New Course Request

Check Appropriate Boxes: Undergraduate credit ☑️  Graduate credit ☐  Professional credit ☐

1. School/Division: Educational Studies
2. Academic Subject Code: EDUC
3. Course Number: N443 (must be cleared with University Enrollment Services)
4. Instructor: Merz
5. Course Title: Teaching Elementary Mathematics Problem Solving
   Recommended Abbreviation (Optional): Teaching Math Problem Solving
   (Limited to 32 Characters including spaces)
6. First time this course is to be offered (Semester/Year): Spring 2011
7. Credit Hours: Fixed at 3 or Variable from _________ to _________
8. Is this course to be graded S-F (only)? Yes ☐ No X ☑
9. Is variable title approval being requested? Yes ☐ No X ☐
10. Course description (not to exceed 50 words) for Bulletin publication:
    The teaching and learning of problem solving. Topics include types of problems, appropriate instructional sequences, strategies for solving problems, factors related to problem difficulty, evaluating problem-solving learning. Work with elementary school children is included.

11. Lecture Contact Hours: Fixed at 3 or Variable from _________ to _________
12. Non-Lecture Contact Hours: Fixed at 0 or Variable from _________ to _________
13. Estimated enrollment: 20 of which 20 percent are expected to be graduate students.
14. Frequency of scheduling: 1 semester/year
   Will this course be required for majors? Yes ☐ No ☑
15. Justification for new course: MATCHING COURSE to be a part of our concentration in mathematics for elementary majors
16. Are the necessary reading materials currently available in the appropriate library?
17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.
18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: ___________________________ Date: 3-18-10
Date Department Chairman/Division Director

Approved: ___________________________ Date: 3-18-10
Dean

Dean of Graduate School (when required)

Chancellor/Vice-President

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724

University Enrollment Services Final-White; Chancellor/Vice-President-Blue; School/Division-Yellow; Department/Division-Pink, University Enrollment Services Advance-White
EDUC N443
TEACHING ELEMENTARY SCHOOL MATHEMATICAL PROBLEM SOLVING

Instructor

OnCourse
This syllabus, as well as various course materials, will be available via IU’s OnCourse system. Students should check the OnCourse site for this course regularly (at least twice per week) for announcements and course information.

Office Hours
By appointment. Also, feel free to stop by my office or to phone me any time, if I am too busy to talk we can arrange for another time.

Course Objectives: This course has three primary objectives:

I. Students will increase their understanding of the nature of mathematical activity by solving a variety of mathematics problems, thereby improving their ability to: (a) think mathematically, (b) reflect on their own thinking processes while doing mathematics, and (c) monitor and evaluate their own thinking while doing mathematics.

II. Students will develop a greater appreciation for and understanding of the value of learning (and teaching) mathematics through active investigation and exploration. By the end of the course students will develop their personal theories of mathematical problem solving.

III. Students will increase their understanding of the role of problem solving in the elementary school mathematics curriculum. In particular, they will: (a) understand the goals of problem solving, (b) become familiar with different types of problems and problem-solving activities appropriate for elementary school, and (c) be able to prepare problem-based instructional units.

Required Text and Readings


Selected readings on the topic teaching mathematics through problem solving, and on mathematical problem solving. Readings will be distributed in class or posted to OnCourse.

Weekly Class Structure & Format

Small-group cooperative work and discussion will characterize all classes format. An important share of the course will consist of students working on problem solving activities including extended ones that we refer to as MODEL-ELICITING ACTIVITIES (MEA).
Students will also engage in reflection activities, discussion groups, follow-up activities, and tool development. Typically, these classes will involve some combination of whole-class discussion, small-group work, and individual reflection. This class is likely to be different from any other math course you have ever taken because instead of stressing the learning of facts, procedures and formulas, the goal is to support you in your development of your own “theory” or model about the nature of mathematical problem solving.

Course Assignments and Grades

Students are to compile a portfolio in which they will document their learning in the class and their evolving conception of problem solving. Two thirds of the grade in the class will be based on the quality of the course portfolio. The remaining one third will be based on the quality of the student’s engagement in the class. Three times in the semester students will submit their portfolios for assessment and will meet with the course instructor for an interview. During the interview students will make their case about what they have learned and point to specific entries in their portfolio that illustrate that. During the interviews students are to show their evolving conception of problem solving. Portfolio entries include the assignments listed below.

Group and individual solutions reports
Read and analyze transcripts
Read, write and present reports on articles and on textbooks
Write one extended problem solving activity
Curriculum project
Mathematics topic exploration
Synthesis reflection
Other activities

Detailed descriptions for all assignments will be provided at a later time. Please prepare each assignment following the corresponding guidelines. Brief descriptions for each assignment are below.

Group and Individual Solutions Reports

Since this is a problem-solving course, you will be expected to attempt to solve quite a large number of problems, most of them during class. You will be writing individual or group reports on your solutions.

Read and Analyze Transcripts

You will be reading and analyzing transcripts of students working on problems.

Read, Write and Present Reports on Articles and Textbooks

You will read, write and present reports on different articles on the topic teaching mathematics through problem solving, and on mathematical problem solving. You will also critically review the use of problem solving in elementary school textbooks, and write reports about your findings.
Write One Extended Problem Solving Activity

You will be expected to produce at least one original problem solving activity in the semester. The activity should be appropriate for elementary school students.

Curriculum Project

You will become familiar with elementary school curriculum and will work on a project to integrate problem solving in current mathematics curriculum. For this assignment you are to identify a portion of the elementary mathematics curriculum and decide how it can be improved with the use of problem solving.

Mathematics Topic Exploration

For this project you and a partner will select a mathematical topic that has direct application in the real world. You will read about the topic and teach yourself all you can about it. The goal is for you to engage in learning some new mathematics on your own and to prepare a presentation to share your new knowledge with the class.

Synthesis Reflection

The portfolio must include a written reflection tying together all portfolio entries, making a case about what you have learned, and summing up your current conception of problem solving. Each version of your synthesis reflection will be kept in the portfolio. A minimum of three reflections, one for each assessment session, need to be included.

Other Activities

There will be many other opportunities to have products for the portfolio to document your learning and understanding of problem solving.

A rubric describing how the quality of course portfolio and engagement in the class are related to specific course grades will be distributed at a later time.