

Course Credit: 4 semester hours Room 2456, Haley Center (TR, 1:00 p.m. – 3:00 p.m.)	Dr. Marilyn E. Strutchens Room 5010, Haley Center Office Hours: Tuesdays and Thursdays, 11:00a.m. - 12:30p.m. or by Appointment Phone: (334) 844-6838 e-mail address: strutme@auburn.edu	Graduate Assistant: Anna Wan Brice Room 5072, Haley Center Office Hours: Tuesday and Thursday 3:00- 4:30 p.m. Phone: (334) 844-6797 e-mail address: azw0009@auburn.edu
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1. **Course Number: CTMD 4010**
Course Title: Teaching Mathematics: Middle School
Credit Hours: 4.0
Prerequisites: Admitted to Teacher Education
Corequisites: None
2. **Date Syllabus Prepared: January 4, 2012**
3. **Texts or Major Resources:** Pearson Custom Education--- CTMD 4010: Teaching Math in the Middle School from Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. (2010). *Elementary and Middle School Mathematics: Teaching Developmentally, Seventh Edition*. New York: Pearson Allyn & Bacon. Also see attached list of resources.
4. **Course Description:** The prospective middle school or junior high school mathematics teacher must examine the characteristics of students this age. Teaching strategies must be developed which lead not only to the learning of correct mathematics but also which address the needs of a wide variety of learners.
5. **Course Objectives:**
 1. To plan mathematical tasks and activities for students who are culturally diverse, and those with special needs.
 2. To create a learning environment in which students feel free to take risks.
 3. To use instructional strategies in mathematics including various student groups such as collaborative groups, cooperative learning, and peer teaching.
 4. To use various learning styles and teaching styles and to modify teaching techniques to accommodate individual learners.
 5. To use various tools to enhance classroom discourse, i.e., speaking and writing mathematics and to use the language of symbolism (of mathematics appropriate to junior high or middle school students). **290-3-3.13: 1a.2, 1a.6, 1a.12**
 6. To use oral and written discourse between teacher and students and among students to develop and extend students' mathematical understanding. **290-3-3.13: 1a.12**
 7. To understand and use mathematics vocabulary and symbols and mathematics as the basic language of science and the relationship of mathematics to emerging technologies. **290-3-3.13: 1a.7, 1b.3**
 8. To use the historical, philosophical, and multicultural development in mathematics instruction.
 9. To understand basic concepts of middle school mathematics and computational algorithms including estimation and approximation. **290-3-3.13: 1a.2, 1b.6**
 10. To develop models of mathematical concepts. **290-3-3.13: 1b.9**
 11. To understand the role, nature, and limitations of calculators and computers as tools in solving problems. **290-3-3.13: 1a. 8**
 12. To understand computer applications sufficient to be able to evaluate, modify, and/or use available programs to solve problems. **290-3-3.13: 1a. 9, 1b.7**
 13. To understand inquiry and its use in effectively teaching mathematics. **290-3-3.13: 1a.10**
 14. To understand and use technological advances that affect the teaching of mathematics, such as calculators, computers, satellite classes, video taping, and videodiscs. **290-3-3.13: 1a.11**
 15. To utilize a variety of instructional methods and materials appropriate for particular topics and situations, emphasizing student participation in hands-on activities. **290-3-3.13: 1b.4, 1b.10**
 16. To be aware and use mathematics curriculum that integrates mathematical concepts across mathematics courses and in other disciplines such as art, music, language arts, natural and physical sciences, social sciences, and business. **290-3-3.13: 1a. 13, 1b.11**
 17. To know about co-curricular activities, such as mathematics tournaments and clubs. **290-3-3.13: 1a. 14**
 18. To utilize a variety of teaching strategies to address the needs of students, including, but limited to:
 - a. Use of concrete manipulative materials in the development and exploration of middle school mathematics concepts; **290-3-3.13: 1b.4**
 - b. Use of concrete models to develop algorithms; **290-3-3.13: 1b.9**

- c. Use of various methods of making the transition from concrete models to abstract learning. **290-3-3.13: 1a.12**
- 19. To model and develop various problem solving strategies including but not limited to:
 - d. Reading the problem, interpreting the problem, writing/using appropriate mathematical models, solving the problem, reflecting on the reasonableness of the answer; **290-3-3.13: 1a.5**
 - e. Working problems backwards; **290-3-3.13: 1a.5**
 - f. Estimating, making predictions, and checking. **290-3-3.13: 1a.5**
- 20. To construct logical arguments for mathematical statements that are consistent with in an axiomatic framework; **290-3-3.13: 1b.2**
- 21. Present and interpret data in graphical form. **290-3-3.13: 1b.8**
- 22. To conduct and lead students in inquiry mathematics activities. **290-3-3.13: 1b.5**
- 23. To value continued professional development through the use of current research about the teaching and learning of mathematics, the benefits to be derived from participation in professional organizations, and national, state and local guidelines relating to mathematics instruction.

