Mat 5441 Methods & Materials for the Teaching of Secondary Mathematics

Prerequisite: graduate standing
This course will acquaint students with NCTM, Common Core for Mathematics, and current issues related to teaching secondary mathematics. Emphasis will be placed on current best practices in secondary mathematics teaching methodology and on using manipulative materials, graphing calculators, and software to teach mathematics. Requirements for licensure will be addressed.

Rationale
Secondary mathematics teachers must be prepared to be learners as long as they are teachers. Methods and technology are changing at such a rapid pace that students must be made aware of what has changed since they were secondary students and where to obtain current information and research about innovative secondary mathematics instruction techniques, new technology and content. The course is also designed to give students multiple opportunities to have peer evaluation of in-class lesson presentations and to observe in middle and high school mathematics classrooms.

Professor
Dr. Melinda Gann

Right to Modify the Course:
The provisions of this syllabus do not create a contract between the university and the student. Mississippi College reserves the right to modify this class at any point during the term, including the mode of course delivery or any other aspects of the course which may become reasonably necessary.

General Agreement:
Enrollment in this and other classes at MC affirms your agreement to abide by the rules, regulations, mission and standards of Mississippi College, including requirements and limitations implemented at any time for health and safety. Failure to abide by the rules, regulations, and limitations may result in suspension from the class, the university, or termination of enrollment.

Learning Objectives
The students will:

- state and discuss principles and standards expressed by the National Council of Teachers of Mathematics and standards for mathematical practices and content domains in the Common Core for Mathematics
- learn the "whys' behind the "whats" of various mathematical concepts
- differentiate between problem solving and algorithm application
- list and apply Polya's problem solving process
- read and summarize current research in mathematics education
- write and teach mini lessons to the class – be evaluated by professor and peers
- prepare a lesson plan unit (evaluated by TIAI guidelines) that emphasizes conceptual understanding. It must include the use of manipulatives/concrete items, include technology, address diversity, and contain a variety of teaching strategies and assessments
- present one of the lessons from the lesson plan unit to the class
- demonstrate knowledge of current mathematics education vocabulary, teaching methods, and research by incorporating it into lesson plans.

- list professional organizations that provide mathematics education resources - NCTM, MCTM, MAA, etc... and become a member of NCTM
- attend the MCTM conference or participate in an NCTM webinar
- explore various resources helpful in teaching mathematics
- explain the concepts of constructivism and behaviorism
- write a personal philosophy of mathematics learning
- create a portfolio
- observe a minimum of 10 hours in middle school/high school mathematics classes
- write, plan, and teach lessons demonstrating use of current method trends in mathematics education
- evaluate lessons of peers taught during class
- demonstrate use of manipulatives - including pattern blocks, algebra tiles, geoboards, integer chips, polyhedron frameworks, measuring devices, etc.
- demonstrate ways to use appropriate technology in various mathematics subjects
- demonstrate competent use of available software
- state the NCTM Principles and Standards
- incorporate ways of addressing diverse student populations in the teaching of mathematics
- read Mathematics for Human Flourishing by Francis Su (working various problems presented in the text) and write a paper describing ways of incorporating ideas in the book into a secondary mathematics classroom.
- present the paper to the class
- Explain an overview of the Common Core mathematics content standards and the mathematics practice standards and outline the thread of a secondary mathematics topic throughout the *Mississippi College-and-Career Readiness Standards* (from introduction to completion)

Academic Integrity

Mississippi College students are expected to be scrupulously honest. Dishonesty, such as cheating or plagiarism, or furnishing false information, including forgery, alteration or misuse of University documents, records or identification, will be regarded as a serious offense subject to severe penalty, including, but not limited to, loss of credit and possible dismissal. See the Mississippi College Student Handbook or University Policy 2.19 for specific information regarding penalties associated with dishonest behavior at Mississippi College. Copies of the Mississippi College Student Handbook are available in the Office of the Vice President for Enrollment Management and Student Affairs, Nelson 313. Copies of University policies are available on the Mississippi College web site.

Outline of Topics

Student internship requirements
Mathematical learning theories and learning styles
Curriculum sources
Assessment of student progress- formative & summative, alternative, performance-based, writing in mathematics, test creation, grading practices
Planning for teaching – writing lesson plans for large groups, small groups, individuals
Cooperative learning
Teaching diverse student populations - equity issues

Skills in teaching mathematics-questioning, motivation, vocabulary, discipline
Teaching using technology – selecting and utilizing appropriate technology
Teaching problem solving/critical thinking skills
Discovery/Proof
Teaching Number Sense
Teaching Probability & Statistics, Data Analysis
Teaching Algebra
Teaching Geometry
Teaching Trigonometry/Pre-Calculus/Calculus

Methods of Instruction

The methods of instruction include class discussion of text and journal articles, lecture, class demonstration (both student and teacher), student presentations, video presentations, modeling using manipulatives, technology demonstrations (graphing calculators and software), and group problem solving (both large and small). Each student is expected to have a text, other required materials, writing materials, and a graphing calculator.

Required Practices

Students will regularly write summaries of journal articles, demonstrate manipulative use, complete written homework assignments, use the Internet, review videos, utilize technology, participate in discussions, write a unit, present a lesson from that unit to the class, teach mini lessons to the class, *observe middle school/high school mathematics classes (10 hours), create a portfolio, join NCTM, and take two tests (a midterm and a final).

*All mathematics education majors will be required to take the Praxis II math content exam (5161) by September 1st. (not in 2020)

Highly suggested to prepare for Praxis:

http://store.ets.org/store/ets/en_US/pd/ThemeID.12805600/productID.5082202000

CliffsNotes Praxis Mathematics: Content Knowledge (5161), 3rd Edition by Sandra Luna McCune is a good resource to study

Instructional Materials

Texts: Brahier, