

MED308: Methods in the Teaching of Secondary School Mathematics

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Course Description:

This course provides an introduction to the theory and practice of classroom teaching for prospective secondary mathematics teachers. Topics include learning theory, construction and critique of lesson plans, use of technology, research on teaching and learning that includes addressing the needs of students with diverse mathematical abilities and English Language Learners, assessment, classroom management, state and national standards, and curricular issues.

Buffalo State Teacher Education Unit Goals:

The three overarching principles of reflection, innovation, and student-centered education, work interdependently and are integral to developing teacher candidates who possess the necessary content knowledge, professional awareness, and professional dispositions to support and enhance the education of all students in all contexts. Below are the unit goals that support this conceptual framework.

Content – The professional educator will know the subject matter to be taught to P-12 learners.

Learner – The professional educator will understand P-12 learners’ socialization, growth and development; the learning process; reflection of teaching; and the establishment of a classroom climate that facilitates learning.

Pedagogy – The professional educator will attain an understanding of the strategies that candidates use to teach all learners.

Technology – The professional educator uses technology as a vehicle for learners to acquire information, practice skills, use higher order thinking skills, and participate in collaborative projects.

Reflection – The professional educator exhibits the ability to reflect and assess his/her own effectiveness, and to systematically make adjustments to improve and strengthen areas needing attention.

Dispositions – The professional educator demonstrates respect for learner differences, commitment to own personal growth, and engagement in short and long-term planning.

Diversity – The professional educator is aware of and sensitive to diversity issues and to use culturally and socially responsive pedagogy.

Course Outcomes: Students that successfully complete MED 308 will:

1. develop lessons that demonstrate understanding of the essential characteristics and components of instruction and reflect their knowledge of the content taught in grades 7 through 12 as specified in the NYS Common Core Standards including the Standards for Mathematical Practice;
2. develop lessons utilizing high leverage practices that provide opportunities for all students to deeply engage in content including those learners with special needs and English Language Learners
3. utilize resources to develop lessons that engage students in significant, worthwhile mathematical tasks that feature high cognitive demand and allow for productive struggle;
4. design lessons that feature the use of a variety manipulatives and technology (including, but not limited to, Apps, Smart Boards, calculators, etc.);
5. develop materials that challenge secondary school students to solve significant real-world and hypothetical mathematics problems, to apply mathematical thinking to non-routine mathematical questions, and that engage students in reasoning and proof;
6. communicate verbally (orally and in writing) about teaching and learning mathematics and work cooperatively to develop and refine lesson plans;
7. develop formative and summative assessments that inform teaching and monitor progress of secondary school students and allow for insight into the students' procedural knowledge and conceptual understanding;
8. demonstrate verbally (orally and in writing) knowledge of the broader mathematics education community and the issues and discussions that guide both practice and research. In particular, students will be knowledgeable about NCTM and its role in mathematics education reform, about results from the National Assessment of Educational Progress (NAEP), and specific New York State curricular issues.

Materials and Expenditures:

Textbook: Teaching Mathematics in Grades 6 – 12: Developing Research-Based Instructional Practices by Randall Groth; (note: e-version 6-month rental for \$65 at link below or find online)

<https://www.vitalsource.com/products/teaching-mathematics-in-grades-6-12-developing-randall-e-groth-v9781483307091>

Calculator: a TI-84 is required; an N-Spire will be provided

Professional Organizations: NCTM and AMTNYS student membership is required.

Attendance: You are expected to attend every class. The activities, materials, readings, and discussions that will be the focus of each class provide a foundation for reflective writing and professional growth. Since this is a preparatory course for your student teaching experience, it is expected that you will respond professionally, and strive for unblemished attendance. Less than perfect attendance may affect your grade as described below. In the event of an absence you should contact a classmate to discuss the material covered prior to contacting the instructor.

Grading Policy: Final grades will be calculated based upon the following criteria:

Assignments	60%
Exam	20%
Presentations	10%
Group Process /Class Participation	<u>10%</u>
	100%

Final Grading System:

B+: 87 – 89	C+ 77 – 79	D+ : 67 - 69	
A: 95 - 100	B: 83 – 86	C: 73 – 76	D: 60 - 66
A-: 90 – 94	B-: 80 – 82	C-: 70 – 72	E : Below 60

Assignments: Assignments will be an integral part of your learning experience in this course. You are encouraged to work with your classmates on the assigned problems and tasks, however you must each complete your own individual write-up. (see NOTE under Academic Integrity) Assignments that involve mathematics problems need to have complete work and may include diagrams, charts, a paragraph, or any other format that conveys what you did and how you did it. Assigned readings should include highlighting and notes reflective of your insights and questions. These may at times be collected.

