

## **Teaching Middle School Mathematics and Science Math/Science 323, 3 credits, Winter 2006**

Instructor: Teri Willard / Tim Sorey

Meeting Time: Fri., 9:00 am to 10:50 am

Office: Bouillon Hall 114 / Science  
302H

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Office Hours or by appointment:

Teri – 9-10am M–Th;

Tim – M:9-10am, W:10-11am, Th:12-1pm,  
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**Course Description:** As a prospective teacher, you will learn and use the methods and materials needed to teach middle school students mathematics and science with emphasis on the use of experiments, manipulatives, problem solving, cooperative learning, and communication.

**Prerequisites:** The prerequisites are Math 324 or EDEL 323 and SCED 324 or SCED 322 or permission of the instructors.

**Course Rationale:** To meet the expectations for mathematics and science teachers, a shift in content, instructional and assessment practices is crucial. The *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 2000) and the *National Science Education Standards* outline the specific changes needed in pre-service mathematics and science education. “The experiences that mathematics teachers have while learning mathematics have a powerful impact on the education they provide their students.” (NCTM) To become an effective mathematics teacher, you must learn a variety of teaching strategies including discovery, experiments, cooperative learning, and technology, in addition to direct instruction. To become an effective science teacher, you must learn how to teach science using inquiry-based lessons and learning communities. Therefore, you as students need to experience mathematics and science instruction in a way that will influence you positively as a teacher. This course employs the constructivist model of learning in which you will, with your interactions with your physical and social environments, individually construct and socially co-construct knowledge.

Part of our mission is to accommodate for your differences in learning styles in order to help all of you achieve a higher level of understanding. Excellent assessment practices are stressed; all assessment and instructional activities are integrated and used to promote better communication between you and your instructors. Part of the lesson plan includes choosing appropriate assessment strategies, such as questions and observation, that reflects student achievement in an unbiased manner. After the lesson is taught in an authentic teaching environment, you will get feedback through self-reflection, peer evaluation, and constructive comments from the supporting practicum teachers and course instructors. Through these practicum experiences, you are both introduced and encouraged to participate as a member of the professional community of mathematic and science educators. You are also encouraged to do this on a state and national level by becoming familiar with and joining a professional teaching organization such as National Council of Teachers of Mathematics, Washington State Mathematics Council, National Association for Research in Science Teaching, along with a content specific organization such as

the American Chemical Society, American Institute of Biological Sciences, and American Physical Society, just to name a few.

**Course Materials:** Your “textbook” will consist of handouts from the course instructors that you will receive throughout the quarter. These handouts will be part of your resource notebook. In addition, you will need to do the following.

- 1) Create a student Blackboard account and enroll in SCED323. (<http://courses.cwu.edu/>) (*A hand-out will be provided to help you perform this task.*)
- 2) Purchase a LiveText account. (<http://livetext.com>) (*You will be creating and submitting your individual lesson plans for a grade via LiveText.*)
- 3) Access the Washington State Essential Academic Learning Requirements for Science and for Mathematics at <http://www.k12.wa.us/CurriculumInstruct/default.aspx>. (*You will be supporting your lesson plans with appropriate state science and mathematics standards.*)
- 4) Access the National Science Education Standards for Teachers and Students at <http://www.nap.edu/readingroom/books/nse/>. (*You will be supporting your lesson plans with appropriate national science standards.*)
- 5) Access the National Council of Teachers of Mathematics (NCTM) website for viewing the Curriculum and Evaluation Standards for School Mathematics and the Professional Standards for School Mathematics (<http://www.nctm.org> – you can sign up for a free 90–day membership to view these documents or you can join). (*You will be supporting your lesson plans with appropriate national mathematics standards.*)
- 6) Obtain supplies – a calculator, spiral notebook for journaling, and a 3-ring binder  $\geq 2.5$  inches.

