

EDUC 540 Mathematics Teaching, Gr. 6 - 12

Description:	All courses for professional studies leading to licensure must use the SOE syllabus template.
Program Course Information:	<p>PROGRAM: Carolina Online Lateral Entry EDUC 540 SECTION 966 COURSE TITLE: Mathematics Teaching INSTRUCTOR NAME and CONTACT INFORMATION: Aaron Trocki, trocki@email.unc.edu 919 – 967 – 2143 Office Hours – By email, anytime. DATE SYLLABUS REVISED: Sept. 2006 COURSE MEETINGS: 4:30 – 6:15 PM, days listed in syllabus, login at http://breeze.unc.edu/edu100mathteaching Blackboard Research/Discussion Classes – days listed on syllabus COURSE DESCRIPTION: This graduate course for lateral entry teachers will focus on curriculum and instruction in mathematics for learners, grades 6 – 12 as defined by national and state standards. Teachers will investigate the meaning of a standards based mathematics classroom and conceptual understanding through problem solving. Topics will include “hands-on” materials, technology to create an inquiry learning environment, classroom equity, and instructional methods. Throughout the course, teachers will reflect upon effective mathematics pedagogy and student learning. (2 hours credit)</p>
UNC-CH School of Education Conceptual Framework:	<p>Preparing Leaders in Education The School of Education is committed to the preparation of candidates who can assume leadership roles in the field of education. Such preparation is accomplished through the coherent integration of the abilities and predispositions of candidates, the knowledge and abilities of faculty, and the contextual elements of academic and field settings. Candidates accept their professional responsibilities and focus their expertise and energy on supporting Birth-12 student development and learning. They must work to maintain a meaningful involvement in activities within schools and in partnership with parents and the community.</p> <p>The growth and development of candidates is promoted through curriculum, instruction, research, field experiences, clinical practice, assessments, evaluations, and interactions with faculty and peers. All of these elements work together to build a solid foundation for exemplary practice in education, creating educational practitioners who are prepared to better serve children, families and schools, as well as business and agencies of government within North Carolina, across the nation and throughout the world.</p> <p>For Equity and Excellence Preparation of educational leaders for today's society is based in values of equity and excellence that assure our candidates' and their students' future success. Attending to the challenge of promoting both equity and excellence is imperative. To address only one of these goals would, on the one hand, sacrifice those put at risk by social and cultural hierarchies in society or would, on the other hand, fail to press for the highest possible levels of accomplishment. Equity and excellence must be pursued concurrently to assure that all students are well served and that all are encouraged to perform at their highest level.</p> <p>Within the School of Education, equity is seen as the state, quality, or ideal of social justice and fairness. It begins with the recognition that there is individual and cultural achievement among all social groups and that this achievement benefits all students and educators. Equity acknowledges that ignorance of the richness of diversity limits human potential. A perspective of equity also acknowledges the unequal treatment of those who have been historically discriminated against based on their ability, parents' income, race, gender, ethnicity, culture, neighborhood, sexuality, or home language, and supports the closure of gaps in academic achievement. Decisions grounded in equity must establish that a wide range of learners have access to high quality education in order to release the excellence of culture and character which</p>

can be utilized by all citizens of a democratic society.

Within the School of Education, excellence is seen as striving for optimal development, high levels of achievement and performance for all and in all that is done. In preparatory programs across grade levels, curriculum and instruction furthers excellence when it moves a learner as effectively as possible toward expertise as a thinker, problem solver and creator of knowledge. Excellence entails a commitment to fully developing candidates, not only academically but also in moral and political senses.

In a Democratic Society

The preparation of exemplary practitioners in education to meet the challenges of equity and excellence is best accomplished through preparation for a democratic society. Democracy around the globe is an ideal, one with the potential to meet the needs, recognize the interests and establish the rights of all citizens. Education is a necessary foundation for this ideal, and both must be subscribed to and participated in by all.

School of Education Conceptual Framework Principles

The School of Education is committed to diverse, equitable, democratic learning communities. As a result, candidates are expected to acquire and apply the knowledge, skills and dispositions that prepare them to support the development and education of all students.

The School of Education uses the following unit principles, applicable at all program levels, to identify the knowledge and skills that are central to preparation of candidates. It is the School of Education 19s goal that candidates will become leaders supporting and promoting the development, teaching and learning of all students in multiple contexts.