All written assignments should be double-spaced and in a 12-point font.

Late Submissions: Unless otherwise stated, assignments are to be submitted by the start of the following class after being assigned. If you have a problem submitting an assignment on time, discuss it with me as soon as possible. Any work that is not submitted on time will suffer a reduction in grade that will vary according to the degree of tardiness. I will not be able to accept an assignment more than 2 class days late. Assignments should be e-mailed unless otherwise stated.

Grading Assigned Work: Collected work will be assessed based upon the general 4-point rubric described below. Weights may vary with the expectations of the assignment. The 4-point system is similar to the 4 point GPA system.

Scoring Rubric:

4: Contains a complete response with clear, coherent, unambiguous explanation. Demonstrates a thorough understanding of the generalizations, concepts and facts specific to the task or situation and provides insight into some aspect of this information. Where appropriate:

Demonstrates self-assessment, personal growth and challenge.

Demonstrates understanding of the question's mathematical purpose and ideas.

Includes examples and/or counterexamples and/or a clear and simple diagram.

Pedagogical implications are discussed.

Spelling, grammar, format, or organization of the work does not detract from the reading and understanding.

3: Contains a good response with some of the characteristics above, but not all. Displays knowledge of the generalizations, concepts and facts specific to the task or situation. Where appropriate:

Some evidence of self-assessment and personal growth is present. Explanation complete but may raise questions regarding the understanding of the question's mathematical purpose and ideas.

Pedagogical implications are discussed.

Spelling, grammar, format, or organization of the work detracts very little from the reading and understanding.

2: Contains an incomplete response and/or displays incomplete knowledge of the generalizations, concepts and facts specific to the task or situation and/or has notable misconceptions. Where expected:

Little or no evidence of self assessment and/or personal growth.

Explanation is incomplete and raises questions regarding the understanding of the question's mathematical purpose and ideas.

Pedagogical implications are not discussed.

Spelling, grammar, format, or organization of the work detracts from the reading and understanding.

- 1:** Omits significant parts of the question and response and/or demonstrates misconceptions about the generalizations, concepts and facts specific to the task or situation. Where expected:
 Displays no evidence of self-assessment and/or personal growth.
 Contains major mathematical errors and/or use of inappropriate strategies.
Spelling, grammar, format, or organization of the work detracts a great deal from the reading and understanding.
- 0:** No submission or submission is of such low quality that no credit may be awarded

Writing:

This course is an education course and thus will require extensive writing. One of the goals in this course is to improve the quality of your writing so you may communicate at a professional level within educational environments. The rubric below will be used to evaluate your written work and may supplement the above rubric when appropriate. All written work should be completed using a word processor, with a 12-point font, 1-inch margins, and double spacing. Documents emailed to me should be saved as files *named with your last name and reference to the assignment number*. I can open pdf files, MS Word documents or rich text files. Please use these formats only when submitting work.

Written Assignment Rubric: (adapted from SUNY guidelines)

- 4:** Writer presents an easily identifiable, focused, original, and thought provoking controlling purpose or thesis. The paper moves coherently, logically, and even creatively from an engaging introduction to a well-demonstrated conclusion. Paragraphs fit within this structure coherently and present pertinent examples and evidence to support central and subsidiary ideas. Sentence structure displays sophistication and variety; transitions add to the logical development of the topic. The essay exhibits a solid command of word variety and a tone and diction appropriate for the subject and its implied audience. Mechanics (grammar, punctuation, spelling and documentation, if needed) are nearly flawless.
- 3:** Writer presents an identifiable and focused controlling purpose or thesis. The paper moves coherently and logically from a satisfying introduction to a solid conclusion. Paragraphs fit within this structure and present examples and evidence to support the ideas presented. For the most part, sentences are well constructed and transitions are sound—though the sequence of ideas may occasionally be awkward. The essay exhibits some degree of control over the tone and diction appropriate for the subject and its implied audience. Mechanics (grammar, punctuation, spelling and documentation, if needed) are mostly accurate.
- 2:** Writer presents a wandering, vague, or unfocused controlling purpose or thesis. The paper moves awkwardly from a weak introduction to a conclusion that does not adequately represent the body of the paper. Basic paragraphing exists, but often fails to support or even recognize a central idea, and the use of evidence and examples is inadequate. Sentence and paragraph transitions are often unclear, awkward, indirect, and/or illogical. Tone and diction are often inconsistent and/or inappropriate for the subject and its implied audience. Mechanics (grammar, punctuation, spelling and documentation, if needed) are not well executed and may, at times, obscure meaning.
- 1:** Writer fails to present a controlling purpose or thesis; consequently it is difficult to identify exactly what the thesis is. The essay moves from an unsatisfactory introductory paragraph to an ending that does not serve as a conclusion, thus conveying the sense that much of what has been presented is unresolved. Sentence structure is often awkward and transitions are ineffectual and/or abrupt or simply missing. Diction, tone, and word choice are not appropriate for the subject or for the implied audience. Mechanics (grammar, punctuation, spelling and documentation, if needed) disrupt reading and often obscure meaning.
- 0:** No submission or submission is of such low quality that no credit may be awarded

Exam: There will be one examination during the semester that will be administered on Tuesday, November 20.

