Mathematics in the Secondary School
Math 416
Fall 2012 - Meeting T & R 10:30 - 11:45 in MacLean 269

Professor: Tim Harms  
Office: MacLean 375F
Office Phone: 218-477-4016  
Office hrs: T & R  8:30 – 10:20,  
4:00-5:00 M -R
Additional meetings available by appointment
E-mail: harms@mnstate.edu  
Web page: web.mnstate.edu/harms

Class assignments with due dates are posted along with individual progress report are located on the course website.

Required Text and software license:
Teaching Secondary Mathematics: Teaching and Enrichment Units, 8th Edition by Posamentier, Smith, & Stapelman

Required Supplies
Three ring binder, jump drive, & graphing calculator (you may check-out a TI-83/TI-Nspire from Professor Harms if you do not own one)

Course Description:
Objectives, methods, materials, and evaluation of teaching mathematics in grades 9-12.

Prerequisites: Secondary Math Education Major with Junior or Senior standing who has been admitted into Teacher Education.

Course Objectives:
1) Formulate a personal sense of what is mathematics and what it means to teach mathematics.  
2) Plan lessons that involve thoughtful questioning while balancing styles of presentation.  
3) Create assessments that will be used to evaluate students understanding.  
4) Demonstrate appropriate uses of technology in teaching.  
5) Practice equity of instruction through applicable modifications of lessons.  
6) A minimum of 16 pages (4800 to 5000 words) per student of formal, polished writing in multiple assignments that span the semester, rather than one long paper handed in at the end of the term;  
7) Include at least one assignment that requires drafting and revision;  
8) Include informal writing-to-learn assignments or activities;

Class Expectations:
• Regular and active classroom participation  
• Students will take on teaching responsibilities through class presentations, tutoring, and discussions.  
• Please silence cell phones and avoid texting in class  
• Students will act in an honest and trustworthy manner in class and on all assignments.  
• 20 hours of tutoring in the Math Learning Center  
• MN Council of Teachers of Mathematics Conference in Champlin, MN on October 18th – 19th
Course Activities:
Cooperative learning, integration of technology, and assessment of mathematical knowledge will be used in the teaching of this course by the instructor as well as the students during their lesson presentations. Students will include current MN/ND Mathematics Standards in lesson and unit planning.

Evaluation:
- Professionalism, book and supplementary assignments – 3 to 5 pts. each
- Lesson Plans – 10 pts. each
- Mini-lessons taught & reflections submitted – 10 pts. each
- Analyzing Student Work – 15 pts
- Academic Language – 10 pts
- Unit plan (outlining the objectives, assignments, creating at least 2 assessments, & the identification of modifications for a student with disabilities) – 50 pts.
- Quizzes – 10 pts each
- Tutoring & performance log – 20 pts
- Mentoring training, performance, & reflections of your Tutoring Mentoring – 20 pts
- Teaching Handbook – 52 pts.
- Final Exam – 35 pts. letter of application and mock interview for a High School Math Teaching position

(Late work will lose 50% of its value each weekday unless prior arrangements have been made)

Grading Scale:
100-98 A+; 97-93 A; 92-90 A-
89-88 B+; 87-83 B; 82-80 B-
79-78 C+; 77-73 C; 72-70 C-
69-68 D+; 67-63 D; 62-60 D-
59%– F

Special Accommodations
Students with disabilities who believe they may need an accommodation in this class are encouraged to contact Greg Toutges, Director of Disability Services at 477-4318 (Voice) or 1-800-627-3529 (MRS/TTY), Flora Frick 154 as soon as possible to ensure that accommodations are implemented in a timely fashion. Information regarding Disability Services is available at http://web.mnstate.edu/disability

Reference Texts:
Guidelines for the Tutor of Mathematics, Laughlin, C., and Kepner, H., NCTM, 2001 (on reserve in the Library MAT 533 for 2 hr check out and overnight)
Minnesota K-12 Academic Standards in Mathematics [http://education.state.mn.us/mde/Academic_Excellence/Academic_Standards/Mathematics/index.html](http://education.state.mn.us/mde/Academic_Excellence/Academic_Standards/Mathematics/index.html)
Minnesota K-12 Mathematics Framework This is on the web at: [http://www.scimathmn.org/frameworks_title.htm](http://www.scimathmn.org/frameworks_title.htm)

To meet the Writing-Intensive course requirements, the course must:

- **assign a minimum of 16 pages (4800 to 5000 words)** per student of formal, polished writing in multiple assignments that span the semester, rather than one long paper handed in at the end of the term;
- **include at least one** assignment that requires drafting and revision;
- **include informal** writing-to-learn assignments or activities;
- **indicate how the quality** of student writing will affect the course grade.

