University of North Alabama
Departmental Syllabus
(revised June 2012)

MA 425 Methods & Materials for Teaching Secondary Mathematics

Course Description: (3 semester hours) Practical aspects of teaching and learning mathematics at the secondary level. Topics covered include secondary mathematics curricula, preparation and presentation of lesson material, classroom management, and professional behaviors. This class includes five 3 hour blocks of classroom observation visits. Open only to education majors with a teaching field in mathematics.

Prerequisite: Credit or concurrent enrollment in MA 421

Course Objectives:

1. *Knowledge of secondary curricula:* Student will examine the secondary courses (algebra, geometry, general mathematics, pre-calculus, and calculus) and the methods that should be utilized to teach them.
2. *Practice in developing lesson plans and teaching them.* Students will develop lesson plans and deliver some of those lessons. Students will be videotaped as they practice teach and will critique their own and their classmates' performance. Various strategies for problem solving will be explored as well as estimation strategies for determining the reasonableness of answers.
3. *Demonstrate knowledge of the intellectual, historical, and philosophical development of mathematics and how humans learn mathematics:* Students will understand the development of mathematics and become aware of multicultural contributions to mathematics. Students will be exposed to the current literature that is concerned with how humans learn mathematics.
4. *Practice preparing lessons that will include technology:* Students will have hands-on experience in preparing and delivering lessons that include the use of calculators, graphing calculators, computer, etc.
5. *Classroom management:* Students will explore ideas concerning how to maintain control and how to maintain a positive attitude towards one's students.
6. *What mathematics reform has accomplished in K-6 and knowledge of alternative computational algorithms:* Students will learn about the curriculum and methods in use at the elementary school level so that they will appreciate the academic background of their secondary students.
7. *Professional behaviors:* Students will become aware of mathematics professional organizations. They should develop an appreciation for the need for professional development and become aware of resources that are available to enhance their personal knowledge of mathematics.
8. *Knowledge of co-curricular activities:* Student will become aware of the importance of mathematics tournaments and clubs.
9. *Math Manipulatives:* Students will study math manipulatives and their use in effectively teaching mathematics.
10. *Inquiry:* Students will learn about inquiry and its use in effectively teaching mathematics. Students will also demonstrate the ability to conduct and lead students in inquiry math activities.
11. *Mathematical Problem Solving:* Students will demonstrate knowledge of various problem-solving strategies, including reading the problem, interpreting the problem, writing/ using appropriate mathematical models, solving the problem, and reflecting on the reasonableness of the answer; working problems backwards; and estimating, making predictions, and checking. 290-3-3-.13(2)(a)

12. *Mathematics communication:* Prior to program completion, prospective teachers of mathematics shall demonstrate the ability to:
Accurately communicate, orally and in writing, with students about mathematical concepts, and symbols. 290-3-3-.13(2)(c)1.
Analyze and evaluate the mathematical processes and strategies used by students. 290-3-3-.13(2)(c)2.

13. *Technology:* Prior to program completion, prospective teachers of mathematics shall demonstrate the ability to:
Select and use appropriate technological tools and software, including but not limited to dynamic graphing tools, computer algebra systems, statistical packages, data-collection devices, spreadsheets, and online resources. 290-3-3-.13(2)(f)1.
Use technology to enhance the teaching of mathematics and to promote student's understanding of Mathematical concepts. 290-3-3-.13(2)(f)2.

14. *Mathematics pedagogy.* Prior to program completion, prospective teachers of mathematics shall demonstrate:
Knowledge of:
A wide variety of available mathematics curricula and teaching materials for all students including those with special needs such as the gifted, challenged, and speakers of other languages. 290-3-3-.13(2)(g)1.(i)
Developmentally appropriate and research-based strategies for teaching mathematics, including Inquiry-and application –based instruction as advocated y the Alabama Math, Science, and Technology Initiative (AMSTI). 290-3-3-.13(2)(g)1.(ii)
Professional mathematics organizations and their available print, online, and other resources. 290-3-3-.13(2)(g)1.(iii)
Instructional strategies to raise student achievement for specific populations. 290-3-3-.13(2)(g)1.(iv)
Ability to:
Plan lessons, units, and course that address appropriate learning goals, including those that address Local, state, and national mathematics standards and legislative mandates. 290-3-3-.13(2)(g)2.(i)
Use different types of instructional strategies in planning mathematics lessons. 290-3-3-.13(2)(g)2.(ii)
Lead classes in mathematical problem solving and developing in-depth conceptual understanding, and to help students develop and test generalizations. 290-3-3-.13(2)(g)2.(iii)
Use a variety of manipulative ad visual materials to help students explore and develop mathematical concepts. 290-3-3-.13(2)(g)2.(iv)
Aid students in acquiring mathematical vocabulary and concepts in context through problem-solving Experiences. 290-3-3-.13(2)(g)2.(v)

15. *Mathematics Content :* Prior to program completion, prospective teachers of mathematics must *d*emonstrate knowledge of:
The secondary mathematics content as mandated in the Alabama Course of Study: Mathematics. 290-3-3-.13(2)(h)1.
The U.S. Department of Education's National Mathematics Advisory Panel's Final Report (2008) from the U.S. Department of Education and its benchmarks addressing the Critical Foundations of Algebra. 290-3-3-.13(2)(h)2.
The historical development of mathematics, including contributions from diverse cultures. 290-3-3.13(2)(h)3.
Knowledge of the content standards and of the scope and sequence of the subject areas of

one's teaching field(s) as defined in the Alabama Course of Study for those teaching fields.
290-3-3.03(1)(c)2.(i) **Assessment** using test and reading summary.

Course Content:

1. The Secondary Mathematics Curriculum and Teaching
2. Development of Mathematics and Recent Research Concerning How Humans Learn Mathematics
3. Student Conceptions
4. Teaching with Technology
5. Classroom Management and Professional Behaviors

Course Evaluation:

1. **Tests** 290-3-3-.13(2)(a)
2. **Reading summaries** 290-3-3-.13(2)(f)1 ; 290-3-3-.13(2)(f)2 ; 290-3-3-.13(2)(g)1.(i); 290-3-3-.13(2)(g)1.(ii); (2)(g)1.(iii); 290-3-3-.13(2)(h)1; 290-3-3-.13(2)(h)2; 290-3-3.13(2)(h)3; 290-3-3.03(1)(c)2.(i)
3. **Student Teaching a Lesson** 290-3-3-.13(2)(c)1, 290-3-3-.13(2)(c)2; 290-3-3-.13(2)(g)1.(iv); 290-3-3-.13(2)(g)2.(v).

Grading Policy: Grades will be assigned according to the following scale: 90 - 100 = A; 80 - 89 = B; 70 -79 = C; 60 - 69 = D; 0 - 59 = F

Accommodation Statement

In accordance with the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act of 1973, the University offers reasonable accommodations to students with eligible documented learning, physical and/or psychological disabilities. Under Title II of the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973, a disability is defined as a physical or mental impairment that substantially limits one or more major life activities as compared to an average person in the population. It is the responsibility of the student to contact Developmental Services prior to the beginning of the semester to initiate the accommodation process and to notify instructors within the first three class meetings to develop an accommodation plan. Appropriate, reasonable accommodations will be made to allow each student to meet course requirements, but no fundamental or substantial alteration of academic standards will be made. Students needing assistance should contact Developmental Services.