Note on Exam Absence: A minimum of a two-hour notification of an absence from an exam is required. This notification can be by e-mail or text. In addition, written documentation of the problem is required if a make-up is to be allowed. Specifically, a physician’s note must be presented in the event of illness. In the event of a death in the family, a copy of the obituary is required. Failure to adhere to these procedures will result in a grade of zero on the exam.

Presentations

You will make several presentations during the semester. Unless otherwise stated it is expected that all presentations will be done in Powerpoint, Google, Prezi or Keynote and supplemented with appropriate handouts.

Class Participation and Group Process: You are expected to participate fully in the discussions that take place within your groups and across the class. In part, your engagement in these discussions is a way of developing your own thinking about the course content and thus is an integral part of the learning experience. It is expected that you will function effectively as part of a group and the following rubric will be used to assess your active engagement in the group process and efforts at promoting an effective learning environment for all.

Assessment of Cooperative Learning indicators

	4	3	2	1
Works Toward Group Goals	Actively helps identify group goals and works hard to meet them	Communicates commitment to group goals and effectively carries out work to meet them	Communicates a lack of commitment to the group goals	Does not work toward group goals or actively works against them
Uses Effective Interpersonal Skills	Actively promotes effective group interactions and the expression of ideas and opinions in a way that is sensitive to the feelings and knowledge base of others	Participates in group interaction without prompting. Expresses ideas and opinions in a way that is sensitive to the feelings and knowledge base of others	Participates in group interaction with prompting or expresses idea and opinions without considering the feelings and knowledge base of others	Does not participate in group interaction even with prompting or expresses ideas and opinions in a way that is insensitive to the feelings or knowledge base of others
Contributes to Group Maintenance	Actively helps the group identify changes or modifications necessary in the group process and works toward carrying out those changes	Helps identify changes or modifications necessary in the group process and works toward carrying out those changes	When prompted, helps identify changes or modifications necessary in the group process or is minimally involved in carrying out those changes	Does not attempt to identify changes or modifications necessary in the group process even when prompted or refuses to work toward carrying out those changes
Takes on a Variety of Roles	Effectively performs multiple roles within the group	Effectively performs one role within the group	Makes an attempt to perform one role but has little success	Rejects opportunities to perform one role

Academic Integrity: *The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect for others' academic endeavors. By placing their name on academic work, students certify the originality of all work not otherwise identified by appropriate acknowledgments.* No credit shall be awarded in situations where it has been determined that this policy has not been followed. (Adapted from the University of Wisconsin's *Student Disciplinary Guidelines*) **Instances of academic misconduct may result in a failing grade and/or disciplinary actions including program dismissal.** **Note:** I will use a *0 to indicate a grade of zero that reflects what I see as plagiarized work. You may challenge this grade by meeting with me and discussing the process by which you arrived at your response.

Statement on Students with Disabilities: If you have a diagnosed physical disability, learning disability, or psychological disability which will make it difficult for you to carry out the course work outlined above or which requires accommodations such as assistance from note takers and/or readers, extended time on assignments, and so on, please advise us during the first week of the course and contact the Student Accessibility Office in Twin Rise South 120 (878-4500) to discuss possible arrangements for reasonable accommodations.

Out-of-class Communication

I use email as my primary mode of communicating. When replying to an email please use "reply" to respond so that the existing email is visible. (i.e., don't open a fresh email window). I also ask that you please not "text" in email. Your emails should be composed of a greeting, body (complete and grammatically correct sentences), and a closing/signature. Should you need to send me a text, please include your name since you will not be in my contacts list.

Classroom Etiquette: Please **silence** all cell phones and put them out of sight so as not to interrupt your engagement in the lesson. Please inform me of any emergency situation that requires otherwise. Similarly, you are expected to arrive on time for every class.

Important Dates (see exam date above):

September 25: no class meeting

October 8-9: Fall Recess

October 23: no class meeting

November 6: Desmos Presentation

November 21-23: Thanksgiving break

December 6: last class meeting before CEP

Tuesday December 11 or Thursday December 13: CEP meeting (see CEP schedule)