MAT 764 A—Methods of Teaching
Secondary/Middle School Mathematics
Fall Semester, 2004

Vital Information:

Days: Tuesday and Thursday
Time: 2:00 – 3:20 PM
Place: 158 SMB—Sada L Clarke Curriculum Classroom

Instructor: Dr. Timothy Hendrix
Office: 246 SMB
Office Phone: 760-8240 (Voice Mail is available; please leave a message if I am not available)
Home Phone: 510-8725 (before 10 PM)
Email: hendrixt@meredith.edu
Office Hours: Mondays & Fridays: 9:00 – 10:00 AM; Wednesdays, 1:00 – 2:00 PM;
Tuesdays & Thursdays, 11 AM – 12 Noon

Resources and Technology:

- In this course, we will explore mathematics teaching and learning with a variety of hands-on materials and technology resources. Many of the manipulative resources will be provided to you in class and will be available for temporary check-out for your use in course projects and for use in the field.

- This course will be quite technology-intensive. You should be able to complete many projects to include in your technology portfolio component of the professional teaching standards.

- If you have a Meredith laptop through the Laptop Initiative, then you need to see Tech Services to have the following software packages installed on your computers: Geometer’s Sketchpad, Fathom, Graphing Calculator 3.2, and Logger Pro 3.1. Please make sure that you have a Java-enabled Browser available on your laptop computer or home computer as well (Usually this implies Internet Explorer 5.x or greater or Netscape Communicator/Navigator 7.x or greater.).

- If you have your own personal computer (desk or laptop), I encourage you to explore the use of the software listed above. Explore the following website, http://www.keypress.com, to find information about Geometer’s Sketchpad and Fathom software packages. While the demo versions are free, one is not able to save files with the demo. Student versions are rather inexpensive relative to other software packages. Likewise, explore http://www.vernier.com for Logger Pro 3.1 information. One copy of the software entitles you to a site license for school use, so several of you could go in together to purchase a copy. Graphing Calculator 3.2 can be found at http://www.pacifict.com/.

- In this methods course, you will submit a great deal of your assignments via the web in HTML format. To this end, you need to have access to HTML editing software, such as Netscape Communicator 7.1 (Composer), Microsoft Front Page, Adobe GoLive or Macromedia Dreamweaver. It is my understanding that most of these software packages are in the computer labs. Course Website: The course website is located at the following URL: http://www.mste.uiuc.edu/courses/mat764fa04/. We will use this website as a means of submitting assignments and as a point of exploration of web resources and curriculum publishing. We will also use Blackboard, but in a limited capacity. You may enroll in the course via Blackboard at http://courses.meredith.edu/.
Textbooks:

- *Principles and Standards for School Mathematics*
  **Author:** National Council of Teachers of Mathematics

- *Teaching Secondary and Middle School Mathematics*
  **Author:** Brahier

Other readings will be distributed to you in class and a reading resource list will be posted on both Blackboard and the course website. A sample of the readings are included in the list below.

- Various journal articles in mathematics education
- *A Research Companion to Principles & Standards for School Mathematics*
  **Authors:** National Council of Teachers of Mathematics
- *Mathematics, Pedagogy, and Secondary Teacher Education*
  **Authors:** Cooney, Dossey, et al.
- *Implementing Standards-based Mathematics Instruction*
  **Authors:** Stein, Smith, Henningsen, and Silver
- *The Teaching Gap*
  **Authors:** Stigler and Heibert

Course Description:

This course is designed to be the capstone course in the teaching and learning of mathematics in the secondary pre-service teacher education program. This course will examine and model a more investigative approach to secondary mathematics instruction through hands-on activities with standards-based and technology-intensive curricula in secondary mathematics. The course will examine learning theories in mathematics in view of recent national and state recommendations for mathematics curricula and instruction—i.e., the National Council of Teachers of Mathematics’ Principles and Standards 2000 and North Carolina statewide learning goals as articulated in the Standard Courses of Study.