6. Course Content and Schedule:

Date	Topics and Assignments
1/10/12	Introduction to Course; The Nature of Middle Grades Mathematics; Goals for Teaching Mathematics in the Middle Grades: Read Chapters 1- 2.
1/12/12	Exploring What It Means to Know and Do Mathematics; Teaching Mathematics in the Era of NCTM Standard: Read Chapters 3-4.
1/17/12	Teaching Through Problem Solving; Planning in the Problem-Based Classroom: Read Chapters 5 & 11 and Stein's Article. Prompt #1 is due.
1/19/12	Building Assessment into Instruction & Proportional Reasoning: Read Chapters 7, Tate's article, and Jo Boaler's article.
1/24/12	No class, counts as hours toward your field based experience.
1/26/12	Proportional Reasoning; Teaching Mathematics Equitably to All Children; Read Chapter 14; Pi Day Lesson Plan is due.
1/31/12	Developing Concepts of Data Analysis: Concept Report is due.
2/02/12	Developing Concepts of Data Analysis: Read Chapter 16. Lesson Plans 1 – 4 are due.
2/07/12	Exploring Concepts of Probability: Read Chapter 10
2/09/12	Exploring Concepts of Probability and Algebraic Thinking: Generalizations, Patterns, and Functions
2/14/12	Algebraic Thinking: Generalizations, Patterns, and Functions: Read Chapter 13. Interview Script is Due.
2/16/12	Developing Measurement Concepts
2/21/12	No class, counts as hours toward your field based experience.
2/23/12	No class, counts as hours toward your field based experience.
2/28/12	No class, counts as hours toward your field based experience.
3/01/12	No class, counts as hours toward your field based experience.
3/06/12	No class, counts as hours toward your field based experience.
3/08/12	Pi Day at Drake Middle School (12:30 – 3:30)
Spring Break (March 12 – 18, 2012)	
3/20/12	Developing measurement Concepts: Read Chapter 6.

- 3/22/12 Using Technology to Teach Mathematics; Read Chapter 9
- 3/27/12 Developing Fraction Concepts; **Pi Day Reflection is due**
- 3/29/12 Developing Fraction concepts: Read Chapter 8. **Report on Interview is due.**
- 4/03/12 Developing Strategies for Fraction Computation: Read Chapter 12.
- 4/05/12 Developing Concepts of Decimals and Percent: **All outstanding lesson plans and reflections are due.**
- 4/10/12 Developing Concepts of Decimals and Percent: Read Chapter 15.
- 4/12/12 Geometric Thinking and Geometric Concepts: **Letter to Caregivers**
- 4/17/12 Geometric Thinking and Geometric Concepts: Read Chapter 17
- 4/19/12 Developing Concepts of Exponents, Integers, and Real Numbers: **Writing Prompt # 2 is due.**
- 4/24/12 Developing Concepts of Exponents, Integers, and Real Numbers
- 4/26/12 Review for Final
- 5/01/12 **Final Exam, 12:00 noon to 2:30 p.m.**

7. Course Requirements/Evaluation:

This course is designed to help students develop content and pedagogical knowledge with some practical experiences in the field. Most of the experiences in this course will be on campus via lecture, cooperative group work and lab experiences with manipulatives. The rest of the experience will be through middle school placements. Thus, to obtain full credit for the course, students must complete 21 hours of field-based work. For each hour that students complete, students must provide proof of their attendance and what they have accomplished during their school visits.

In addition to weekly reading assignments from the text and class handouts, students are expected to complete both on-campus and field-based assignments. For each assignment there will be a handout describing the activity in detail. A number of the assignments are candidates for inclusion in a professional portfolio. **All assignments must be typewritten and double-spaced. Use size 12 font.** Points will be deducted from assignments for grammatical mistakes, typos, and spelling errors. The assignments will be graded on a point scale as follows:

Assignment	Points
Concept Report, Diagnostic Interview, & Report on Interview	100
Pi Day Lesson Plan and Report	60
Writing Prompts (40 each)	80
Chapter Questions and Answers (5 each)	65
Exit Reflections (5 each)	55
Reflections on Teaching (20 each)	40
Professional Work Sample	120
Reflections on Tutoring Sessions (20 each)	40
Final Exam	100
Letter to Caregivers	40
TOTAL	700

EVALUATION

Final course grade will be assigned based on the percentage of possible points earned. The scale used in grading will reflect the following scale and the bunching and distribution of total point scores. In no case will a student receive a grade lower than the scale indicates.

