

SHORT SIGNATURE SHEET

RECEIVED
JAN 30 2012



Date: MATH-01-30-12 BY: CLAS UNC CHARLOTTE

Subject: New Course Proposal for MAED 6252: Advanced Methods in Middle and Secondary Mathematics

Originating Department: Mathematics and Statistics

TYPE OF PROPOSAL: UNDERGRADUATE _____ GRADUATE X UNDERGRADUATE & GRADUATE _____
(Separate proposals sent to UCC and Grad. Council)

DATE RECEIVED	DATE FORWARDED	COMMENTS: APPROVED, APPROVED WITH REVISIONS, ETC.	SIGNATURES
	1-30-12		<u>PERSON ORIGINATING PROPOSAL</u> <i>Victor V. Cifarelli</i> Victor V. Cifarelli
	1-30-12	Approved	<u>DEPARTMENT CHAIR</u> <i>Alan Dow</i> Alan Dow
2/22/12	2/22/12	Approved	<u>COLLEGE CURRICULUM COMMITTEE CHAIR</u> <i>Jason Flores</i> Jason Flores
2/22/12	2/23/12	Approved	<u>COLLEGE DEAN</u> <i>Charles Brady</i> Nancy Gutierrez <i>CHARLES BRADY</i>
		Approved	<u>GENERAL EDUCATION</u> (for General Education courses)
		Approved	<u>UNDERGRADUATE COURSE & CURRICULUM COMMITTEE CHAIR</u> (for undergraduate courses) Janet Levy
3/29/12	8-13-12	Considered 4/3/12 Grad Council Mtg. Approved Forwarded w/ revisions	<u>GRADUATE COUNCIL CHAIR</u> (for graduate courses) <i>Rob Roy McGregor</i> Rob Roy McGregor
		Approved	<u>FACULTY GOVERNANCE ASSISTANT</u> (Faculty Council approval on Consent Calendar) Clarence Green



UNC CHARLOTTE

MEMO FORM COURSE AND CURRICULUM PROPOSAL

To: Charles Brody, Office of the Dean, CLAS
Jason Flores, Chair, Course and Curriculum Committee, CLAS
Janet Levy, Chair, Undergraduate Course and Curriculum Committee, CLAS
Rob Roy McGregor, Graduate Council
Clarence Greene, Faculty Governance

From: Victor Cifarelli, Coordinator, Mathematics Education, Department of
Mathematics & Statistics

Date: January 30, 2012

Re: New Course Proposal: MAED 6252 – Advanced Methods in Middle and Secondary
Mathematics

SUMMARY: The Mathematics and Statistics Department proposes the addition of one course for students in the Master of Arts in Teaching and Master of Education for Middle Grades programs. Students in both of these programs need a course that investigates the research on the teaching of mathematics and looks closely at advanced instructional methods. We have been using specially designated Topics classes at the 5000-level to offer this course. This has caused confusion for students since we routinely offer several Topics courses most every semester. Despite our best advising, MAT and M.Ed. students have sometimes registered for an inappropriate section that had the Topics designation. The proposed course will eliminate this confusion.

FOR CONSULTATION WITH OTHER DEPARTMENTS:

1. Does the proposed change affect other departments?
 Yes No

2. If Yes, please list the other departments affected by the proposal:

Middle, Secondary and K-12 Education (MDSK), College of Education

3. Have you consulted with each department listed in question 2 regarding the proposed change?

Yes No

4. Result(s) of Consultation(s):

We agree with MDSK that the change is necessary to eliminate the confusion that now exists among students (consultation letter from MDSK and the library are attached).

RESOURCES: Indicate the additional resources required, if any, to implement and maintain the proposed change:

None

PROPOSED CATALOG COPY (SYLLABUS ATTACHED)

MAED 6252. Advanced Methods in Middle and Secondary Mathematics. (3) Prerequisite: Students enrolling in this course must be admitted to the MAT or M.Ed. program. Examination of current research and scholarship on the teaching of mathematics in middle and secondary schools. Particular emphasis on the development of advanced instructional expertise and leadership. (*Spring, On demand*)



Department of Middle, Secondary and K-12 Education

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Memorandum

To: Dr. Victor Cifarelli, Department of Mathematics and Statistics
From: Warren J DiBiase, Chair, Middle, Secondary, and K-12 Education
Date: 8/13/2012
Re: Proposal for MAED 6252 – Advanced Methods in Middle and Secondary Mathematics

The Department of Middle, Secondary, and K-12 supports the establishment of the course designation MAED 6252 for the Advanced Methods in Middle and Secondary Mathematics course. The course is required in our phase II MAT and M.Ed. programs. The course has been taught under topics number for several years. Establishment of this course number will be an appropriate and needed step in formalizing the name and number of this required course in these two programs.

To: Victor Cifarelli, Dept. of Mathematics & Statistics
From: Judy Walker, Education/Curriculum Materials Librarian
Date: January 18, 2012
RE: Consultation on Library Holdings

Course/Program: MAED 6252 – Advanced Methods in Middle and Secondary Mathematics

Summary of Librarian’s Evaluation of Holdings:

Evaluator: Judy Walker **Date:** January 18, 2012

Please Check One:

- Holdings are superior _____
- Holdings are adequate **X**
- Holdings are adequate only if Dept. purchases additional items. _____
- Holdings are inadequate _____

Comments:

The library has a good number of books related to mathematics education but they are a little dated. A concerted effort will be made to update the titles. Students and faculty have access to all of the major education database as well as other databases such as MathSciNet, Academic Search Complete, Wiley Online, Sage Online and PsycInfo which can provide additional resources on the topic. The library also has many of the middle and secondary textbooks that have been adopted by NC DPI in the Curriculum and Instruction Materials Center.



