

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
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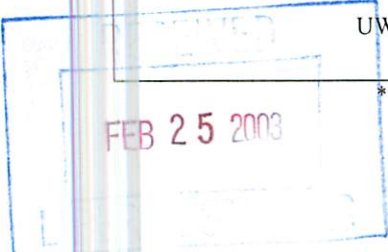
**Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee**

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Proposing Department/Unit Mathematics	Phone 7-2608

**Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.**

<b>1. Course Proposals (check all that apply)</b> <input checked="" type="checkbox"/> New Course <input type="checkbox"/> Course Prefix Change <input type="checkbox"/> Course Deletion <input type="checkbox"/> Course Revision <input type="checkbox"/> Course Number and/or Title Change <input type="checkbox"/> Catalog Description Change		
<u>Current Course prefix, number and full title</u>	<u>Proposed course prefix, number and full title, if changing</u>	
<b>2. Additional Course Designations: check if appropriate</b> <input type="checkbox"/> This course is also proposed as a Liberal Studies Course. <input type="checkbox"/> Other: (e.g., Women’s Studies, Pan-African) <input type="checkbox"/> This course is also proposed as an Honors College Course.		
<b>3. Program Proposals</b> <input type="checkbox"/> New Degree Program <input type="checkbox"/> Program Title Change <input type="checkbox"/> Other <input type="checkbox"/> New Minor Program <input type="checkbox"/> New Track <input type="checkbox"/> Catalog Description Change <input type="checkbox"/> Program Revision		
<u>Current program name</u>	<u>Proposed program name, if changing</u>	
<b>4. Approvals</b>		
Department Curriculum Committee	<i>Gary Stoudt</i>	Date
Chair(s)		2-7-03
Department Chair(s)	<i>Gary Stoudt</i>	2-7-03
College Curriculum Committee Chair	<i>[Signature]</i>	02/12/03
College Dean	<i>[Signature]</i>	2/12/03
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	<i>Joseph Domarache TECC</i>	2-25-03
	<i>[Signature]</i>	2-25-03
UWUCC Co-Chairs	<i>Gail Schuist</i>	3/18/03

\* where applicable



## I. Catalog Description

**MATH 340: Principles of Secondary School Mathematics**

3 class hours

0 lab hours

Prerequisite: MATH 271

3 credit hours

(3c-0l-3cr)

This course is designed to provide students with mathematics content and mathematical thinking they will need to teach in secondary schools, as well as to connect the content learned in college mathematics courses with the secondary curriculum. Open to secondary mathematics education majors only.

## II. Course Objectives

Students will be able to:

1. Experience mathematics as a process: that of conjecturing, problem solving and posing, forming generalizations, finding multiple representations or solutions to mathematical ideas and problems, seeking connections within and outside of mathematics, and communicating mathematical ideas.
2. Become proficient with mathematics content that they need to teach in secondary schools, such as complex numbers, theory of equations, combinatorics, and probability.
3. Make connections of some higher-level mathematics topics to secondary school mathematics topics.

## III. Course Outline

- A. Methods of Mathematical Reasoning 6 hours
1. Venn Diagrams
  2. Conditional Statements
  3. Negations of Quantified Statements
  4. Deductive vs. Inductive Reasoning
- B. Functions 9 hours
1. Transformations and Families of Functions
  2. Applications of Functions
  3. Sequences as Functions
  4. Recursive and Explicit Representations of Sequence Formulas
  5. Problem Solving Related to Sequences and Functions
  6. Mathematical Induction
- C. Matrices 3 hours
1. Relationship to Systems of Equations
  2. Relationship to Linear programming
  3. Properties of Matrices

Midterm 1 hour

**D. Theory of Equations** 9 hours

1. Solutions of Polynomial Equations with Real Coefficients
2. Complex Number Solutions
3. Descartes' Rule of Signs, Factor Theorem, Fundamental Theorem of Algebra
4. DeMoivre's Theorem
5. Lagrange Polynomials and Curve Fitting
6. Complex Number Representations

**E. Probability** 5 hours

1. Counting principles
2. Theoretical Probability
3. Experimental Probability

**F. Analytic Geometry** 9 hours

1. Conic Sections
2. Applications and Problem Solving Related to Conic Sections
3. Transformations on Conic Sections

**G. Final Exam**

**IV. Evaluation Methods**

Students will present projects, problems, and applications to the class. They will submit written work explaining mathematical ideas, proofs, or solutions.

Grades will be based on quizzes, assignments, projects, class participation, class presentations, a midterm exam, and a comprehensive final exam.

The final grade will be determined as follows:

Class assignments and participation	10%
Presentations	20%
Quizzes	20%
Writing Assignments (proofs, problem solutions)	20%
Midterm/Final Exams	30%

Grading Scale:A: 90-100%; B: 80-89%; C: 70-79%; D: 60-69%; F: below 60%

**V. Attendance Policy:**

Students are expected to attend class. The attendance policy will be defined by the instructor according to the University Course Attendance Policy.