- A 90% or above
- B 80 % - 89%
- C 70% - 79%
- D 60% - 69%
- F 59% or less

SUMMARY OF ASSIGNMENTS

Concept Report, Diagnostic Interview, and Report on the Interview

This assignment will give students the opportunity to do research on how to help their students develop a relational understanding of a particular concept in the middle grades. Students will use the information from their concept report to develop and conduct a diagnostic interview with a student to find out his/her understanding of the concept that is in keeping with the tone of the NCTM Standards. Moreover, students will also write reports based on their interviews.

Pi Day Lesson Plan and Report

Students will write a lesson plan that focuses on a non-routine problem solving activity that requires the use of manipulatives to solve. Students will facilitate this activity at a middle school during the school's Pi Day. Students may end up doing the activity three or four times during the day. Thus they should see a variety of responses and thought processes. They will reflect on the experience in the form of a written report. This report should describe the conditions under which the activity took place, students' thought processes, and examples of students' solution strategies.

Writing Prompts

Throughout the course the students will be asked to write 3 - 4 page responses to questions related to reading assignments, mathematics education materials, resources, or class discussions.

Exit Reflections

Students will respond to writing prompts at the end of particular class sessions. They will be asked to complete one prompt similar to the ones listed below:

1. Describe an instance where you realized that you developed a better understanding of a concept or skill.
2. Discuss one strategy that you learned related to teaching mathematics.
3. What questions or concerns do you have related to the topics discussed in class this week?

Chapter Questions and Answers

Students will complete and turn in a typed response to assigned questions from the Writing to Learn section at the end of each chapter or questions from a related article. Questions will be randomly assigned. At the beginning of alternate class sessions, students along with other classmates who received the same question(s) will discuss the question(s) in a small group and then present a summary of their discussion to the class. This format will aid in class discussions of the chapters and supporting articles.

Scoring Rubric for Chapter Questions and Answers	
Points	Criteria
3	<ul style="list-style-type: none"> ○ Provided a logical, coherent, and detailed correct response ○ Gave your own opinion when appropriate ○ Cited the book or other references to back up your response
2	<ul style="list-style-type: none"> ○ Writing, clarity, grammar, etc.

Lesson Plans and Reflections Related to Field-based Experiences

Throughout the semester students will obtain part of their credit for the course through field-based opportunities. They are required to teach four lessons to a group of students during the field-based experience. Each group member will plan one of the lessons. All of the lessons should come from the *Connected Mathematics* Textbook Series. Lesson plans must be graded **before** they are implemented in the schools. Students will also reflect on each experience. Guides will be provided with specific questions to answer regarding the experience.

Modified Professional Work Sample

A Professional Work Sample (PWS) highlights the primary and cyclical work of teachers—their planning, implementation, and reflection. The PWS provides an in-depth look at one lesson: the decision making that informed that lesson, the student learning that occurred during the lesson, and the collaborative and personal reflections that led to improved practices. Choose a lesson for the PWS that is linked to other lessons. Also, choose a lesson that is connected to a pre- and post-assessment. The PWS lesson may include the pre- and post-assessments or represent one of multiple lessons between pre- and post-assessments.

Tutoring Reflections

Students will reflect on experiences in the field other than when they have taught a lesson. They will write at least two reflections on tutoring. A guide will be provided with specific questions to answer regarding the experience.

Final Exam

This exam is designed to find out what students have learned about teaching mathematics at the middle grades level. They will reflect on and apply skills and concepts that they have learned throughout the course.

Letter to Caregivers

Prospective teachers will write a mock letter to parents about a middle school student's mathematical progress. The prospective teachers will discuss the student's strengths and weaknesses. They will also tell parents what they can do to help the student at home.

8. Class Policy Statements:

Participation: Students are expected to participate in all class discussions and participate in all exercises. It is the student's responsibility to contact the instructor if assignment deadlines are not met. Students are responsible for initiating arrangements for missed work.

Attendance/Absences: Each student is expected to attend all classes as scheduled, including lab sessions held off campus. The second unexcused absence from class or from the lab placement, and each succeeding unexcused absence, will result in a lowering of the final course grade by one letter grade. If an exam is missed, a make-up exam will be given only for University-approved excuses as outlined in the Tiger Cub. Arrangement to take the make-up exam must be made in advance. Students who miss an exam because of illness need a doctor's statement for verification of sickness and should clear the absence with the instructor the day they return to class. Other unavoidable absences from campus must be documented and cleared with the instructor **in advance**.

Unannounced quizzes: There will be no unannounced quizzes.

Accommodations: Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternative time can be arranged. To set up this meeting, please contact me by e-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with the Program for Students with Disabilities at 1244 Haley Center, 844-2096 (V/TT).

Honesty Code: The University Academic Honesty Code and the Tiger Cub Rules and Regulations pertaining to Cheating will apply to this class.