Department of Mathematics & Statistics
MAED 6252 - Advanced Methods in Middle and Secondary Mathematics

Credit Hours: 3
Spring Semester 2013

Instructor: Dr. Teresa M. Petty
Office: COED 312E
Office Phone: 704.687.8888

Office Hours: Monday (9:30 a.m. – 12:30 p.m., 3:15 - 4:15 p.m.)
Tuesday (7:00 - 9:00 p.m.) VIRTUAL via Wimba
Other times by appointment.

Note: Please direct all communications to the instructor **through UNCC email**. This will ensure timely responses and full availability. I will abide by a 48 hour return rule for email return Monday to Friday from 9:00 a.m. to 5:00 p.m. (i.e., an email sent on Monday at 10:00 a.m. will be answered by Wednesday 10:00 a.m.).

Catalog Description:

Examination of current research and scholarship on the teaching of mathematics in middle and secondary schools. Particular emphasis on the development of advanced instructional expertise and leadership.

Course Prerequisites:

Students must be accepted as teacher education students in the Master of Arts in Teaching or Master of Education for Middle Grades programs in the College of Education.

Course Rationale:

Advanced methods in middle and secondary mathematics provides a foundation for the development of teachers who are professional educators in mathematics teaching. The course will provide a basis for the development of reflective skills as candidates explore the application of content area and related knowledge in developing pedagogical skills which are responsive to the instructional needs of students. Candidates will explore current research and scholarship on the teaching and learning of mathematics in middle and secondary schools.

Objectives upon course completion:

Upon completion of this course, successful candidates will be able to:

1. Acknowledge and value the individuality and worth of each student, believe that every student can learn and use mathematics, and become dedicated to their success.

2. Commit to the fair and equitable treatment of all students - especially in their learning of mathematics.
3. Exhibit a deep and broad knowledge of the concepts, principles, techniques, and reasoning methods of mathematics, and use this knowledge to inform curricular goals and shape their instruction and assessment.
4. Use their knowledge of human development and individual students to guide their planning and instructional decisions.
5. Use their knowledge of pedagogy along with their knowledge of mathematics and student learning to inform curricular decisions; select, design, and develop instructional strategies and assessment plans; and choose materials and resources for mathematics instruction.
6. Stimulate and facilitate student learning by using a wide range of practices.
7. Create environments in which students are active learners, show willingness to take intellectual risks, develop self-confidence, and value mathematics which fosters student learning of mathematics.
8. Develop their own and their students' abilities to reason and think mathematically - to investigate and explore patterns, to discover structures and establish mathematical relationships, to formulate and solve problems, to justify and communicate conclusions, and to question and extend those conclusions.
9. Integrate a range of assessment methods into their instruction to promote the learning of all students by designing, selecting, and ethically employing assessments that align with educational goals.
10. Provide opportunities for students to reflect on their strengths and weaknesses in order to revise, support, and extend their individual mathematics performance.
11. Reflect on what they teach, how they teach, and how their teaching impacts student learning.
12. Keep abreast of changes and learn new mathematics and mathematical pedagogy, continually improving their knowledge and practice.
13. Collaborate with families and communities to support student engagement in learning mathematics.
14. Collaborate with other teachers and education professionals to strengthen the school's mathematics program, promote program quality and continuity across grade levels and courses, and improve knowledge and practice in the field of mathematics education.

College of Education's Diversity Statement

The College of Education at UNC Charlotte is committed to social justice and respect for all individuals, and it seeks to create a culture of inclusion that actively supports all who live, work, and serve in a diverse nation and world. Attaining justice and respect involves all members of our community in recognizing that multi-dimensional diversity contributes to the College's learning environments, thereby enriching the community and improving opportunities for human understanding. While the term "diversity" is often used to refer to differences, the College's intention is for inclusiveness, an inclusiveness of individuals who are diverse in ability/disability, age, economic status, ethnicity, gender, language, national origin, race, religion, and sexual orientation. Therefore, the College aspires to become a more diverse community in order to extend its enriching benefits to all participants. An essential feature of our community is an

environment that supports exploration, learning, and work free from bias and harassment, thereby improving the growth and development of each member of the community.

College of Education Technology Statement

Professional education programs at UNC Charlotte are committed to preparing candidates for success in the 21st century through an emphasis on knowledge, effectiveness and commitment to technology integration and application. Preparation in the integration and application of technology to enhance student learning is essential for all candidates. Programs across the professional education unit, including the College of Arts + Architecture, College of Education, and College of Liberal Arts and Sciences, reflect this commitment in coursework, early field experiences, and clinical practice which includes student teaching and/or the capstone/internship phase of the respective programs.

Conceptual Framework

Professional Educators Transforming Lives, the Conceptual Framework for Professional Education Programs at UNC Charlotte, identifies the proficiencies that our graduates will demonstrate. During coursework, early field experiences, and clinical practice candidates have multiple opportunities to develop the **knowledge, effectiveness, and commitment** necessary to transform the lives of the learners with whom they work. This course seeks to develop the proficiencies that are highlighted below.

