SYLLABUS

MAT 345: TEACHING MATHEMATICS IN THE SECONDARY SCHOOL
WINTER 2013-2014 TR 3:30 – 5:30
INSTRUCTOR: MRS. JANIE BOWER, NBCT (retired)
Contact: Math Dept.: 601-318-6173; Home: 601-990-8241

TEXT (Optional; any edition is useful)
(Required: Access to the Common Core State Standards for Mathematics (various Internet sites).

CATALOG DESCRIPTION
(Three hours) The study of methods and problems related to teaching mathematics in secondary school.

COURSE DESCRIPTION AND RATIONALE

This course is designed to give the pre-service teacher an overview of the scope and sequence of mathematics instruction in the secondary school. Emphasis is placed on learning how to implement the Common Core State Standards in Mathematics (CCSSM) and to learn and practice using the Standards for Mathematical Practice (SMP) from the CCSSM. The latter expands on the previous emphasis in this course on the process standards recommended by the NCTM. That is, helping learners develop problem solving skills and improving the learner's ability to reason mathematically, communicate effectively and to make connections between branches of mathematics. The use of a variety of instructional strategies such as guided discovery, teacher-led whole-class discussion, the use of manipulatives, power points, SMART boards, calculators and computers, and the use of the textbook and other materials in the classroom will be practiced and evaluated as a means for implementing these standards. Guidelines for using cooperative learning groups will be discussed and practiced. Internet and library resources will be examined.

The course is based on knowledge of theories of learning and instruction, including relevant research; a knowledge of psychological concepts such as readiness and motivation; a knowledge of the state curriculum structure in secondary mathematics [the Common Core State Standards for Mathematics]; and a working knowledge of the NCTM standards for curriculum and evaluation and the NCTM professional standards for teaching mathematics. A goal of the course is that students will acquire this knowledge base. The course will also emphasize the increased use of technology in the secondary mathematics classroom. Students will learn how to use the TI graphing calculators and will be presented with a variety of activities using the calculator to develop higher order thinking skills. Students will conduct mathematical investigations using such calculators in algebra, trigonometry, precalculus, and calculus courses and will demonstrate that they know how to teach using this type of technology in at least one of the practice lessons that they teach. Students will practice using manipulatives and visual aids such as the use of red and black squares and number lines to walk for teaching signed numbers, the use of algebra tiles to teach multiplication of binomials and factoring, and the use of place value and fraction materials to teach percent, decimals, and fractions. Each student will be required to teach his or her peers how to use one or more of these devices within the context of a mathematics lesson.
Students will learn how to plan, develop, and present lessons on topics from the secondary mathematics curriculum structure. Although students will practice presenting teacher-directed lessons with the goal of developing a clear expository style, the role of teacher as a facilitator of learning will also be explored. Alternative forms of assessment will be discussed and modeled. A number of enrichment activities will be evaluated. Library research will include an examination of a variety of articles from professional magazines and journals. Students will compile lists of teacher resources including, but not limited to, resources available on the Internet.

All education courses at William Carey University are designed to provide a meaningful education that will result in the graduates becoming effective, state certified teachers. To this end, the education department builds upon the strong liberal arts and sciences curricula offered in the basic core through offering research-based courses which present a variety of educational theories with emphasis on transferring theories into effective teaching practices. Each mathematics course is designed to give the student an insight into the nature of mathematics, to acquaint students with some of its fundamental principles, and to emphasize the cultural values of the arts and sciences. Each mathematics course emphasizes critical thinking, problem solving, and the ability to communicate basic concepts orally and in writing. This course attempts to blend the goals of both departments. In accordance with the mission of William Carey University, mathematics and education courses are provided in a Christian environment, conducive to personal growth and the development of excellence in scholarship, leadership, and service.

**STUDENT LEARNING OUTCOMES**

The basic objective of the course is that every student will be able to develop and present a mathematics lesson, using problem solving, manipulatives, and appropriate technology, on a topic from any level of secondary mathematics; will be able to select and use different instructional strategies which address the needs of diverse learners; and will be able to assess the outcomes of that instruction. In particular, after completing the requirements of the course, the students should be able to:

1. define principal mathematical vocabulary and terms used in the secondary mathematics program and/or describe where to find a glossary of terms;

2. describe the common core state standards for grades 7-12;

3. name and discuss the Standards for Mathematical Practice (SMP) in the CCSSM;

