## I. ASCRC General Education Form

<table>
<thead>
<tr>
<th>Group</th>
<th>III Symbolic Systems</th>
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<tbody>
<tr>
<td>Dept/Program</td>
<td>Mathematical Sciences</td>
</tr>
<tr>
<td>Course Title</td>
<td>Mathematics for Elementary Teachers</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>Credits 4</td>
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</tbody>
</table>

## II. Endorsement/Approvals

Complete the form and obtain signatures before submitting to Faculty Senate Office

| Instructor          |          |
| Phone / Email       |          |
| Program Chair       | Dave Patterson |
| Dean                | Gerald A. Fetz |

## III. Description and purpose of the course:

General Education courses must be introductory and foundational. They must emphasize breadth, context, and connectedness; and relate course content to students’ future lives: See Preamble:

[http://www.umt.edu/facultysenate/gened/GEPreamble_final.htm](http://www.umt.edu/facultysenate/gened/GEPreamble_final.htm)

## IV. Criteria:

Briefly explain how this course meets the criteria for the group. See:

[http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm](http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm)

1. rigorously present a mapping between a real-world system and a human abstraction of the system.

   MATH 131 is a course in geometry, a classical setting for examining the relationship between a real-world system and a human abstraction. This course presents a study of properties of 2- and 3-dimensional objects through abstract representations using synthetic, analytic, and transformational methods. The course also investigates the roles of both direct and derived measurement on the study of physical space.

2. applies analysis, reasoning and creative thinking in the understanding and manipulation of symbolic codes.

   The course uses proof and justification of generalizations that are symbolic representations of congruence, similarity (including proportional reasoning), transformations, and coordinate geometry (analytic arguments).
3. utilizes alternative methods of communication, perception, and expression in order to encourage rigorous thinking.

The course uses physical models along with drawing and electronic representations. We study constructions using ruler and compass, explore the properties of planar transformations using Mira, and investigate generalizations using Geometer’s Sketchpad (a dynamic computer geometry system). We also compare 2- and 3-dimensional models with pictorial and symbolic representations.

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<tr>
<th>V. Student Learning Goals: Briefly explain how this course will meet the applicable learning goals. See: <a href="http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm">http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm</a></th>
</tr>
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<tbody>
<tr>
<td>1. demonstrate an understanding of the symbols and the transformations of the system.</td>
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<tr>
<td>2. relay and interpret information in terms of the given symbolic system.</td>
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<tr>
<td>3. apply creative thinking using the symbolic system in order to solve problems and communicate ideas.</td>
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VII. Syllabus: Paste syllabus below or attach and send digital copy with form. The syllabus should clearly describe how the above criteria are satisfied. For assistance on syllabus preparation see:

MATH 131
Mathematics for Elementary Teachers 1:10-2:00 MTWF
Section 03 LA 235

Teacher: Xxx Xxxxxx
Office: XXXXX
Phone: XXX-XXXX
Hours: 11-12 MTWF
Email: xxxx@xxxxxxx.xxx others by appointment

Prerequisites:
Open to Elementary Education (or pre-ED) majors only. Math 130.

Text:
A Problem Solving Approach to Mathematics for Elementary School Teachers
(9th Edition) by Billstein, Libeskind, & Lott (Addison Wesley, 2007)

A calculator is highly recommended. You will need a ruler, protractor, and a good compass. Two computer disks will be required to hand in computer assignments.

Learning Goals:
1. To identify and solve elementary geometry problems.
2. To model the logic of arguments involving parallelism, congruence, and similarity.
3. To use basic measurement to approach problems involving length, area, volume, mass, and temperature.
4. To explore, conjecture, and prove mathematical ideas and theorems.
5. To perform classical constructions using compass-straightedge, Mira, and computer software (Geometer’s Sketchpad).
6. To develop a facility with geometric theorems and proofs, through hands-on exploration.

Course Agenda:

Chapter 9: Introductory Geometry (3 weeks)
TEST 1
Chapter 12: Motion Geometry (3 weeks)
TEST 2
Chapter 11: Measurement (4 weeks)
TEST 3
Chapter 10: Constructions, Congruence, and Similarity (3 weeks)
QUIZ
Review
FINAL EXAM - Monday, December 12 8:00 – 10:00 am

Assignments and Grading:
Homework is assigned regularly, and collected occasionally. Some graded assignments will be assigned. Tests will contain some problems similar to homework problems and some new problems. On some days, we will hold class in the computer lab.

The grading distribution will be approximately as follows:
Homework & Text Assignments 15%
Geometer Sketchpad Assignments 15%
Course: MATH 131  
Title: Mathematics for Elementary Teachers  

Date revised: 9/10/2008

I. Purpose of the Course: To give prospective K-8 elementary school teachers the content background to teach mathematics; to introduce students to mathematical reasoning, mathematical problem solving, and communication. To introduce prospective teachers to mathematical investigations using computer geometry software.

II. Course Description (from http://www.umt.edu/catalog/mathsci.htm):  
U 131 Mathematics for Elementary Teachers 4 cr. Offered autumn and spring. Prereq., 130. Topics include introductory geometry, geometric constructions, congruence, similarity, measurement, coordinate geometry and an introduction to computer geometry.

III. Credit Hours: 4

IV. Frequency of Offering: Every semester (multiple sections)

V. Audience: Prospective K-8 elementary school teachers

VI. Learning Goals (What do we want the students to learn?):

7. To identify and solve elementary geometry problems.
8. To model the logic of arguments involving parallelism, congruence, and similarity.
9. To use basic measurement to approach problems involving length, area, volume, mass, and temperature.
10. To explore, conjecture, and prove mathematical ideas and theorems.
11. To perform classical constructions using compass-straightedge, Mira, and computer software (Geometer’s Sketchpad).
12. To develop a facility with geometric theorems and proofs, through hands-on exploration.

VII. Typical Methods of Course Assessment: EX (W), HW, OP, PR [Individual and Group]

VIII. Course Format: Lecture and class discussion. Students explore problems and discuss solutions. Students present the results of their explorations to each other and to the class. Homework is assigned and exams or projects are given. The class meets in the computer lab to do geometry investigations for each unit.

IX. Use of Technology (if any): Elementary calculators are used to explore the properties of measurement. Geometer's Sketchpad (computer software) is used to
investigate geometric properties and transformations. Internet applets are used to illustrate geometry concepts.