Core Proficiency: Knowledge. Candidates will demonstrate the **Knowledge** that provides the foundation for transforming the lives of the children, youth, and families with whom they work. This knowledge includes elements such as:

- K1: Knowledge relevant to life in the 21st century
- K2: Specialty area knowledge
- K3: Pedagogical knowledge
- K4: Knowledge of learners and their contexts
- K5: Self-awareness
- K6: Knowledge of policies, laws, standards, and issues

Core Proficiency: Effectiveness. Candidates will demonstrate **Effectiveness** in their work with children, youth, and families by applying knowledge and developing effective skills in areas such as:

- E1: 21st century skills
- E2: Planning, implementation, and evaluation
- E3: Research-based practice
- E4: Research skills
- E5: Culturally competent practice
- E6: Response to diverse learners
- E7: Reflective practice

Core Proficiency: Commitment. Candidates will demonstrate their **Commitment** to

transforming the lives of others through their actions in areas such as:

- C1: Positive impact on learners
- C2: Ethics
- C3: Leadership
- C4: Collaboration
- C5: Advocacy
- C6: Professional identity and continuous growth

The core proficiencies of **knowledge**, **effectiveness**, and **commitment** are fully aligned with the North Carolina standards for teachers, school executives, and counselors. This course seeks to develop the North Carolina standards listed below.

The North Carolina Professional Teaching Standards Commission developed teaching standards based on a “new vision of teaching” in light of 21st century opportunities, needs and demands. The following five graduate program standards are parallel to and expand upon those standards. These are advanced standards, appropriate for teacher education programs to use as guidelines in developing their graduate level teaching programs. Teachers granted the master’s degree license are expected to be teacher leaders in their specialty area, to facilitate the creation of healthy educational environments, to have deep knowledge and skills in their content and curriculum, to use research in making decisions about effective practice for student learning, and to be continuous, reflective practitioners who model the values of lifelong learning, critical thinking, problem-solving and innovation.

Standard 1: Teacher Leadership

Teacher leaders assume the roles and responsibilities of collaborative leaders in schools and communities. Teachers demonstrate leadership in their classrooms, schools and professional organizations; they advocate for students and effective educational practices and policies; and they are role models for ethical leadership. Teacher leaders will know and be able to:

- Demonstrate effective ongoing communication, collaboration, and team-building among colleagues.
- Facilitate mentoring and coaching with novice teachers.
- Set goals and establish priorities while promoting educational initiatives that positively affect student learning.
- Participate in professional learning communities.

Standard 2: Respectful Educational Environments

Teacher leaders model leadership by establishing a positive and productive environment for a diverse population of students, their families, and the community. Teachers are knowledgeable about cultures and global issues and how they are contextualized locally. Teachers help colleagues develop effective strategies for students with special needs. They encourage positive, constructive relations among colleagues and students. Teacher leaders:

- Facilitate the development of inviting, respectful, supportive, inclusive, and flexible educational communities.
- Create collaborative partnerships with families, schools, and communities to promote a positive school culture.
- Facilitate and model caring and respectful treatment of individuals within the learning community.
- Demonstrate knowledge and understanding of diverse world cultures and global issues.
- Encourage high expectations for all students.
- Collaboratively design and implement curriculum and instruction that is responsive to learner differences.

Standard 3: Content and Curriculum Expertise

Teacher leaders have a deep knowledge of the subjects they teach and understanding of curriculum theory and development. They value collaboration and the interconnectedness of disciplines. They understand the importance of curriculum relevance in engaging students in content. Teacher leaders:

- Demonstrate in-depth knowledge of curriculum, instruction, and assessment.
- Model the integration of 21st century content and skills into educational practices.
- Develop relevant, rigorous curriculum.

Standard 4: Student Learning

Teacher leaders facilitate student learning through evidence-based practice informed by research. They understand and apply research in child and adolescent development, cognitive development, and general and specialized pedagogy. They encourage critical reading, writing and thinking in the learning process. They foster instructional and evaluation methods that embrace variety and authenticity. They promote student reflection and self-assessment. They encourage colleagues and students to take on leadership roles and work in teams. Teacher leaders:

- Seek out and use existing research to inform school practices.
- Design action research to investigate and improve student learning and school policies and practices.
- Model technology integration that supports student learning.
- Critically analyze student and school performance data to determine needs and plan instruction that is rigorous, coherent, and substantiated within a theoretical and philosophical base.

Standard 5: Reflection

Teacher leaders contribute to systematic, critical analysis of learning in their classrooms and beyond. They are lifelong learners who model and support ongoing professional

development. Teachers embrace critical thinking, problem solving, and innovation. Teacher leaders:

- Promote an educational culture that values reflective practice.
- Model the development of meaningful professional goals.
- Model personal and professional reflection to extend student learning and school improvement.

NBPTS Core Propositions

The National Board for Professional Teaching Standards seeks to identify and recognize teachers who effectively enhance student learning and demonstrate the high level of knowledge, skills, abilities and commitments reflected in the following five core propositions.