4. state the position of professional organizations regarding use of calculators and computers in the mathematics class and cite relevant research;

5. design and teach a lesson using a calculator to develop reasoning skills;

7. describe the Polya model for solving problems and list and use at least ten problem solving strategies;

8. use a variety of classroom management and motivational techniques;

9. develop mathematics lesson plans for mathematics topics, using behavioral objectives and incorporating problem solving, reasoning, critical thinking, mathematical investigation using a graphing calculator, and the various standards from the Standards for Mathematical Practice;
10. state a rationale for assigning homework and design appropriate homework assignments;

11. describe an appropriate strategy for determining daily grades from homework and in-class activities;

12. construct and grade a mathematics test, and plan appropriate remediation;

13. describe the professional responsibilities of teachers and locate resources available to teachers, including (but not limited to) Internet resources;

14. design an enrichment activity for a mathematics topic;

15. become proficient in the use of mathematics manipulatives;

16. design a lesson using at least one manipulative device to develop a mathematics concept; teach other class members how to use the device to carry out the designed lesson;

17. discuss what is meant by diverse learners; verify that all lessons and activities created have components to fit each learning style and would appeal to different groups of students;

18. evaluate instructional materials, including print, video, Internet, and educational television.

NOTE: The amount of course content reflected in the list of student outcomes and the following list of course requirements is very extensive. If time factors become an issue, *items related to calculator use will be omitted, since these are also covered in MAT 310 Field Experience II and in the math content course taken by all majors: MAT 109 Mathematics Seminar I.
COURSE REQUIREMENTS

The student is expected to:

1. Attend and participate in all class sessions;

2. Complete all daily assignments: topics will be discussed in class and problems or activities will be assigned. Short pop quizzes may be given at any time.

3. Turn in all assignments when due. Work turned in late may be subject to a penalty. Missed quizzes will be assigned a grade of zero. If notified in advance of an unavoidable absence, the instructor will arrange for the test to be made up before the next class session;

4. Read and take notes on the reading assignments;

5. Maintain a daily log of notes, handouts, and assignments;

6. Prepare at least three days of developmental lesson plans;

7. Prepare a series of questions designed to develop a mathematics concept;

8. Prepare at least three motivational activities;

9. Prepare drill or review lesson plans;

10. Observe or assist in six hours of mathematics classes in secondary schools. More than one teacher and more than one school should be observed. [Consult list of approved teachers.] A form sheet will be provided for the classroom teacher to sign, certifying how many hours you were present and specifying in what ways you assisted. Other observation and participation forms will be completed during one or more of these visits.

11. Describe the main characteristics of different textbook series, primarily those based on the CCSSM, specifying positive and negative features of each;

12. Read and review 3 journal articles as specified in the daily assignments;

13. Compile a list of local, state, national and web resources available to teachers;

14. Develop and prepare for class presentation two mathematics lessons using manipulatives, calculators, and/or problem solving; Lesson plans should be approved in advance, grading details will be provided; Present at least a portion of these to a secondary classroom. NOTE: Secondary teachers will be more eager for you to present in their classes if your lesson topic is directly related to one or more ACT question-types. Provide materials so that the classroom teacher can evaluate your lesson using appropriate portions of the M-STAR;

15. Take and pass scheduled tests and the COMPREHENSIVE final exam.

16.* Demonstrate proficiency in using a graphing utility to develop higher-order thinking skills.
TEACHING METHODS

The instructor will model a variety of instructional strategies and guide students to practice using each of these teaching methods and to devise lessons, projects, and activities to fit diverse learners with diverse learning styles. Strategies will include, but not be limited to:

- lecture and demonstration
- modeling using manipulatives and visuals
- mathematical investigations using the graphing calculator
- guided discovery
- the use of a variety of cooperative learning groups.

EVALUATION CRITERIA

Students are expected to attend all class sessions and are responsible for contacting the instructor regarding any work missed due to unavoidable absences. A grade of zero will be assigned to missed tests unless other arrangements are made prior to the time of the test. Students who miss more than 25% of the class will not receive credit (see catalog). Students are strongly encouraged to consult with the instructor outside of class for extra help. Working in cooperative learning groups is encouraged. Students are expected to read and critique the lesson plans of other students as they are being developed and to critique lessons presented in class, providing written feedback to the presenter.

A total of points obtained from the following sources will be calculated. Observe that point values for these sources are not listed. Students will have input into the relative point value of the various activities. An updated list of activities, complete with point values, will then be given to each student.