In a Writing-Intensive course, formal writing assignments and evaluation criteria must be given to students in **writing far enough ahead of time** to facilitate thoughtful writing and students’ use of conferences with the instructor, a writing center tutor, or a peer response group before the paper is due if they choose. The professor will offer substantive response to the students’ writing, using the following criteria:

**Focus** — The paper addresses the assignment/answers the question? There is a thesis, main idea, or hypothesis that holds the paper together.

**Organization** — The paper is cohesively organized, making effective use of paragraphs and transitions, or other appropriate genre conventions.

**Development** — The paper provides sufficient evidence to support the over-all thesis, or answer the question. Topic sentences for each paragraph are adequately supported.

**Clarity** — Sentences are clear and effectively punctuated (appropriate diction, no run-ons, fragments, misspellings, or grammar errors).

**Voice** — The tone is professional and informative (not stuffy, preachy, whiny, or filled with slang).

**Teaching Handbook** - First drafts 7 pts/assignment to be typed and **address each item**

- An easy to read first day of School Handout with the following: Due **Sept. 6th** [StEP 5C]
  - Goals for the class
  - Guidelines for student behavior and consequences of misbehavior
  - Grading philosophy (include extra credit policy)
  - Make-up policy
  - Calculator and computer policy (*and other required materials*)
- Tutoring Goals - **Read Guidelines for the Tutor of Mathematics** (On Reserve in the Library as MAT-533) Due **Sept. 13th** [StEP 6H]
  - What are the most important communication skills for tutors that are mentioned in this book?
  - What are the most relevant comments to you regarding being prepared to tutor?
  - List at least two questions you will regularly ask students as you tutor.

- Read **Every Minute Counts** - Due **Sept. 20th** Oct. 4th [StEP 6H]
  - What are at least three questioning techniques you read that you want to include in your teaching?
  - What are at least three questioning techniques you read that you want to avoid in your teaching?
  - Describe a “routine” you plan to use with your math classes

- Summarize an article from Mathematics Teacher Due **Sept. 27th** [W1]
  - Summarize the article in 2-3 paragraphs.
  - Describe how you could use this information in your teaching
  - Include a citation with: the author(s), title, volume, number, month, yr, and page numbers **along** with a copy of the article
  - A 2-3 min. summary to your classmates in Math 416 is to be given within a week of submitting your write-up

- Write 10 anticipatory problems Due **Oct. 25th** [Math Standards 3I1 K,P,A; 3I8 K; StEP 7F]
  - These to include 5 problems to engage students in geometry lessons
  - 3 problems to engage students in Algebra II lessons
  - 2 problems to engage students that are in Pre-Calculus

- Tutoring Reflections – Due **Nov. 1st** [Math St 3I1&2 K,P,A; StEP 9E & 9H]
  - You had listed two questions in your first tutoring log that you were regularly going to ask students as you tutored. Did you do this, if so how well did this help students better understand the problems? When you are teaching, what questioning will you incorporate?
  - How has your work in the MLC prepared you to become a better teacher? (What learning difficulties did students encounter and how will you address these topics when you are teaching these?)
  - Overall, identify any suggestions or recommendations that would make these experiences more beneficial?

- Final Handbook – Due **Nov. 15th** [Math Standards 3I8 K,P,A] (**10 pts**)
  - Revised drafts of the assignments listed above following recommendations made. The final draft is to include correct spelling, grammar, and punctuation.
**High School Math Unit Plan & Assessment** {Math Standards 3G4b K,P,A; 3I3 K,P,A; StEP 1E, 1J, 7D, 8E, 8G} *(50 pts)*

**Unit Plan** should contain 3-4 weeks’ worth of:
- An overview of the unit with the number of lessons, with timeline for teaching with a brief description of instructional strategies to be used (5 pts)
- Daily student performance objectives linked to state math standards (5 pts)
- Identify the textbook and at least 3 supplements you would include such as problems from other books, worksheets, or websites that make connections between the mathematics being studied and other disciplines. (5 pts)
- A description of accommodations for 3 groups of students: those with special needs on an IEP for attention deficit disorder, ELL students, and high-achieving students (5 pts)
- List Daily homework (2 pts)
- **& Assessment(s)**— In the form of at least two quizzes and one test which:
  - Incorporates the daily objectives along with the MN graduation standards (10 pts)
  - Questions clearly and correctly *phrased*, properly *formatted*, with a reasonable length of time allotted, point values *assigned*, and adequate *space* provided for work (8 pts)
  - *Solution* keys that include worked out assessments (10 pts)