- Teachers are committed to students and their learning. Accomplished teachers are dedicated to making knowledge accessible to all students. They act on the belief that all students can learn. They treat students equitably, recognizing the individual differences that distinguish one student from another and taking account of these differences in their practice. They adjust their practice based on observation and knowledge of their students' interests, abilities, skills, knowledge, family circumstances and peer relationships.

Accomplished teachers understand how students develop and learn. They incorporate the prevailing theories of cognition and intelligence in their practice. They are aware of the influence of context and culture on behavior. They develop students' cognitive capacity and their respect for learning. Equally important, they foster students' self-esteem, motivation, character, civic responsibility and their respect for individual, cultural, religious and racial differences.

- Teachers know the subjects they teach and how to teach those subjects to students. Accomplished teachers have a rich understanding of the subject(s) they teach and appreciate how knowledge in their subject is created, organized, linked to other disciplines and applied to real-world settings. While faithfully representing the collective wisdom of our culture and upholding the value of disciplinary knowledge, they also develop the critical and analytical capacities of their students.

Accomplished teachers command specialized knowledge of how to convey and reveal subject matter to students. They are aware of the preconceptions and background knowledge that students typically bring to each subject and of strategies and instructional materials that can be of assistance. They understand where difficulties are likely to arise and modify their practice accordingly. Their instructional repertoire allows them to create multiple paths to the subjects they teach, and they are adept at teaching students how to pose and solve their own problems.

- Teachers are responsible for managing and monitoring student learning. Accomplished teachers create, enrich, maintain and alter instructional settings to

capture and sustain the interest of their students and to make the most effective use of time. They also are adept at engaging students and adults to assist their teaching and at enlisting their colleagues' knowledge and expertise to complement their own.

Accomplished teachers command a range of generic instructional techniques, know when each is appropriate and can implement them as needed. They are as aware of ineffectual or damaging practice as they are devoted to elegant practice.

They know how to engage groups of students to ensure a disciplined learning environment, and how to organize instruction to allow the schools' goals for students to be met. They are adept at setting norms for social interaction among students and between students and teachers. They understand how to motivate students to learn and how to maintain their interest even in the face of temporary failure.

Accomplished teachers can assess the progress of individual students as well as that of the class as a whole. They employ multiple methods for measuring student growth and understanding and can clearly explain student performance to parents.

- Teachers think systematically about their practice and learn from experience. Accomplished teachers are models of educated persons, exemplifying the virtues they seek to inspire in students -- curiosity, tolerance, honesty, fairness, respect for diversity and appreciation of cultural differences -- and the capacities that are prerequisites for intellectual growth: the ability to reason and take multiple perspectives to be creative and take risks, and to adopt an experimental and problem-solving orientation.

Accomplished teachers draw on their knowledge of human development, subject matter and instruction, and their understanding of their students to make principled judgments about sound practice. Their decisions are not only grounded in the literature, but also in their experience. They engage in lifelong learning which they seek to encourage in their students.

Striving to strengthen their teaching, accomplished teachers critically examine their practice, seek to expand their repertoire, deepen their knowledge, sharpen their judgment and adapt their teaching to new findings, ideas and theories.

- Teachers are members of learning communities. Accomplished teachers contribute to the effectiveness of the school by working collaboratively with other professionals on instructional policy, curriculum development and staff development. They can evaluate school progress and the allocation of school resources in light of their understanding of state and local educational objectives. They are knowledgeable about specialized school and community resources that can be engaged for their students' benefit, and are skilled at employing such resources as needed.

Accomplished teachers find ways to work collaboratively and creatively with parents, engaging them productively in the work of the school.

NBPTS Standards for Mathematics Teachers

The National Board for Professional Teaching Standards has organized the standards for accomplished teachers of mathematics into the following ten standards. The standards have been ordered to facilitate understanding, not to assign priorities. They each describe an important facet of accomplished teaching; they often occur concurrently because of the seamless quality of accomplished practice. These standards serve as the basis for National Board Certification in this field.

Standard I: Commitment to Mathematics Learning of All Students

Accomplished mathematics teachers acknowledge and value the individuality and worth of each student, believe that every student can learn and use mathematics, and are dedicated to their success. Accomplished mathematics teachers are committed to the fair and equitable treatment of all students - especially in their learning of mathematics.

Standard II: Knowledge of Mathematics

Accomplished mathematics teachers have a deep and broad knowledge of the concepts, principles, techniques, and reasoning methods of mathematics, and they use this knowledge to inform curricular goals and shape their instruction and assessment. They understand significant connections among mathematical ideas and the applications of these ideas to problem solving in mathematics, in other disciplines, and in the world outside of school.

Standard III: Knowledge of Students

Accomplished teachers use their knowledge of human development and individual students to guide their planning and instructional decisions. They understand the impact of prior mathematical knowledge, home life, cultural background, individual learning difference, student attitudes and aspirations, and community expectations and values on students and their mathematics learning.

Standard IV: Knowledge of the Practice of Teaching

Accomplished mathematics teachers use their knowledge of pedagogy along with their knowledge of mathematics and student learning to inform curricular decisions; select, design, and develop instructional strategies and assessment plans; and choose materials and resources for mathematics instruction. Accomplished mathematics teachers stimulate and facilitate student learning by using a wide range of practices.

Standard V: Learning Environment

Accomplished mathematics teachers create environments in which students are active learners, show willingness to take intellectual risks, develop self-confidence, and value mathematics. This environment fosters student learning of mathematics.