Topic summary (and presentation)
Reviews of journal articles
Mathematics activities and quizzes
Lesson I (technology)
Lesson II (manipulatives)
Lesson III (all three may be combined into one 3-day to 5-day lesson sequence)
Assessment and feedback from lesson presentations [peers, WCU instructor, and cooperating teacher]
Problem solving packet
Manipulatives quiz
Class log and notebook
Resource list
Textbook review
Observe and assist forms
Calculator/Computer skills test
Motivational, drill, and questioning activities (may be included in lesson plan)
Homework and in-class daily activities
Tests
Final examination
Grades will be assigned to the percentage grades according to the following scale:

A  =  90 – 100%
B  =  80 – 89%
C  =  70 – 79%
D  =  60 – 69%
F  =  Below 60%

AMERICANS WITH DISABILITIES ACT

Students with disabilities who are protected by the Americans with Disabilities Act of 1990 and require special accommodations, should contact Ms. Valerie Bridgeforth at 601-318-6188. Ms. Bridgeforth is located in the Student Services Office in Lawrence Hall.

UNIVERSITY POLICY ON ACADEMIC INTEGRITY

William Carey University seeks to create an environment that encourages continued growth of moral and ethical values, which include personal honesty and mutual trust. The university places the highest value on academic integrity and regards any act of academic dishonesty as a serious offense. Academic dishonesty is considered unethical and in violation of William Carey University’s academic standards and Christian commitment. If such an incident occurs, students, faculty, and/or staff are obligated to initiate appropriate action. Depending upon the seriousness of the offense sanctions could include failure of the assignment, failure of the course, and could lead to suspension or dismissal from the college. Full explanations of the procedures for responding to instances of academic dishonesty are contained in the college’s Policies and Procedures manual and in the student handbook, The Lance.

DISASTER PLAN

In the event the operation of William Carey University is affected by a natural disaster (i.e., hurricane, tornado, widespread flu outbreak, etc.), students will be provided opportunity to complete the course via assignments posted online. Students should be prepared to check WCU’s web page (www.wmcarey.edu) and to contact the professor by e-mail or phone.

Email: jbower@wmcarey.edu  phone: 601-990-8241

COURSE REFERENCES

Professional Journals:

Mathematics Teaching in the Middle School (National Council of Teachers of Mathematics)
The Mathematics Teacher (National Council of Teachers of Mathematics)
The Journal for Research in Mathematics Education (NCTM)
School Science and Mathematics

Books:

All NCTM Yearbooks
Textbook series based on CCSSM
(Other textbook series on state adoption list)


Internet:


Oregon Dept. of Education: [http://www.ode.state.or.us/search/page/?id=3747](http://www.ode.state.or.us/search/page/?id=3747)


**TENTATIVE SCHEDULE**
Week 1: Common Core State Standards in Mathematics (CCSSM)
Standards for Mathematical Practice (SMP)
NCTM Standards
NCTM Journals; other professional journals
Learning theory and learning styles
Activities with colored cubes
Assigned readings in the professional journals.

Week 2: INTASC and TIAI Standards
Planning a lesson
Writing lesson plans utilizing behavioral objectives
Techniques of motivation
Teaching algebra topics.

Week 3: Textbook evaluation and trade book evaluation
Manipulatives and learning aids in teaching algebra

Week 4: Cooperative learning groups
Classroom management
Manipulatives and learning aids in teaching algebra, cont.

Week 5: Classroom questioning; discovery learning; inquiry
Using a calculator to develop higher order thinking skills
Using a graphing utility
TEST ONE.

Week 6: Professional growth and evaluating teacher performance
Manipulatives and learning aids in teaching geometry.
Presentation of topics and lessons

Week 7: Assigning and evaluating homework
Constructing tests and interpreting results.
Alternative assessment
Evaluating student performance
Remediation
Presentation of topics and lessons, cont.

Week 8: Problem solving, reasoning, communicating, and making mathematical connections.
Problem-solving activities; teaching strategies to improve thinking/problem solving skills
Rubrics for assessing problem solving activities
TEST TWO (if given).

Week 9: Teaching fractions, decimals, percent and ratio in grades 7-9;
Teaching informal geometry concepts
Metric and customary measurement

Week 10: Professional standards for teaching mathematics
Review of the new evaluation system for Mississippi licensed teachers [M-STAR].

Week 10 or 11: FINAL EXAMINATION to be determined by WCU exam schedule.