While working 20 hrs with students in the **Math Learning Center** pre-service teachers will be prepared to assist students by working the labs prior to the lesson, actively question students to determine their level of understanding, and reflect how to help students develop mathematical understanding with more assurance. {Math Standards 3C1-C5 P,A; StEP 8F, 8k}

You are to keep a **log** of your experience tutoring this semester in the Math Learning Center that includes: Due Dec. 6th {StEP 8C, 9J, 10G} *(20 pts)*

- List date of tutoring, list classes tutored, and list topics covered in class.
- Rate your preparation for the lab. This will be evaluated by math faculty to confirm you thoroughly worked out the problems in advance and came prepared when scheduled to tutor.
- Describe what you noticed about how students were thinking about at least two problems.
- What did you consider the most helpful comments the lab instructor made to help students think about what they were doing? If working no instructor comments fit this situation, or if you are serving as a drop-in tutor describe at least two things you did to assist students in each session.

**Lesson presentation of a high school level math topic** {Math Standards 3G4c & a K,P,A; 3I5 K; StEP 1C, 9.8.E}

- Turn in a copy of your lesson plan before you teach
- Professional Dress and Behavior
- Motivational activity that makes connections between mathematics and daily living
- Asks questions throughout the lesson from a variety of cognitive domains
• Content presented clearly & correctly (speech in loud and articulate, writing is legible and large, statements are mathematically correct)
• Lesson Reflection completed within 2 class periods of the lesson presented

Readings and Textbook Questions:
Review [http://www.revisor.leg.state.mn.us/arule/8700/7500.html](http://www.revisor.leg.state.mn.us/arule/8700/7500.html)

The Standards cited are from:
8710.4600 Teachers of Mathematics Grades 5-12 Standards, With K = knowledge, P = practice, and A = assessment
8710.2000: Standards of Effective Practice 8/2010

CONCEPTUAL FRAMEWORK OF THE MSUM TEACHER EDUCATION UNIT

MSUM candidates are professionals who are knowledgeable, reflective, humanistic, and creative.

**Knowledgeable**: MSUM candidates display competence in their subject matter, built upon a strong grounding in liberal studies. MSUM candidates understand the principles of learning, assessment and technology. They understand and apply legal and ethical considerations to all aspects of their work. MSUM candidates are able to integrate theory and practice, and view learning as an active process. MSUM candidates demonstrate the ability to model connections between philosophical foundations and best practices in the field. As life-long learners, MSUM candidates engage in research and complex thinking. They design opportunities for others to seek knowledge and to understand themselves as members of the world community.

**Reflective**: MSUM candidates engage in thoughtful analysis of the meaning and significance of their actions, decisions, and results with regard to their work in order to assess progress in meeting this guiding principle. It is through this reflective process that candidates improve instruction, implement new ideas, abandon ineffective methodologies, and enhance learning outcomes for their students. MSUM candidates are skilled at analyzing their teaching from a variety of perspectives and identifying connections between teaching strategies and student learning. In addition, candidates utilize a variety of techniques to question their procedures and consider alternatives for instruction and student growth. MSUM candidates recognize learning, motivational, and developmental variables and relate those dimensions to their teaching practices. Finally, MSUM candidates bring a questioning spirit to received wisdom and conventional practice when needed.

**Humanistic**: MSUM candidates value the personal worth of each individual. This is based on a belief in people's potential and innate ability to develop to their fullest. MSUM candidates' actions are grounded in knowledge of different cultural and ethnic groups within the world community, and in knowledge of the influence of culture and history, ethnicity, language, gender and socio-economics on one's life. This knowledge base informs candidates' decision-making as they create environments that promote freedom, compassion, and success for all learners. MSUM candidates are fair-minded in their interactions with others, as well as sensitive to and accepting of individual differences. Further, MSUM candidates have an understanding of aesthetics and the diversity that is part of the human experience and will incorporate this knowledge into their work. MSUM candidates recognize and accommodate a variety of linguistic and nonlinguistic interpersonal skills in their actions with others. MSUM candidates foster resiliency in the students with whom they work and model these qualities in their own work.

**Creative**: MSUM candidates understand the powerful resources of the arts and sciences and use their knowledge of these areas to bring the best of their imaginative and creative acts into the classroom. MSUM candidates recognize the important role creativity plays in the design of instruction and classroom environment. They will, for themselves and for their students, meet new situations with resourcefulness, excitement and curiosity, with an investigative attitude, and with the ability to pose, seek and design solutions to problems. MSUM candidates are cognizant of the aesthetic elements of the world and draw on that knowledge to make curricular decisions designed to help students not only learn about aesthetics, but to also learn how to think about the world at large.