1. Candidates possess the necessary content knowledge to support and enhance student development and learning.
2. Candidates possess the necessary professional knowledge to support and enhance student development and learning, including meeting student needs across physical, social, psychological, and intellectual contexts. Candidates incorporate a variety of strategies, such as technology, to enhance student learning.
3. Candidates possess the necessary knowledge and skills to conduct and interpret appropriate assessments.
4. Candidates view and conduct themselves as professionals, providing leadership in their chosen field, including effective communication and collaboration with students and stakeholders.

SOE Conceptual Framework Dispositions

Certain dispositions are essential to prepare leaders who support equity and excellence in education within a democratic society. Dispositions are beliefs that foster commitments, leading to actions within educational environments with students, colleagues, families, and communities. Candidates strengthen these dispositions as they think deeply, reflect critically and act responsibly in their professional practice. These dispositions are interconnected with knowledge and skills; specific dispositions connect to and exemplify unit principles, facilitating their enactment in particular programs.

1. Candidates will exhibit behavior that demonstrates a belief that all individuals can develop, learn, and make positive contributions to society.
2. Candidates will exhibit behavior that demonstrates a belief that continuous inquiry and reflection can improve professional practice.

<p>Technical Requirements</p>	<ul style="list-style-type: none"> • Internet Access (broadband) • Access to Macromedia Breeze • Microsoft Word
<p>Course Objectives:</p>	<p>Lateral entry teachers will:</p> <ol style="list-style-type: none"> 1. Describe characteristics of a Standard’s Based Mathematics Classroom representing the NCTM <i>Principles and Standards for School Mathematics</i> and philosophy behind NC Mathematics Standard Course of Study. 2. Reflect upon curriculum issues involved in implementing the North Carolina Standard Course of Study and NCTM Standards. 3. Describe what it means to “teach through problem solving.” 4. Choose, design and evaluate instructional materials including manipulatives and technology to develop concept understanding in mathematics. 5. Discuss achievement differences by ethnicity in the mathematics and effective methods to “close the gap.” Design materials with multicultural connection. 6. Reflect upon effective instructional methods in mathematics and how these methods impact student learning. 7. Design and implement a standards based lesson. Reflect upon classroom implementation.
<p>Course Standards (Addressed):</p>	<p>SOE Principles</p> <ol style="list-style-type: none"> 1. Candidates process the necessary content knowledge to support and enhance student development and learning. 2. Candidates possess professional knowledge to support and enhance student development and learning. <p>SOE Dispositions</p> <ol style="list-style-type: none"> 1. Candidates will exhibit behavior that demonstrates a belief that all individuals can develop, learn, and make positive contributions to society. 2. Candidates will exhibit behavior that demonstrates a belief that continuous inquiry and reflection can improve professional practice. <p>NC Core Standards</p> <ol style="list-style-type: none"> 1. Teachers know the content they teach. 2. Teachers know how to teach students. 3. Teachers are reflective about practice. <p>NC Diversity Standards</p> <ol style="list-style-type: none"> 1. Teachers understand central concepts, tools of inquiry, and structures of the discipline they teach and can create classroom environments and learning experiences that make these aspects of subject matter accessible, meaningful and culturally relevant for diverse learners. 4. Teachers acknowledge and understand that diversity exists in society and utilize this diversity to strengthen the classroom environment to meet the needs of individual learners. 6. Teachers of diverse students are reflective practitioners who are committed to equity in education. <p>NC Technology Standards</p> <ol style="list-style-type: none"> 2. Students plan and design effective learning environments and experiences supported by technology. <p>NC Mathematics Standards</p> <ol style="list-style-type: none"> 1. Number sense, numeration, and numerical operations. 2. Spatial sense, measurement, and geometry 3. Patterns, relationships, and functions 5. Process Skills – Teachers understand the use of processes of problem solving, reasoning and proof, communication, connection, and representation as the foundation for the teaching and learning of mathematics. 6. Curriculum pacing and alignment – Mathematics teachers are aware of the importance of and implement effective instructional pacing and alignment.

7. Instructional strategies - Mathematics teachers use a variety of instructional strategies to promote student understanding of mathematics.
8. Instructional tools – K-12 math teachers understand and use effectively the hierarchy of the use of instructional tools.
9. Ethnicity, gender, race, and socioeconomic status – Mathematics teachers recognize that all students, regardless of their personal characteristics, backgrounds, or physical challenges, must have opportunities to study and learn mathematics.
10. Accommodating individual needs – To promote diversity as a strength, teachers are knowledgeable about and sensitive toward various teaching /learning styles.
11. Historical perspectives – Mathematics teachers understand that historically based pedagogy can give all students, regardless of their learning preferences, the opportunity to learn mathematics. It provides an opportunity to focus on special interests, and it provides the teacher with insights into the diversity in the development of mathematics.