Standard VI: Ways of Thinking Mathematically

Accomplished mathematics teachers develop their own and their students' abilities to reason

and think mathematically - to investigate and explore patterns, to discover structures and establish mathematical relationships, to formulate and solve problems, to justify and communicate conclusions, and to question and extend those conclusions.

Standard VII: Assessment

Accomplished mathematics teachers integrate a range of assessment methods into their instruction to promote the learning of all students by designing, selecting, and ethically employing assessments that align with educational goals. They provide opportunities for students to reflect on their strengths and weaknesses in order to revise, support, and extend their individual performance.

Standard VIII: Reflection and Growth

To improve practice, accomplished mathematics teachers regularly reflect on what they teach, how they teach, and how their teaching impacts student learning. They keep abreast of changes and learn new mathematics and mathematical pedagogy, continually improving their knowledge and practice.

Standard IX: Families and Communities

Accomplished mathematics teachers collaborate with families and communities to support student engagement in learning mathematics. They help various communities, within and outside the school building, understand the role of mathematics and mathematics instruction in today's world.

Standard X: Professional Community

Accomplished mathematics teachers continually collaborate with other teachers and education professionals to strengthen the school's mathematics program, promote program quality and continuity across grade levels and courses, and improve knowledge and practice in the field of mathematics education.

NCTM National Standards [source: <http://standards.nctm.org>]

The National Standards are based on ten themes, five content-oriented and five process-oriented:

1. Number and Operations

Instructional programs from prekindergarten through grade 12 should enable all students to:

- understand numbers, ways of representing numbers, relationships among numbers, and number systems;
- understand meanings of operations and how they relate to one another;
- compute fluently and make reasonable estimates.

2. Algebra

Instructional programs from prekindergarten through grade 12 should enable all

students to:

- understand patterns, relations, and functions; represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships;
- analyze change in various contexts.

3. Geometry

Instructional programs from prekindergarten through grade 12 should enable all students to:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations;
- use visualization, spatial reasoning, and geometric modeling to solve problems.

4. Measurement

Instructional programs from prekindergarten through grade 12 should enable all students to:

- understand measurable attributes of objects and the units, systems, and processes of measurement;
- apply appropriate techniques, tools, and formulas to determine measurements.

5. Data Analysis & Probability

Instructional programs from prekindergarten through grade 12 should enable all students to:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on data;
- understand and apply basic concepts of probability.

6. Problem Solving

Instructional programs from prekindergarten through grade 12 should enable all students to:

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems;

- monitor and reflect on the process of mathematical problem solving.

7. Reasoning & Proof

Instructional programs from prekindergarten through grade 12 should enable all students to:

- recognize reasoning and proof as fundamental aspects of mathematics;
- make and investigate mathematical conjectures;
- develop and evaluate mathematical arguments and proofs;
- select and use various types of reasoning and methods of proof.

8. Communication

Instructional programs from prekindergarten through grade 12 should enable all students to:

- organize and consolidate their mathematical thinking through communication;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- analyze and evaluate the mathematical thinking and strategies of others;
- use the language of mathematics to express mathematical ideas precisely.

9. Connections

Instructional programs from prekindergarten through grade 12 should enable all students to:

- recognize and use connections among mathematical ideas;
- understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- recognize and apply mathematics in contexts outside of mathematics.

10. Representation

Instructional programs from prekindergarten through grade 12 should enable all students to

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems; use representations to model and interpret physical, social, and mathematical phenomena.

Course Text

There is no course text. You will have assigned article readings throughout the course and these will be available via Moodle.

Course Readings: (Links to these readings will be provided in the course modules.)

- NCTM Principles and Standards for School Mathematics located at <http://www.nctm.org/standards/content.aspx?id=16909>
- Common Core State Standards for Mathematics located at http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf
- National Board for Professional Teaching Standards Mathematics Standards located at http://www.nbpts.org/userfiles/file/aya_math_standards.pdf
- A Mathematician's Lament located at <http://www.maa.org/devlin/LockhartsLament.pdf>
- Steedly, K., Dragoo, K., Arafeh, S. & Luke, S. (2008). Effective mathematics instruction. *Evidence for Education*, 3(1).
- Klein, D. (2007). A quarter century of US 'math wars' and political partisanship. *BSHM Bulletin: Journal of the British Society for the History of Mathematics*, 22(1), 22-33.
- Gagnon, G. (2006). Healing math learners. New Horizons for Learning located at <http://education.jhu.edu/newhorizons/Transforming%20Education/Articles/Healing%20Math%20Learners/index.html>
- Tarr, James E., Reys, Robert E., Reys, Barbara J., Chávez, Óscar, Shih, Jeffrey, and Osterlind, Steven J. "The Impact of Middle-Grades Mathematics Curricula and the Classroom Learning Environment on Student Achievement." *Journal for Research in Mathematics Education* 39, (May 2008): 247–280. Located at <http://www.nctm.org/news/content.aspx?id=15513>
- Hill, H., Rowan, B. & Ball, D. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal*, 42, 371-406.
- Hill, H. (2007). Mathematical knowledge of middle school teachers: Implications for the No Child Left Behind Policy Initiative. *Educational Evaluation and Policy Analysis*, 29, 95-114.
- Kiliç, H. (2011). Preservice secondary mathematics teachers' knowledge of students. *Turkish Online Journal of Qualitative Inquiry*, 2(2).
- Mathematics Professional Development, NCTM Research Report. Located at http://www.nctm.org/uploadedFiles/Research_News_and_Advocacy/Research/Clips_and_Briefs/Research_brief_15-Goldsmith.pdf#search=%22Hill H. C. Ball D. L.%22
- Ball, D. L., Lubienski, S., and Mewborn, D. (2001). Research on teaching mathematics: The unsolved problem of teachers' mathematical knowledge. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed.). New York: Macmillan.
- Rawnsley, D. & Fisher, D. (1998). *Learning environments in mathematics classrooms and their associations with students' attitudes and learning*. Paper presented at the Australian Association for Research in Education Conference, Adelaide.
- Kirsner, S. & Bethell, S. (1992). *Creating a flexible and responsive learning environment for general mathematics students*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Common Core State Standards - Key Points in Mathematics. Located at <http://www.corestandards.org/about-the-standards/key-points-in-mathematics>
- Evolving Mathematics Classroom Assessment Cultures. In R. Hunter, B. Bicknell, & T. Burgess (Eds.), *Crossing divides: Proceedings of the 32nd annual conference of the*