**Course Objectives:** In this class, you will become familiar with national and state mathematics and science standards for teaching and learning by reading, discussing, and applying those standards. The standards specifically addressed include:

<i>Mathematics</i>	<i>Science</i>
<b>Standards for Student Learning</b>	<b>Standards for Student Learning</b>
Number and Operations	Unifying concepts and processes in science
Algebra	Science as inquiry
Geometry	Physical science
Measurement	Life science
Data Analysis and Probability	Earth and space science
Problem Solving	Science and technology
Reasoning and Proof	Science in personal and social perspectives
Communication	History and nature of science
Connections	
Representation	
<b>Standards for Teaching: Teachers will</b>	<b>Standards for Teaching: Teachers will</b>
provide worthwhile mathematical tasks for engaging students in their own learning.	plan an inquiry-based program for their students.
orchestrate mathematical discourse with appropriate questioning and listening techniques.	guide and facilitate learning.

promote classroom discourse that engages students to reason, make connections, solve problems, and communicate.		engage in ongoing assessment of their teaching and of student learning.
enhance discourse by using tools that may include technology, manipulatives, stories, and dramatizations.		design and manage learning environments that provide students with the time, space, and resources needed for learning science.
create a learning environment that fosters student's development of mathematical power.		develop communities of learners that reflect the intellectual rigors of scientific inquiry and the attitudes and social values conducive to science learning.
engage in ongoing analysis of teaching and learning.		actively participate in the ongoing planning and development of the school science program.

### **Learner Outcomes and Assessment Strategies:**

You will demonstrate your ability to perform the following outcomes through the assigned assessments. By the end of the course, you will be able to:

1. Develop and teach lessons to middle level students using methods and appropriate measurement technology that support student inquiry.
2. Demonstrate understanding of the importance of the history of mathematics or science by completing a research project about a specific mathematics or science topic and its development.
3. Use safe practices when teaching “hands-on” science and mathematics by
  - Having awareness when developing, presenting, and participating in science and mathematics activities;
  - Listing appropriate safety precautions that students should take before performing a science and/or mathematics activity.
4. Adapt existing curricula and resources AND originate new curricula and resources into age-appropriate lessons using best teaching practices by researching curricula and resources related to specific WA EALRs, NSES, and NCTM benchmarks and adapting these materials to specific learning needs.
5. Demonstrate effective questioning techniques to both assess and guide students in “hands-on” exploration and constructing knowledge by developing questions that guide students from observations to experimental results to logical conclusions through inquiry and critical thinking.
6. Display knowledge of the WA EALRs by aligning curricular materials to specific WA EALR benchmarks.

### **Assessment and Evaluation Guidelines:**

The instructional and assessment strategies for this course are designed to inform you of your progress in achieving the performance outcomes. The instructors will give you feedback on your progress in meeting the performance outcomes.

### **Assignments\*:**

<b>Assignment</b>	<b>Points</b>
1. Math/science autobiography and reflection	100
2. Lesson Plans – 3 total (100 points each) 2 individual and 1 with a partner	300
3. Teach one lesson individually in a middle school classroom	100
4. Team teach one lesson in CWU classroom	100
5. Middle school classroom observations	200
6. Journal of observations in 5	200
7. LiveText Portfolio	200
<b>Total Points</b>	<b>1200</b>

\* Complete descriptions of the assignments and/or rubrics for grading the assignments will be handed out at appropriate times.

### **Grading:**

Grades will be determined by the following percents:

93- 100% A	90- 92% A-	87- 89% B+	83- 86% B	80- 82% B-	77- 79% C+	73- 76% C	70- 72% C-	67- 69% D+	63- 66% D	60- 62% D-	<60% F
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### **Professionalism:**

Remember you will be working with students at your assigned school, so as a teaching professional you must be dressed professionally, on time, and well-prepared. It is very important to be at your school before classes start. Your professionalism will be assessed by your university instructors and your assigned classroom teachers. Many students are allergic to fragrances, so please do not wear colognes, perfumes, etc.

### **Schedule/Rules:**

The class calendar is subject to change, but will be our tentative guideline for the course. If you miss a class, it is your responsibility to find out what was covered, announced, or assigned. In case of emergencies, it is your responsibility to contact the instructors as soon as possible. If a course deadline was missed, assessment alternatives are left up to the discretion of the instructors.

### **How to succeed:**

Take the responsibility for your own achievement. If you have questions regarding any of the assignments, ask the instructors.

If you have special needs or disabilities that may affect your ability to access information and/or material presented in this course, you are encouraged to contact the office of student assistance on campus 963-2171.

### **Final Note:**

We already have teachers in area schools anxiously anticipating your arrival in their classrooms!