Course Standards (Assessed):	Your course grade will be based upon the following assignments. A project grade will be lowered a grade level for each day submitted late. A project more than a week late will not be accepted. Email Mr. Trocki if you need an extension for an unusual circumstance.		
	Weekly Classes	100 pt. (50%)	SOE – P – 1, SOE – P – 2, SOE – D – 1, SOE – D -2, NC-CH-P2, NC-M-S5, NC-M-S6, NC-M-S7, NC-M-S8, NC – M – S9, NC-M-S10, NC-DIV.1, NC-DIV.4, NC-DIV.6, NC-T-2, NCTM-1-6, 8, 10.1
	Project 1 – Resource File - Due	30 pt. (15%)	NC-CH-P2, NC-M-S5, NC-M-S7, NCTM -1-5,8
	Project 2 – Closing the Achievement Gap Due -	30 pt (15%)	SOE – P- 2, SOE – D – 1, NC-DIV-1, NC-DIV – 4, NC- DIV – 6, NC-M-S10, NC – M-S11
	Project 3 – Implementing a Lesson with Technology Due -	40 pt. (20%)	SOE – P-1, SOE – P-2, NC-CH-P2, NC-CH-P3, NC-M-S7, NC-M-S8, NCTM 1-4, 8

Activities & Assignments: See attached weekly schedule

Requirements: **Honor Code:** the Honor Code of UNC binds your work in this course. Any breach of the Honor Code is a breach of professional ethics. A breach in the Honor Code detected on any assignment will result in an automatic F for the class and your name may be forwarded to the UNC ethics committee for further investigation. Further information on the Honor Code may be found at <http://instrument.unc.edu/>

Course Evaluation
H = 180 pt. or above
P = 156 pt. – 179 pt.
L = 120 pt. – 155 pt.
F = below 120 pt.

Attendance Expectations: Our class is designed in weekly lessons. Participation in each breeze and blackboard class is required with specified due dates each week.

Breeze Classes - You are expected to be prepared for each breeze class meeting, to be on time and participate actively. In order to receive a passing grade for the class, you may not miss more than ONE breeze class. Notify the instructor ahead of time if you need to miss a class. All class work missed from an absence or tardy must be made up. Two tardies to a breeze class will equal one absence. A tardy is more than 5 minutes late to class. If you are more than 25

minutes late to class, this is considered an absence. If you have an unusual circumstance, call me at 919-967-2143 or email me ahead of class. We will alternate a Breeze class followed by a Blackboard class. Thus, **we will meet over Breeze every other week.**

Participation: Communication is very important for this course. Regular discussion makes a breeze class meaningful, while lack of communication can undermine the effectiveness. "Participating" in a breeze class means making thoughtful comments regularly and applying course readings. This will help us all learn as much as possible from each other. Effective participation receives 4 points towards your grade. (see rubric in Assignments on Blackboard)

On-line Blackboard and Discussion - The weeks that we do not meet over Breeze, you will have a Blackboard Class and Discussion. These will include readings with activities and an on-line asynchronous discussion. You will be set up in groups of 6-8 teachers. You will be given questions to reflect upon and answer pertaining to readings. Each person will post his/her initial response to their Group by Saturday, 3 pm. Each person will then be responsible to write thoughtful comments to 3 other group members to extend the discussion in response to postings. The first responses are due by Monday at 9 PM. You may write your first responses any day and time before Monday, if you wish. Each person is responsible to make a second response to 2 group members either the same people or to other group comments by Tuesday – 9 PM. (again, you may make your second responses any day and time before Tuesday). This will end the discussion. I will join in at least 3 times with comments to group members. You can earn 8 points for effective completion of each blackboard discussion class and 4 points for a backboard class with only a posting (see the rubric in Assignments on Blackboard.)

Late Assignments: All assignments must be turned in by the deadline dates. Discussion postings for each week must be made by the deadline date for the week. An assignment turned in late will receive a lowered grade equivalent to one letter grade per day late. An assignment over a week late will not be accepted. Please contact me BEFORE the due date if an unusual circumstance occurs.