The course will include several special emphases. Issues of diversity and equity will pervade the course as we explore the goal of mathematical power for all our students and the diverse learning styles our students bring to the classroom. Technology will be used and evaluated critically throughout the course for its instructional value. Practically all coursework will be submitted online through the course website. In addition, students will have:

1. The opportunity to develop and to present lessons, to examine secondary mathematics curricula, and to learn mathematics more deeply;

2. Hands-on experience with powerful tools for learning mathematics, including various manipulatives; software such as Geometer's Sketchpad, Excel, and Fathom; graphing calculators; computer-based laboratories and data collection devices; interactive Java applets and other internet resources;

3. The opportunity to learn about web development (reviewing the basics of HTML) and curriculum development for the Internet; and

4. The opportunity to interact with teachers and students in a secondary field placement setting, assisting the cooperating teacher in daily instructional activities, and teaching lessons.
Course Objectives:

This course is designed to prepare you for the teaching of mathematics at the middle and secondary grade levels. While the course will examine specific methods and issues in teaching and learning mathematics, it is my hope and intention that you grow mathematically through this course as well. In every course I teach, I hope that students will:

- **Experience new ideas**—by articulating your philosophy of mathematics, teaching and learning; by looking at and doing mathematics from new and different perspectives; from reading and discussing different viewpoints.
- **Continue building rich mathematical power**—by understanding the concepts behind rules and procedures that we teach; by learning new mathematics.
- **Gain multiple perspectives**—by engaging concepts in multiple representations. In this course, you should expect to meet concepts from graphical, visual, numerical, and verbal representations, as well as symbolical representations.
- **Apply knowledge of mathematics with other fields of study**—by exploring how mathematics is used in different fields and disciplines; by building models to solve problems that arise in other fields, such as business, engineering, biology, physics, information science, sports, etc.
- **Build connections within mathematics**—by exploring how school geometry and algebra are connected; by seeing how statistics, discrete mathematics, and calculus are related geometrically and algebraically.
- **Use powerful technology tools of computation and investigation**—by using graphing calculators, computer algebra systems, spreadsheets, and data collection/analysis software promote diverse learning styles and deeper understanding.
- **Do mathematics both collaboratively and independently**—by engaging group problem-solving as well as independent mastery work. You will have the opportunity to contribute to collective understanding and application of concepts with other class members throughout the course. However, to contribute meaningfully, you must have a level of understanding and ease with the concepts individually.

Statement of Honor:

“We, the Meredith Community, are committed to developing and affirming in each student a sense of personal honor and responsibility. Uncompromising honesty and forthrightness are essential elements of this commitment. The Honor System is a method by which individual honors are protected and maintained. Any dishonorable action will be regarded as a violation of this commitment, and corrective action will be taken.

“If I am in violation of the Honor Code, to prevent jeopardizing the Honor System or weakening our system of self-government, I have an obligation to report myself to the proper authorities. If I am aware of a violation of the Honor System by another student, I shall call this matter to the attention of the student as a violation of responsibility to the community.

“In choosing Meredith College, I am accepting the Honor System as a way of life. As a Meredith student, I am responsible for insuring that the Honor System is at all times carried out.”

I will expect you to sign and to commit all of your work products to scrutiny of this pledge.

In class, I will clearly identify which types of work products are intended to represent independent work or collaborative work.
Attendance Policy:

- The College Policy is that "each student is expected to be regular and prompt in her attendance at all classes."
- In this course, you are expected to attend all classes. The material in the course is cumulative by nature rather than topically discrete. Moreover, in this course, you will be expected to work both independently as well as collaboratively with other course members. That imparts a responsibility to each individual to be present in class and to prepare accordingly.
- If it becomes necessary for you to miss a class, it is your responsibility to be prepared for the next class period. The course website will have reading and homework assignments as well as due dates posted. If you miss a class due to illness, I am willing to work with you to help you with work missed.
- It is your responsibility to contact me prior to any absences. If you need to miss a class to represent the College, you should be able to notify me well in advance. If you need to miss a class due to illness, contact me via phone or email prior to class if at all possible.
- In the case of inclement weather, if the College is open officially, then class will be held. Commuter students should not take any life threatening risks to come to class; such an absence will be excused. In case of class cancellations resulting from inclement weather, the college will run public announcements on the radio station, MIX 101.5 FM and the television station, WRAL Channel 5 (Channel 3 on cable). The emergency weather phone number is 832-8688.

Students with Disabilities

- **Students with Disabilities**: Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must go through the Counseling Center/Disability Services office. Disability Services is located in 106 Carroll Hall and can be reached at 760-8427 or disabilityservices@meredith.edu. For additional information see the website at [http://www.meredith.edu/students/counsel/disability](http://www.meredith.edu/students/counsel/disability).

Collaborative Community-wide Course Requirements:

15% **Community Participation & Professionalism**

In this course, attendance is not only mandatory; it is a necessity! To learn about and to gain experience in the endeavor of teaching and learning mathematics, one must interact with other students and teachers of mathematics. Helping others learn mathematics is not merely a skill, much less one that can be learned in isolation—it is a culmination of both intellectual and pragmatic understanding of people and of mathematics. This is gained from "fleshing out of ideas and understandings" with other teachers and other students of mathematics.