Mathematics Education Research Group of Australasia (Vol. 2). Palmerston North, NZ: MERGA.

- Ross, J. A. & Bruce, C. D. (2007). Teacher self-assessment: A mechanism for facilitating professional growth. *Teaching and Teacher Education*, 23(2), 146-159.
- Investigating Assessment Strategies in Mathematics Classrooms. Located at http://www.learningdesigns.uow.edu.au/tools/info/T1/MathsAssess_sample/index.html
- STEM Teachers in Professional Learning Communities: A Knowledge Synthesis. Located at <http://www.nctaf.org/documents/STEMTeachersinProfessionalLearningCommunities.AKnowledgeSynthesis.pdf>

Course Materials

You will need a computer with speakers and a microphone or a headset to participate in the Wimba sessions. The first time you log onto Wimba you should run the Wimba Wizard. Information regarding this and Wimba technical support can be found at <http://distanceed.uncc.edu/or/Technical/wimba.aspx>

Course Expectations:

Grading

- The grade of A signifies clearly outstanding work, exceeding expectations = 90% of total points (90-100% = A)
- The grade of B indicates good work, meeting expectations = 80% of total points (80-89 % = B)
- The grade of C indicates average work with acceptable progress, work meets minimum expectations = (70-79% = C)
- The grade of U indicates failure to master the goals of the course or demonstrate competence in the minimum expectations (<69 % = U)

Course Requirements:

A. Participate in all aspects of the course (20%)

Our class is comprised of diverse individuals, each having their own expectations, perceptions, skills, abilities, experiences, and prior knowledge. As such, we **all** have much to offer and learn from each other. It is expected that you will participate **fully** in each and every course “activity” and requirement. This course is designed utilizing both synchronous (Wimba) and asynchronous (Moodle) delivery modes. Approximately half of our class sessions will be synchronous while the other half will be asynchronous. As such, there are seven required synchronous Wimba sessions during the semester. These sessions are on Tuesday nights (January 10, January 17, January 31, February 14, February 28, March 13, March 27, April 17,

May 1) from 7:00 to 9:00. During these sessions you will be: 1) engaging in whole class discussions, 2) discussing course readings in small groups, 3) making presentations regarding course projects and reflections on readings, and 4) participating in question/answer sessions. Three points will be deducted from the final average for each missed Wimba session. Technical problems are not an excused reason for missing a session. Please be sure to check your equipment prior to the first Wimba session. You will need either speakers and a microphone or a headset to participate in these sessions.

Technical assistance is provided to Distance Education students by: **ITS/Student Computing**
Student Computing Help Center: Toll Free: **1-877-396-8462** Local: **704-687-6400** HelpDesk
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B. Discussion Forum (20%)

You are asked to participate in a weekly electronic online discussion. Each discussion entry will typically have required responses based on the assigned readings/activities and responses to other students' entries. Each discussion forum entry should be posted in this way:

- Under the appropriate module, click on the discussion topic.
- Then click on 'Reply' and fill in the subject line **with both your name and the subject**
- Compose your response and post it
- Now: What to post?
 - Required response: Each discussion forum entry should include the following:
 - A comprehensive response to the discussion questions and activities (Be sure to address all components of the question.)
 - Reflection on assigned readings and lived experiences, as well as current issues in schooling that you deem appropriate to discuss given the module's topic (but which may not be called for in the actual questions)
 - Any questions, concerns, or other ideas you have that pertain to the module's topic, but which are not directly called for through the assigned discussion questions or discussion of any meaningful insights that you are developing as a result of your reading, reflecting, or responding to others.

Required response: You must also read and comment on the postings made by your classmates in this class, which will ensure a "threaded" discussion as opposed to smaller segregated entries. To make this happen, you must complete your initial posting (based on discussion questions and activities provided) **by Sunday night prior** to the module's close. This will allow everyone to respond to the postings of classmates **by Tuesday night which is the close of the module.** (After that, you will still be able to post; however, a grade will not be issued.) To help you control your time and pacing with the material, you are required to respond to only two classmates' postings as opposed to each of them; however, you may respond to as many postings as you wish. NOTE: You will follow the same posting procedures as above, but you will simply select "Reply" in order to respond to another student.