**VI. Required Textbooks, Supplemental Books and Readings**

There is no required textbook.

**VII. Special Resources or Requirements**

Students are required to have a TI-83+ graphing calculator.

## VII. Bibliography

- Connally, Eric, et al (1999). *Functions Modeling Change: A Preparation for Calculus*. New York: John Wiley and Sons.
- Consortium for Mathematics and Its Applications – COMAP (1997). *Principles and Practice of Mathematics*. New York : Springer-Verlag.
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- Foerster, Paul A. (1998). *Algebra and Trigonometry: Functions and Applications*. Boston: Addison-Wesley.
- Herr, Ted and Ken Johnson (1994). *Problem Solving Strategies: Crossing the River with Dogs*. Emeryville, CA: Key Curriculum Press.
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- Mason, John, with L. Burton and K. Stacey (revised edition) (1985) . *Thinking Mathematically*. Boston: Addison-Wesley.
- Mathematical Sciences Education Board (National Research Council) (1998) . *High School Mathematics at Work*. Washington, DC: National Academy Press.
- National Council of Teachers of Mathematics (2000). *Principles and Standards for School Mathematics*. Reston, VA: NCTM.
- Nelsen, Roger B. (1993). *Proofs Without Words: Exercises in Visual Thinking*. Washington, DC: Mathematical Association of America (MAA).
- Nelsen, Roger B. (2000). *Proofs Without Words II: More Exercises in Visual Thinking*. Washington, DC: MAA.
- Sobel, Max A.; and Evan M. Maletsky (1988). *Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies*. Englewood Cliffs, NJ: Prentice Hall.
- Washington, Allyn J. (2000). *Basic Technical Mathematics*. Boston: Addison Wesley.

**Course Analysis Questionnaire—MATH 340 Principles of Secondary School Mathematics**

**Section A: Details of the Course**

- A1 How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies). Explain why this content cannot be incorporated into an existing course.

This course will be required of Secondary Mathematics Education majors. This course is designed to cover mathematics content not currently in existing courses and to make connections between content of existing courses and content of secondary school mathematics. These connections cannot be made in existing courses because mathematics content courses also serve students not in the Secondary Mathematics Education program.

- A2 Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

This course requires a change in the requirements for the B.S. Ed. in Secondary Mathematics Education. This course is part of the revised program proposal.

- A3 Has this course ever been offered at IUP on a trial basis (e.g. as a special topic). If so, explain the details of the offering (semester/year and number of students).

This course has not been offered at IUP.

- A4 Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

This course is not a dual level course.

- A5 If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

This course cannot be taken for variable credit.

- A6 Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

California State University-Northridge, MATH 396HS, High School Mathematics from an Advanced Standpoint  
University of Georgia, EMAT 4500 Connections in Secondary School Mathematics  
University of California, Berkeley, MATH 191, High School Mathematics from an Advanced Standpoint

- A7 Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

The National Council of Teachers of Mathematics (NCTM, 1991) suggests that "central to the preparation for teaching mathematics is the development of a deep understanding of the mathematics of the school curriculum and how it fits within the discipline of mathematics" (p. 134). For NCTM, this means preservice teachers should study a broad range of mathematics. Teachers should be able to see the connections between mathematics and other school subjects

and with real world situations where mathematics could be applied. The Council argues that mathematics teachers must study higher mathematics at an advanced level and revisit the content of elementary mathematics. [National Council of Teachers of Mathematics. (1991). *Professional standards for teaching mathematics*. Reston, VA]

The content of this course is also designed to correspond with the content of the PRAXIS II Mathematics Content Test.

**Section B: Interdisciplinary Implications**

- B1 Will this course be taught by instructors from more than one department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

This course will not be taught by instructors from more than one department.

- B2 What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

There is no relationship.

- B3 Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

This course will not be cross-listed.

**Section C: Implementation**

- C1 Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

Faculty resources are adequate. This course will eventually replace MATH 117 in our course offerings.

- C2 What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy?

The resources needed to teach the course are adequate.

- C3 Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

No resources are funded by a grant.

- C4 How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

This course will be offered every Fall semester. It is designed so that Secondary Mathematics Education majors will have completed MATH 271 during the Fall or Spring of the second year of their program.

- C5 How many sections of this course do you anticipate offering in any single semester?

One section every Fall semester.

- C6 How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

We plan to accommodate 35 students per section. This is based on the number of majors during the sophomore/junior years.

- C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

No enrollment limits are recommended.

- C8 If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

This course is not a distance education course.

**Section D: Miscellaneous**

This course fits the Department's overall plan to comply with the 120 credit graduation requirement while functioning with fewer faculty positions.