LSC Use Only No: LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
	02-87d	App 3/18/03	App - 4/1/03

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Gary Stoudt	gsstoudt@iup.edu
Proposing Department/Unit	Phone
Mathematics	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.

1. Course Proposals (check all that apply)

_____New Course _____Course Prefix Change _____Course Deletion

__X__Course Revision _____Course Number and/or Title Change _____Catalog Description Change

MATH 460 Technology in Mathematics Instruction	
***Current** Course prefix, number and full title*	***Proposed** course prefix, number and full title, if changing*

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_______ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision

_____New Degree Program _____Program Title Change _____Other

_____New Minor Program _____New Track

***Current** program name*	***Proposed** program name, if changing*

4. Approvals

		Date
Department Curriculum Committee Chair(s)	Janet M Walker	2-7-03
Department Chair(s)	Gary Stoudt	2-7-03
College Curriculum Committee Chair	[signature]	02/12/03
College Dean	John D. Eck	02/12/03
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph Domaracki	2-25-03
	[signature] Dean COE	2-25-03
UWUCC Co-Chairs	Gail S Sechrist	3/18/03

* where applicable

1. New Syllabus of Record

I. Catalog Description

MATH 460 Technology in Mathematics Instruction	3 class hours 0 lab hours
Prerequisites: COSC 110, Junior Status	3 credit hours (3c-0l-3cr)

The course is laboratory-based and designed to provide pre-service mathematics teachers with expertise in instructional technology for teaching mathematics at the secondary level. A strong emphasis is placed upon the integration of pedagogy and subject matter knowledge. Open to secondary mathematics education majors only and must be taken within two semesters prior to student teaching.

II. Course Objectives

The overall goal of this course is for students to learn to integrate appropriate technology in the teaching of mathematics. A laboratory approach to instruction will provide students experience with instructional tools for teaching in the 21st century.

Students will be able to:

1. Use technology in the teaching of secondary school mathematics.
2. Become aware of current national policies and trends in the use of technology in secondary mathematics.
3. Use a wide variety of modern technologies.
4. Integrate technology in the teaching of pre-algebra, algebra, probability, statistics, geometry, calculus, and discrete mathematics.
5. Become better problem-solvers in mathematics through using technology.
6. Use technology to encourage more active learning from secondary school mathematics students.
7. Gain a deeper conceptual understanding of mathematical content taught in secondary schools.
8. Review and use research and literature related to technology.

To accomplish these goals, students will work with computers, a variety of software tools for teaching mathematics, calculators, telecommunication systems, other modern technology.

III. Course Outline

A. Introduction to Technology in Mathematics Education — 3 hours
   1. Review of Literature
   2. Current Research

B. Using Technology to Teaching Mathematics — 18 hours
   1. Computer Software
      a. Spreadsheets/Graphing
      b. Database
      c. Applied Mathematics software

d. Algebraic software
e. Geometry software
f. Problem-solving software
g. Internet Resources
h. Presentation software

2. Calculators 9 hours
   a. Non-programmable
   b. Scientific
   c. Graphing calculators
   d. CBL: Calculator-Based Laboratory
3. Other Technology 9 hours
   a. Distance learning
   b. Videotaping

C. Student Project Presentations 3 hours

IV. Evaluation Methods

The final grade will be determined as follows:

Class Work/Participation	20%
Quizzes	30%
Projects	30%
Portfolio	20%

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 Resource Requirements

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

VIII. Bibliography

Burrill, G. (1992). The graphing calculator: A tool for change. In J. T. Fey (Ed.), *Calculators in Mathematics Education* (pp. 14-22). Reston, VA: National Council of Teachers of Mathematics.

Burke, Maurice J. (ed.) (2000). *Learning Mathematics for a New Century.* Reston, VA: National Council of Teachers of Mathematics.

Crane, Beverly (2000). *Teaching With the Internet: Strategies and Models for K-12 Curricula.* New York: Neal-Schuman Publishers.

Demana, F., & Waits, B. K. (1990). The role of technology in teaching mathematics. *The Mathematics Teacher*, 83(1), 27-31.

Fey, J. T. (Ed.), *Calculators in mathematics education: 1992 NCTM Yearbook.* Reston, VA: National Council of Teachers of Mathematics.

Heid, M. K., & Baylor, T. (1993). Computing technology. In P. S. Wilson (Ed.), *Research ideas for the classroom: High school mathematics.* New York: Macmillan.

Hirschbuhl, J. H., & Bishop, D. (1996). Computers in education, (7 ed.) Guillford, CT: Dushkin Publishing Group/Brown & Benchmark Publishers.

Kaput, J. J. (1992). Technology and mathematics education. In D. A. Grouws (ed.) Handbook of research on mathematics teaching and learning (pp. 515-556). New York: Macmillan.

Masalski, William J. (1999). *How to Use the Spreadsheet as a Tool in the Secondary Mathematics Classroom.* Reston, VA: National Council of Teachers of Mathematics.

Mercer, J. (1992). What is left to teach if students can use calculators? *The Journal of Technological Horizons in the Classroom*, 84 (September), pp. 415-417.