Professionalism: As faculty, staff, and students interact in professional settings, they are expected to demonstrate professional behaviors as defined in the College's conceptual framework. These professional commitments or dispositions are listed below:

- Engage in responsible and ethical professional practices
- Contribute to collaborative learning communities
- Demonstrate a commitment to diversity
- Model and nurture intellectual vitality

Students will sign a form related to their role as a professional.

RESOURCES

- Ashlock, R. B., Johnson, M. L., Wilson, J. W., & Jones, W. L. (1983). Guiding each child's learning of mathematics: A diagnostic approach to instruction. Columbus: Charles E. Merrill Company.
- Bryant, D., & Driscoll, M. (1998). Exploring classroom assessment in mathematics: A guide for professional development. Reston, VA: Association for Supervision and Curriculum Development and National Council of Teachers of Mathematics.
- Burns, M. (1992). About teaching mathematics: A k-8 resource. White Plains, NY: Math Solutions Publications.
- Bush, W. S. (Ed.). (2000). Mathematics assessment: Cases and discussion questions for grades 6-12, classroom assessment for school mathematics K-12 Series. Reston, VA: National Council of Teachers of Mathematics.
- Friel, S. N. (Ed.) (2001). Navigating through algebra in grades 6-8. Reston, VA: National Council of Teachers of Mathematics.
- Kenney, P. A., & Silver, E. A. (Eds.). (1997). Results from the sixth mathematics assessment of the National Assessment of Educational Progress. Reston, VA: National Council of Teachers of Mathematics.
- Ladson-Billings, G. (1995). Making mathematics meaningful in multicultural contexts. In W. Secada, E. Fennema, & L. B. Adjian (Eds.), New directions for equity in mathematics education, (pp. 126 -145). New York, NY: Cambridge University Press.
- Leutinger, L. (Ed.) (1998). Mathematics in the middle. National Council of Teachers of Mathematics & National Middle School Association.
- National Council of Teachers of Mathematics. Arithmetic Teacher (Journal). Reston, Virginia: National Council of Teachers of Mathematics.

- National Council of Teachers of Mathematics. Teaching Children Mathematics (Journal). Reston, Virginia: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. Mathematics Teaching in the Middle School (Journal). Reston, Virginia: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. Journal for Research in Mathematics Education (Journal). Reston, Virginia: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. (1989). Curriculum and evaluation standards for school mathematics. Reston, VA: NCTM
- National Council of Teachers of Mathematics. (1991). Professional standards for teaching mathematics. Reston, VA: NCTM
- National Council of Teachers of Mathematics. (1995). Assessment standards for school mathematics. Reston, VA: Author.
- National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Reston, VA: Author.
- National Council of Teachers of Mathematics. (1999-2001). Changing the faces of mathematics monograph series. Reston, VA: Author.
- National Research Council. (1989). Everybody counts: A report to the nation on the future of mathematics education. Washington, D. C.: National Academy Press.
- National Research Council. (1999). Mathematics education in the middle grades: Teaching to meet the needs of middle grades learners and to maintain high expectations. Washington, DC: National Academy Press.
- Owens, Douglas T. (Editor) (1993). Research ideas for the classroom: Middle grades mathematics. New York: Macmillan Publishing Company.
- Parker, Ruth (1993). Mathematical power: Lessons from a classroom. Portsmouth, NH: Heinemann.
- Pateman, N. (1988). EMT 442 and EMT 441 Classnotes. Athens: University of Georgia.
- Silver, E. A., & Kenney, P. A. (Eds.). (2000). Results from the seventh mathematics assessment of the National Assessment of Educational Progress. Reston, VA: National Council of Teachers of Mathematics.
- Thornton, C. A., & Bley, N. S. (Eds.). (1994). Windows of opportunity: Mathematics for students with special needs. Reston, VA: National Council of Teachers of Mathematics.
- Sleeter, C. E. (1997). Mathematics, multicultural education, and professional development. Journal for Research in Mathematics Education, 28(6), 680-696.
- Stein, M. K. (2001). Mathematical argumentation: Putting umph into classroom discussions. Mathematics Teaching in the Middle School, 7(2), 110-112.
- Strutchens, M. (1995). Multicultural mathematics: A more inclusive mathematics. Eric Digest, Clearinghouse for Science, Mathematics, and Environmental Education, EDO-SE-95-3, March.
- Tate, W. (1995). Mathematics communication: Creating opportunities to learn. Arithmetic Teacher, 1(6), 344-349, 369.
- Zaslavsky, C. (1979). Africa counts. New York: Lawrence Hill Books.

OTHER RESOURCES

Alabama Course of Study
 Connected Mathematics Textbooks
 Interactive Mathematics Textbooks
 TEAM-Math Curriculum Guide