Assessments: All assessments for assignments will be found in the Assignments and Assessments folder.

Course Completion: All requirements for attendance and participation must be met for course completion.

Program Continuation: If a student receives an F in any course in the COLE program, the student is not longer able to continue in the program. If a student receives a grade of L in two courses, the student may no longer continue in the program.

Feedback: Every four weeks, I will provide you with feedback on your participation and blackboard assignments. You will find the feedback in your Private Thread. When I send feedback, I will notify you. If you do not receive your feedback, please contact me right away. After reviewing your feedback, please post a reply back that you have seen it.

Required texts and materials:

1. Brahier, Daniel J. (2005). *Teaching secondary and middle school mathematics, 2nd edition.* New York: Pearson Education, Inc. (you do not need the Mylab edition)

Optional book for middle grades – This book would be an outstanding resource for your teaching. Look for a used copy on the internet. (Older versions of this text are great) There will not be readings from this book but the book has many resources for you. Van De Walle, John A. (2007). *Elementary and Middle School Mathematics, Teaching Developmentally.* New York: Person Education, Inc.

	<p>2. 3 ring binder for your Math Teaching notebook for course materials. You may organize your course materials in any manner you like.</p> <p>3. Access to a TI-83, TI-83 plus, or TI-84 graphing calculator.</p>
Topics:	<p>Course topics (see also attached detailed day to day schedule)</p> <p>Jan – Feb. Mathematics Learning – TIMMS & NAEP results NCTM Process Standards, N. C. Standard Course of Study Curriculum Issues, Instructional Resources Instructional planning I - vignette and reflection Instructional planning –part II, lesson plan Tools for Instruction – Graphing Calculators Equity Issues – Math achievement differences by ethnicity, Methods to “Close the Gap”</p> <p>March-May Developing Algebra Concepts Through Problem Solving Tools for Instruction – Concrete to Abstract – Hands-on materials – teaching rational numbers More on Teaching rational number concepts (con’t) Developing geometry concepts –inquiry lessons Developing geometry concepts (con’t) Final Reflection</p>
Schedule:	See attached day to day schedule
References & Resources:	<p>The references listed at the end of each chapter of your textbook are excellent. Please familiarize yourself with these and use these. During the course you will also be provided with references for additional NCTM publications and excellent internet resources. Here are a few additional references.</p> <p>Chappell, M., Choppin, J. and Salls, J.. (2004). <i>Empowering the beginning teacher of mathematics, high school</i>. Reston, VA: NCTM</p> <p>Cooney, T. J. (1996). <i>Mathematics, pedagogy, and secondary teacher education</i>. Portsmouth, NH: Hienemann.</p> <p>Fennema, E. and Romberg, T. (1999). <i>Mathematics classrooms that promote understanding</i>. Mahway, NJ: Lawrence Erlbaum Assoc.</p> <p>Krantz, S. (1999). <i>How to teach mathematics, 2nd ed.</i> Providence, RI: American Mathematics Society.</p> <p>National Council for Teachers of Mathematics (1991). <i>Professional standards for teaching mathematics</i>. Reston, VA: NCTM.</p> <p>National Council for Teachers of Mathematics (2000). <i>Principles and standards for school mathematics</i>. Reston, VA: NCTM.</p> <p>Posamentier, Hartman, and Kaiser (1998). <i>Tips for the mathematics teacher: Research based strategies to help students learn</i>. Corwin Press.</p> <p>Posamentier and Hauptman (2001). <i>101 Great ideas for introducing key concepts in mathematics: A resource for secondary school teachers</i>. Corwin Press.</p> <p>Mendler, A. (2000). <i>Motivating students who don’t care</i>. Bloomington, IL: National Educational Service.</p> <p>Schoen, H. and Charles, R., Editors. (2003). <i>Teaching mathematics through problem solving</i>. Reston, VA: NCTM.</p> <p>Sobel, M. and Maletsky, E. (1998). <i>Teaching mathematics, A sourcebook of aids, activities, and strategies, 3rd edition</i>. Allyn & Bacon.</p> <p>Stein, M., Smith, M., and Silver, E., (2000). <i>Implementing standards-based mathematics instruction: A casebook for professional development</i>. New York: Teachers College Press.</p>