All absences must be excused in advance if at all possible. If illness or emergencies occur, please notify the instructor as soon as possible and follow college guidelines about such situations.
NCTM Standards Project and Textbook Evaluation

In a group setting, you will work with your colleagues to "unpack" the content and process standards in the NCTM Principles & Standards document. You will each create and present one exemplary lesson for secondary school mathematics that reflects the spirit of the standards recommendation in that content strand.

Along with your colleagues, you will examine a section of a chosen textbook for mathematical richness, usefulness, accessibility, ability to stand alone, and relation to Standards. You will then write a 2 to 3 page review of its strengths and weaknesses, and identify supplementary materials that could be used with the text.

Written Assignments, Lesson Plans, and Class Presentations

Throughout the course, there will be a steady stream of mathematics activities assignments, reaction and position papers, lesson activities development, and mini-presentation of activities in class. Due to the nature of the course, many will be assigned on one class day and due the next day. Others will take more than one class session to complete. Some of those assignments will be individual and some will be collaborative in nature.

Unit Plan: One of those assignments will be to develop an overview of a unit plan together with a partner. Along with a colleague(s), you will outline a unit of study for secondary or middle school mathematics that is consistent with the NCTM and statewide standards. The unit will cover approximately 3-4 weeks of mathematics, including overall scope/purpose, general activities, objectives, time line, materials, and assessment. The unit plan will be contained entirely online and accessible to your peers for their future use.

Individual Course Requirements:

In addition to your membership in a community of teachers and learners, you will be expected to continue your individual development as a mathematics educator. Besides readings and discussions, there will be several mathematics activities and explorations during the class. You will be expected to complete several mathematics activities during the semester, and you will have the opportunity to develop lesson activities and lesson plans. All of the assignments in this course will contribute to your individual development and will offer you a variety of artifacts to include in your portfolio to demonstrate movement towards professional teacher standards.

Electronic Notebook

I expect that you maintain a "notebook" for this course, but not the traditional hard-copy notebook. On the course website, there will be a folder established for each person enrolled in the course. It is expected that you submit all of your assignments and other coursework by dropping them into this folder. In class, we will cover the submission procedure to do so. Throughout the course, the instructors will peruse the folders periodically to see that you are maintaining its contents regularly--keeping your assignments up-to-date and keeping it well-organized and neat.

In order for ease of reading and opening all such assignments, it is expected that all assignments will be submitted in HTML format. If you are not an HTML-savvy
person, do not fret. From the beginning of the course, we will review how to use popular HTML editors such as Netscape Composer and Macromedia Dreamweaver. These editors allow you to create HTML documents in WYSIWYG (What You See Is What You Get) mode and will assist you in learning the "innerworkings" of HTML gradually.

15%  **Meta-lessons Reflective Journal Online**

"Meta-lesson" is a term I (Tim Hendrix) coined several years ago when trying to describe what would be an appropriate entry for a class reflective journal. Literally, it means "lesson behind the lesson." In this course, I ask that you complete a reflective journal of meta-lessons with an entry for each week. Usually, one healthy paragraph or approximately 1/2 page is sufficient. It is difficult to prescribe someone's reflection!

Maybe your day's entry might be directly on the discussion or activities from that day's class. Perhaps, it was something more "behind the scenes." An example? Suppose we were doing a math activity in class one day in groups, and something about the way we formed groups or the dynamic of your group interaction struck you as important information about teaching/learning. That would be an appropriate "meta-lesson"--we probably didn't discuss those issues in class explicitly, but the reflections we have about the "background" issues are often what we remember and employ in our own teaching.

I will expect to see that regular attention to maintaining these meta-lessons will be evident in your folders. Name the files transparently, i.e., "metalesson8-21.html" would be the meta-lesson for August 21. **Cardinal rule of HTML filenames:** Use only lowercase letters, numbers, & dashes or underscores. Do not use blank spaces in filenames.

(20%)  **Written Assignments, Lesson Plans, and Class Presentations**

This category is detailed in the community course requirements. Again, some assignments and short projects will be individual in nature and some will be collaborative. I am just listing the category in both places to reinforce that notion.

20%  **Final Unit Plan Project and Presentation**

Your final project in this course will be to develop a short unit of instruction that covers approximately 2 weeks of material. In this unit, you will need to provide a timeline, unit overview, individual lesson plans and all related activity materials, as well as assessment activities and materials. Greater details will be given in class and on the course website by the beginning of October. This unit could (and should) be coordinated with your field placement so that it will be of use to you in student teaching. You will have the opportunity to teach one lesson from the unit to mathematics department peers at the end of the semester or during finals week. The choice of that lesson will be negotiated with the instructor.