Roblyer, Margaret D. (2002). *Integrating Educational Technology into Teaching.* Upper Saddle River, NJ : Prentice Hall.

Sandholts, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms.* Williston, VA: Teachers College Press.

Schattschneider, Doris and James King (eds.) (1997). *Geometry Turned On: Dynamic Software in Learning, Teaching and Research.* Washington, DC: Mathematical Association of America.

Steen, D. R., Roddy, M. R., Sheffield, D., & Stout, M. B. (1995). *Teaching with the internet,* Bellevue, WA: Resolution Business Press, Inc.

Wilson, J. W., & Kilpatrick, J. (1989). Theoretical issues in the development of calculator-based mathematics tests. In J. W. Kenelly (ed.) *The use of calculators in the standardized testing of mathematics.* New York: College Entrance Examination Board.

Selected journals:

Educational Technology
Journal for Research in Mathematics Education
The Journal of Technological Horizons in the Classroom
Learning and Leading with Technology
The Mathematics Teacher
School Science and Mathematics
Teaching Mathematics in the Middle School

2. Summary of Revisions

The only changes are in the prerequisites and the course description. The prerequisite is being changed from COSC 205 to COSC 110 and Junior Status. The course description is being modified to inform students that the course must be taken one or two semesters prior to student teaching.

Old course description:

MA 460 Technology in Mathematics Instruction	3 class hours 0 lab hours
Prerequisites: CO 205	3 semester hours (3c-0l-3sh)

Designed to provide preservice mathematics teachers with expertise in instructional technology for teaching mathematics at the secondary level. Pedagogical and content knowledge are integrated within the context of technology and current reforms.

New course description:

MATH 460 Technology in Mathematics Instruction	3 class hours 0 lab hours
Prerequisites: COSC 110, Junior Standing	3 semester hours (3c-0l-3sh)

The course is laboratory-based and designed to provide pre-service mathematics teachers with expertise in instructional technology for teaching mathematics at the secondary level. A strong emphasis is placed upon the integration of pedagogy and subject matter knowledge. Open to secondary mathematics education majors only and must be taken within two semesters prior to student teaching.

3. Justification/Rationale for the Revision

The Mathematics Department is revising the B.S. Ed. in Secondary Mathematics Education degree program to require COSC 110 rather than COSC 205, thus necessitating the prerequisite change.

Students traditionally take this course one or two semesters prior to student teaching. The Mathematics Department is making this an official requirement. Students must complete this course as close as possible to their student teaching so that their knowledge of teaching and learning with technology is current. In addition, students should have completed as many mathematics courses as possible so that they are better able to make connections between content and technology.

4. Old Syllabus of Record

I. Catalog Description

MA 460 Technology in Mathematics Instruction	3 class hours 0 lab hours
Prerequisites: CO 205	3 semester hours (3c-0l-3sh)

Designed to provide preservice mathematics teachers with expertise in instructional technology for teaching mathematics at the secondary level. Pedagogical and content knowledge are integrated within the context of technology and current reforms.

II. Course Objectives

The overall goal of this course is for students to learn to integrate appropriate technology in the teaching of mathematics. A laboratory approach to instruction will provide students experience with instructional tools for teaching in the 21st century.

Specific instructional objectives for this course include:

1. The students will be able to use technology in the teaching of secondary school mathematics.
2. The students will become aware of current national policies and trends in the use of technology in secondary mathematics.
3. The students will have hands-on experience with a wide variety of modern technologies.
4. The students will be able to integrate technology in the teaching of pre-algebra, algebra, probability, statistics, geometry, calculus, and discrete mathematics.
5. The students will become better problem-solvers in mathematics through using technology.
6. The students will become capable of using technology to encourage more active learning from secondary school mathematics students.
7. The students will gain a deeper conceptual understanding of mathematical content taught in secondary schools.
8. The students will be exposed to research and literature related to technology.

To accomplish these goals, students will work with:
computers, a variety of software tools for teaching mathematics,
calculators, telecommunication systems, other modern technology.

III. Course Outline

	Weeks
A. Introduction to Technology in Mathematics Education 1. Review of Literature 2. Current Research	1 week
B. Using Technology to Teaching Mathematics 1. Computer Software a. Spreadsheets/Graphing	6 weeks

b. Database
c. Applied Mathematics software
d. Algebraic software
e. Geometry software
f. Problem-solving software
g. Internet Resources
h. Presentation software

2. Calculators — 3 weeks
   a. Non-programmable
   b. Scientific
   c. Graphing calculators
   d. CBL: Calculator-Based Laboratory
3. Other Technology — 3 weeks
   a. Distance learning
   b. Videotaping
   c. Student Project Presentations — 1 week

IV. Evaluation Methods

Evaluation of student performance will be based upon:

Class Work/Participation	20%
Tests/Quizzes	30%
Projects	30%
Portfolio	20%

V. Required Textbooks, Supplemental Books and Readings

There is no required textbook.

VI. Special Resource Requirements

This course requires the availability and use of a computer lab, a classroom set of graphing calculators with an overhead display unit, and video technology equipment.