C. Analysis of Teaching Project (20%)

Analysis of Teaching Project with Video Presentation

- Use an Analysis of Teaching Project in their licensing area from an Advanced Methods course to demonstrate their knowledge and applications of respective educational environments, content and curriculum expertise, and their ability to impact student learning.
- The candidates include the complete narrative from the assignments and all artifacts.
- The candidates will develop a three point essay on (1) the actual delivery of the unit, (2) powerful impact on student learning based on evidence and artifacts, and (3) data driven implications for future teaching.
- The choices for the Analysis of Teaching Project are well-grounded in respected educational theory and research and clearly support positive impact on student learning.
- The candidates will present a video that serves to support and verify the project in class.
- All literature must be properly cited in APA format.
- Essay Page Limits: 3 to 6 pages
- Video: 10 to 12 minutes in DVD, VHS, or online format.

Designing and Assessing Student Learning: This requirement will provide the opportunity to demonstrate your ability to develop, implement, and assess both student learning and the effectiveness of a developmentally appropriate instructional investigation designed to promote learners' construction and understanding of one major mathematics concept (or relationship) along with the development of one or more process skills. This task is a reflective analysis of instructional methods that you currently use in your classroom.

As part of this task, you will video tape your instructional implementation and then reflect on the effectiveness of your teaching to impact student learning. Your reflection should be a critical analysis of your instructional decision-making, teaching, and impact on student learning.

Select a concept or topic that you will teach from the NCSCoS. **Video tape your lesson.** Craft a concise and descriptive narrative explicating the following as a guide for reflective analysis of your instruction:

- Define the concept or topic taught. Identify the targeted process skill.
- What instructional strategy did you select to teach this concept or topic?
- How did your instructional strategy address development of the process skill?
- Given the diversity of the selected class, for what specific reasons did you choose this strategy? How did the strategy support the individual needs of these students? How did students respond to the instruction during class?
- How did the instructional strategy scaffold student learning of the concept or

- topic? Were students engaged in the learning process?
- What elements of your teaching were effective? What elements need improvement?
 - What evidence can you provide that demonstrates mastery of content and your content knowledge?
 - Were the content resources that you selected effective in support student understanding of content?
 - What strategy did you use to assess student learning of the concept or topic?
 - How do you know that students understood and learned the concept or topic? Do you think students retained understanding of the concept or topic beyond the unit test or your course? Explain your thinking.
 - How will you communicate student learning to families based on the assessment data collected from this lesson and from your reflective analysis of student interaction and motivation?
 - What challenges did you encounter in planning, preparation, teaching, or evaluation? Explain.
 - What is your formal and informal curriculum? What observations did you make about your implementation in analyzing the video of your teaching?
 - Where applicable, provide examples of the task description and student work to support your reflective evaluation. You will also want to note key segments of your video that document your evaluation of your instruction.

Collaborative evaluation of instructional methods, applications, and impact on student learning will be conducted in class. Assessment for this task will be based upon the quality of your reflective analysis of your instructional decision-making and teaching. This assignment addresses all NCDPI Standards.

You may use Understanding by Design (UbD) Lesson Template, Thinking for Understanding (TfU) Lesson Template, the Lesson Plan template required by the University course instructor, or lesson plan template required by your School or School System.

Rubric for Analysis of Teaching Project:

Elements	Alignment with Standards	Unacceptable (U)	Acceptable (A)	Target (Publishable) (T)
Selection of Instructional Strategies	-Content Knowledge - Pedagogical Content Knowledge -Knowledge of Learners	Limited, little or no evidence is provided to rationalize that the selected instructional strategies are effective to teach content to class given student diversity at	Clear evidence is provided to rationalize that the selected instructional strategies are effective to teach content to class given student diversity at this particular point of time	Clear, consistent and convincing evidence is provided to rationalize that the selected instructional strategies are effective to teach content to class given

Elements	Alignment with Standards	Unacceptable (U)	Acceptable (A)	Target (Publishable) (T)
		this particular point of time.		student diversity at this particular point of time
Selection of Appropriate Resources	-Content Knowledge - Pedagogical Content Knowledge -Knowledge of Learners	Limited, little or no evidence to support the selection of appropriate resources. Selection of inappropriate resources.	Clear evidence is provided to support the selection of appropriate resources.	Clear, consistent and convincing evidence is provided to support the selection of appropriate resources.
Selection of Assessment Strategies	-Content Knowledge - Pedagogical Content Knowledge -Knowledge of Learners	Limited, little or no evidence is provided to rationalize that the selected assessment strategy is effective to assess students' conceptual understanding.	Clear evidence is provided to rationalize that the selected assessment strategy is effective to assess students' conceptual understanding	Clear, consistent and convincing evidence is provided to rationalize that the selected assessment strategy is effective to assess students' conceptual understanding
Evidence of Student Engagement		Limited, little or no evidence is provided to assess students' engagement.	Clear evidence is provided to assess students' engagement.	Clear, consistent and convincing evidence is provided to assess students' engagement.
Assessment of Student Learning	-Content Knowledge - Pedagogical Content Knowledge -Knowledge of Learners	Limited, little or no evidence is provided to assess students' conceptual understanding.	Clear evidence is provided to assess students' conceptual understanding	Clear, consistent and convincing evidence is provided to assess students' conceptual understanding