Course Schedule

		Topic	Reading Assignment before this class
Lesson 1 Breeze Class	1/30	Mathematics Instruction Today Syllabus and Get Acquainted NCTM Process Standards Applying Process Standards	<ul style="list-style-type: none"> • Read Chapter 1 in text, NCTM Process Standards • Bring Course Syllabus from Blackboard • Post “get acquainted” information in the class roster. Read about classmates and email 2 classmates.
Lesson 2 Research/Discussion on blackboard	2/6	Readings & Discussion – NCTM Process Standards NCTM Content Standards NC SCS Scavenger Hunt	<ul style="list-style-type: none"> • Reading – Ch. 3, p. 63 – 75, NCTM Content Standards • Submit NC SCS Scavenger Hunt to your private thread • Blackboard Discussion
Lesson 3 Breeze Class	2/13	Instructional Planning Resource File	<ul style="list-style-type: none"> • Read Vignette – Nysha’s Decisions – in Resources • Read sample activities for teaching integers & websites in Resources. Be ready to discuss these. • Read Ch. 5, p. 130 – 148 in text on lesson planning • Bring copy of Project 1 – Resource File for discussion
Lesson 4 Research/Discussion on blackboard	2/20	Apply Instructional Planning Curriculum Issues	<ul style="list-style-type: none"> • Read in text p. 104 – 114. • Write and post your lesson plan for teaching integers to an Introduction to Math class, read colleagues postings, make comments to 4 colleagues. • Blackboard Discussion – curriculum issues
Lesson 5 Breeze Class	2/27	Tools for Instruction - Technology	<ul style="list-style-type: none"> • Read article <i>Engaging Students through Technology</i> • Read text p. 18, 108, 265 • Bring text, article and graphing calculator to class • Assignment - complete 2 activities with graphing calculator (choose from activities in Resources on Blackboard)
Lesson 6 Research Class	3/6	Resource File	<ul style="list-style-type: none"> • Investigate 3 websites for instructional resources • No discussion this week. Complete Resource File <p>Resource File Due –</p>

Lesson 7 Breeze Clss	3/13	Equity Issues Differences in math achievement	<ul style="list-style-type: none"> • Read NAEP score diff., reasons for achievement differences, how do we close the gap? (blackboard lesson page), text p. 320 - 327 • Bring copy of Project 2 – Closing the Gap for discussion
Lesson 8 Research/Discussion Blackboard	3/20	Assessing your own classroom Issues discussion	<ul style="list-style-type: none"> • Read chapter “Turn Around Teachers and Schools”, take self assessments - creating high expectations, participation, caring relationships. Complete the three assessments. • Begin Project 2 • Blackboard Discussion
Lesson 9 Breeze Class	3/27	Developing Algebra Concepts through Problem Solving	<ul style="list-style-type: none"> • Read <i>Walking Through Space</i>. Text p. 196 – 200 • Bring handouts Townhouse for Sale, Patterns with Geometric Shapes (2), your graphing calculator • Bring copy of Project 3 – Technology Lesson
Lesson 10 Research/Posting	4/3	Developing Algebra Concepts through Problem Solving	<ul style="list-style-type: none"> • Sample lesson – Hot and Cold, Activity – How many Drivers? – post answers. (1 hr.) • Blackboard Posting only – no discussion. • Finish Closing the Gap Project (2-3 hr.)
Lesson 11 Breeze Class	4/10	Tools for Instruction – Concrete to Abstract Closing the Achievement Gap Project – due 4/4	<ul style="list-style-type: none"> • Read text, p. 34 – 39, 47 - 48 about using pattern blocks, • Read Day 1, Day 2, Day 3 lesson plans for addition of fractions. Bring these to class • Bring a set of pattern blocks to class – or make a set from Resource if you cannot find a set at your school.
Lesson 12 Research/Discussion Blackboard	4/17	Rational Number concepts	<ul style="list-style-type: none"> • Read and examine examples for lesson 12 • Blackboard Discussion
Lesson 13 Breeze Class	4/24	Developing Geometry Concepts	<ul style="list-style-type: none"> • Read text p. 40 – 42, 48 – 50, 205 – 210, NCTM standards for Geometry, NC Indicators geometry in grades 6-8 and for High School Geometry • Bring handouts from resources
Lesson 14 Research/Discussion Blackboard	4/	Developing Geometry Concepts	<ul style="list-style-type: none"> • Readings on blackboard • Blackboard Discussion

Lesson 15 Breeze Class	Exam	Breeze Reflection Implementing Technology Project - due	
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