hand-held calculator or the computer as a tool

01-626

Mathematics Department Curriculum Changes

Response Form

The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

Nursing & Allied Health
Department Professions

[Signature] (Kuzneski 6-4-01)
Chairperson / Date

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.

Mathematics Department Curriculum Changes

Response Form

The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

HDES
Department

Linda S. Nelson . 6-15-01
Chairperson / Date

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.

Mathematics Department Curriculum Changes

Response Form

The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

Biology
Department

W. B. B. 5/7/01
Chairperson / Date

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.

Mathematics Department Curriculum Changes

Response Form

— The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

— The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

Computer Science
Department

Gay L. Benterbach / June 19, 2001
Chairperson / Date

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.

Mathematics Department Curriculum Changes

Response Form

The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

pre-professional
Natural Science
Department

Andrew C. Browne
Chairperson / Date
June 16, 2001

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.

Mathematics Department Curriculum Changes

Response Form

The Mathematics Department has informed me of the proposed changes listed below, and I support these changes.

The Mathematics Department has informed me of the proposed changes listed below, and I do not support these changes.

Comments:

Geoscience
Department

Denise Richards 6/13/10
Chairperson / Date

1. MATH 110 Elementary Functions: Change in prerequisite.
2. MATH 123 Calculus I for Physics, Chemistry, and Mathematics: Change in prerequisite, catalog description, and title.
3. MATH 124 Calculus II for Physics, Chemistry, and Mathematics: Change in prerequisite and title.