D. Literature Review Project (20%)

You are asked to read ten (10) research articles dealing with a topic of mathematics education (teaching, learning, assessment, misconceptions, professional development, use of technology, conceptual change, issues of equity and access, common core standards, standards-based

curricula, teacher impact on learning, effects of homework on understanding, etc.). The source of articles includes, but is not limited to, the following research journals:

- *Canadian Journal of Science, Mathematics and Technology Education*
- *Educational Studies in Mathematics*
- *Focus on Learning Problems in Mathematics*
- *For the Learning of Mathematics*
- *Hiroshima Journal of Mathematics Education*
- *International Electronic Journal of Mathematics Education*
- *International Journal for the History of Mathematics Education*
- *International Journal for Mathematics Teaching and Learning*
- *International Journal of Technology in Mathematics Education*
- *International Journal of Computers for Mathematical Learning*
- *International Journal of Mathematical Education in Science and Technology*
- *International Journal of Science and Mathematics Education*
- *Journal of Computers in Mathematics and Science Teaching*
- *Journal of Mathematical Behavior*
- *Journal of Mathematics Education*
- *Journal of Mathematics Teacher Education*
- *Journal for Research in Mathematics Education*
- *Journal of STEM (Science, Technology, Engineering, and Mathematics) Education: Innovation and Research*
- *Literacy and Numeracy Studies: An International Journal in the Education and Training of Adults*
- *Mathematics Education Research Journal*
- *Mathematics Education Review*
- *Mathematics Educator*
- *Mathematics Teaching*
- *Mathematics Teaching in the Middle School*
- *Mathematical Thinking and Learning*
- *Research in Collegiate Mathematics Education (RCME)*
- *Research in Mathematics Education*
- *School Science and Mathematics*
- *Teaching Children Mathematics*
- *Teaching Mathematics and Its Applications*
- *Teaching Statistics*
- *The Teaching of Mathematics*
- Other “approved” general-education research journals (this is where you will likely find the majority of your articles)

Write this Literature Review describing the research presented in each of the ten articles as well as an overview of insights and/or best practices learned from research on the chosen topic. *Examples of literature reviews will be presented during one of our synchronous class meetings.*

You will also include a reflective analysis in which you discuss the connection of the research to current teaching practice. Paper must be formatted in 6th Edition APA.

Prepare a 10 minute PowerPoint presentation or another multimedia presentation providing an overview of your literature review. You will present during one of synchronous class meetings as indicated on the course schedule.

Rubric for Literature Review Project:

Elements	Unacceptable (U)	Acceptable (A)	Target (Publishable) (T)
Identification of Topic for Literature Review	Topic chosen does not appropriately relate to mathematics education.	Topic chosen is appropriately related to mathematics education.	Topic chosen is appropriately related to mathematics education and is clearly articulated.
Selection of Journal Articles	Limited, little or no evidence is provided to rationalize that the selected journal articles are appropriate to the given topic.	Clear evidence is provided to rationalize that the selected journal articles are appropriate to the given topic.	Clear, consistent and convincing evidence is provided to rationalize that the selected journal articles are appropriate to the given topic.
Summary of Each Article	The summaries do not provide a clear overview the journal articles.	The summaries provide a clear overview of most journal articles.	The summaries provide a clear and articulate overview of each of the ten journal articles.
Interpretation of Each Article	Limited, little or no interpretation is provided for each journal article.	Clear interpretation is provided for each journal article	Clear, consistent and convincing interpretation is provided for each of the ten journal articles.
Reflective Analysis	Limited, little or no evidence is provided the connection of the research to teaching practice.	Clear evidence is provided that demonstrates the connection of the research to teaching practice.	Clear, consistent and convincing evidence is provided that demonstrates the connection of the research to teaching practice.
Presentation	Presentation is	Presentation is clear	Presentation is clear

	lacking in clarity with limited connection to the impact of the research and mathematics education.	with an overview of the research and its impact on mathematics education.	and concise with a clear overview of the research and its impact on mathematics education.
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E. Technology Integration Project (20%)

Choose a current technology that is appropriate to the mathematics content you are teaching. You will write a two-day lesson in which the technology is used to teach/facilitate the learning of the mathematics content. In your submission, you will include the following:

- A copy of the two-day lesson plan in which you thoroughly detail the events of each day. It may be appropriate to use screenshots depending on the technology you choose.
- Selected copies of student work (if appropriate) with names removed. It is not necessary to include every student's work.
- A 3 to 5 page reflective analysis of the planning of the lessons, implementation of the lessons, and the overall impact on student understanding.

All of these components should be submitted via Moodle by the date indicated on the course schedule. You will be expected to share your project with the class; however, a formal presentation will not be required.

Academic Integrity

All UNCC students have the responsibility to be familiar with and to observe requirements of the UNCC Code of Student Academic Integrity (refer to the Graduate Catalogue). This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials (such as library books on reserve), and complicity in academic dishonesty (helping others violate the code).

Sexual Harassment

Students are required to abide by the university policy expressed at <http://www.legal.uncc.edu/policies/ps-66.html>

Plagiarism

All students are required to abide by the Code of Student Academic Integrity available on-line at <http://www.legal.uncc.edu/policies/ps-105.html>