**Additional information on each of the assignments will be provided throughout the course.**
Evaluation and Related Course Policies:

A core assumption of this course is that all enrolled participants will bring both an open mind and a critical attitude to their work. Openness in this situation refers to a willingness to consider teaching in settings and grades beyond one's first preferences, as well as to the capacity to find hidden opportunities in assignments, individuals, and settings whose parameters and/or apparent limitations were not expected. A critical attitude refers to the capacity to see both the strengths and weaknesses of practices and situations while still withholding judgment on them. It also refers to the capacity to evaluate and question one's own assumptions and past experiences. Students whose comments, interactions with others, and written work all display evidence of openness and a critical attitude will be favorably evaluated.

Another core assumption of this course is that all participants are responsible adults capable of interacting with each other and with secondary students and school personnel in a professional and responsible manner; of being on time for class and field experiences; of being appropriately dressed; and of being prepared. Be aware that if you do not conduct yourself in a responsible, professional manner, or if you are late for class or field experiences or are absent without notice or excuse, you risk your grade and your standing, not only in this course, but most likely in the program as well.

Late assignments will be accepted only with pre-approved consent of the instructor.

Grades will be based on the following general rubric. These qualitative guidelines are associated with percentage weights, and these parameters are given on the course website.

- Consistent, timely preparation and attendance, thoughtful and substantial contributions to discussions and presentations, and well-written and solidly analytic papers/products will result in an "A."
- Consistent preparation and attendance, occasional contributions to discussions and presentations, and papers/products that "cover" a topic will result in a "B."
- Inconsistencies in preparation and attendance, occasional contributions to discussions and presentations, and "thin" papers/products (in length or substance or both) will result in a "C."
- Failure to attend class regularly or contribute to discussions and presentations, coming to class unprepared, and writing in a manner completely unacceptable for someone with senior standing at this college will result in a "D" or an "F," depending on circumstances and the extent of deficiencies.

This course is the major course in your content preparation for licensure. If your grade is below a “B” level, then you should be greatly concerned. Let’s state it positively—because you are dedicated to becoming effective teachers of mathematics, I know that your efforts and work will reflect that dedication.
## Tentative Schedule

<table>
<thead>
<tr>
<th>Week of the Semester</th>
<th>Topic</th>
<th>Sections of Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  August 18 – 20</td>
<td>Introduction to the course</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>2  August 23 – 27</td>
<td>What is doing mathematics? What does teaching mathematics? What is learning mathematics?</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>3  August 30 – September 3</td>
<td>Learning theories applied to mathematics</td>
<td>PSSM</td>
</tr>
<tr>
<td>4  September 6 – 10</td>
<td>No Class on Labor Day, 9/6 Curricular models</td>
<td>PSSM, Chapter 3</td>
</tr>
<tr>
<td>5  September 13 - 17</td>
<td>Setting goals and objectives</td>
<td>PSSM, Chapter 4</td>
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<tr>
<td>6  September 20 – 24</td>
<td>Lesson planning, presentation of NCTM Standards project</td>
<td>PSSM, Chapter 5</td>
</tr>
<tr>
<td>7  September 27 – October 1</td>
<td>Teaching strategies</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>8  October 4 – 8</td>
<td>Fall Break—October 6 – 10</td>
<td>Chapter 7</td>
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<tr>
<td>9  October 11 – 15</td>
<td>Focus on Content</td>
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<tr>
<td>10  October 18 – 22</td>
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<tr>
<td>11  October 25 – 29</td>
<td>Assessment</td>
<td>Chapters 8 &amp; 9</td>
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<tr>
<td>12 November 1 – 5</td>
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<tr>
<td>13 November 8 – 12</td>
<td>Meeting the needs of all students</td>
<td>Chapter 10</td>
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<tr>
<td>14 November 15 – 19</td>
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<tr>
<td>15 November 22 – 26</td>
<td>Thanksgiving Break—November 23 – 28</td>
<td>Chapter 11</td>
</tr>
<tr>
<td>16 November 29 – December 3</td>
<td>Next steps forward</td>
<td></td>
</tr>
<tr>
<td>17 Final Exam is scheduled for Friday, December 3 at 1:00 PM</td>
<td>Presentation of unit plans</td>
<td></td>
</tr>
</tbody>
</table>

Note: there will be a variety of supplemental readings distributed throughout the class, in addition to the textbook readings. It is your responsibility to maintain the textbook readings concurrent with class topics.

PSSM—Principles & Standards for School Mathematics