VII. Bibliography

Burrill, G. (1992). The graphing calculator: A tool for change. In J. T. Fey (Ed.), Calculators in Mathematics Education (pp. 14-22). Reston, VA: National Council of Teachers of Mathematics.

Carter, R. (1992). Using technology in graphing. The Mathematics Teacher, 85 (2), 118-121.

Demana, F., & Waits, B. K. (1990). The role of technology in teaching mathematics. The Mathematics Teacher, 83(1), 27-31.

Fey, J. T. (Ed.), Calculators in mathematics education: 1992 NCTM Yearbook. Reston, VA: National Council of Teachers of Mathematics.

Heid, M. K., & Baylor, T. (1993). Computing technology. In P. S. Wilson (Ed.), Research ideas for the classroom: High school mathematics. New York: Macmillan.

Hirschbuhl, J. H., & Bishop, D. (1996). Computers in education, (7 ed.) Guillford, CT: Dushkin Publishing Group/Brown & Benchmark Publishers.

Hopkins, M. H. (1992). The use of calculators in assessment of mathematics achievement. In J. T. Fey (ed.), Calculators in mathematics education (pp. 158-166). Reston, VA: National Council of Teachers of Mathematics.

Kaput, J. J. (1992). Technology and mathematics education. In D. A. Grouws (ed.) Handbook of research on mathematics teaching and learning (pp. 515-556). New York: Macmillan.

Mercer, J. (1992). What is left to teach if students can use calculators? The Journal of Technological Horizons in the Classroom, 84 (September), pp. 415-417.

Munday, R., Stamper J., & Windham, R. (1991). Teachers must become better prepared to teach with the use of technology. Educational Technology, 31 (3), pp. 29-31.

Nichols, J. A., & Taylor, L. J. C. (1994). Graphing calculators are becoming increasingly important in the middle school, as well as the high school. Mathematics Teaching the Middle School, 1 (3), pp. 190-196.

Py, D. (1993). The use of computer software to ease the process of solving proofs. Computers and Education, 20 (1), pp. 141-146.

Sandholts, J. H., Ringstaff, C., & Dwyer, D. C. (1997). Teaching with technology: Creating student-centered classrooms. Williston, VA: Teachers College Press.

Steen, D. R., Roddy, M. R., Sheffield, D., & Stout, M. B. (1995). Teaching with the internet, Bellevue, WA: Resolution Business Press, Inc.

Wilson, J. W., & Kilpatrick, J. (1989). Theoretical issues in the development of calculator-based mathematics tests. In J. W. Kenelly (ed.) The use of calculators in the standardized testing of mathematics. New York: College Entrance Examination Board.

Zimmerman, W., & Cunningham, S. (Eds.) (1991). Visualization in teaching and learning mathematics. Washington, DC: Mathematical Association of America.

Other selected journals:

Educational Technology
Journal for Research in Mathematics Education
The Journal of Technological Horizons in the Classroom
Learning and Leading with Technology
The Mathematics Teacher
School Science and Mathematics
Teaching Mathematics in the Middle School

VI. Letters of Support

From: Jim Wolfe [jlwolfe@iup.edu]
Sent: Sunday, November 17, 2002 5:24 PM
To: Gary Stoudt
Subject: Re: Letter of support

Gary,

Computer Science is happy to support the replacement of COSC 205 with COSC 110 for Secondary Mathematics Education majors. We believe that this change will benefit these students by giving them an opportunity to gain more in-depth understanding of a programming language and the task of programming. A full semester of COSC 110 should also prove less confusing than the language change which takes place now in the middle of COSC 205. However, in moving from an overview of two languages to a complete course in one language, the students may need to put more effort into the course - the projects may be more than superficial.

We are offering COSC 205 for the Spring 2003 semester. As you know, we have been offering the course during the Spring semester for the past few years. Regarding Spring 2004, we will await your advice as to whether or not to offer it.

Because COSC 110 is offered every semester (and summer), the Secondary Mathematics Education majors should have a much easier time in fitting it into their schedule than they had with COSC 205. We are happy to cooperate in making this curriculum change.

Jim Wolfe
Chair, Computer Science

From: Gail Sechrist [gailsech@iup.edu]
Sent: Wednesday, January 22, 2003 2:50 PM
To: Gary Stoudt
Subject: Re: More on Curriculum Revisions

No you don't need a letter of support or much of a rationale other than it has been removed from the College Educ. Core.

Gail

----- Original Message -----
From: "Gary Stoudt" <gsstoudt@iup.edu>
To: "'Gail Sechrist'" <gailsech@iup.edu>
Sent: Wednesday, January 22, 2003 9:48 AM
Subject: More on Curriculum Revisions

> I just thought of a procedural question that perhaps you can answer. I believe that at the last Senate
> meeting FDED 102 was removed from the Education core. We are almost done with our Secondary
> Mathematics Education revisions and we are removing FDED 102 from our program as
> well. Do we need a letter of support from the FDED "department" given that the course is no longer
> in the Education core?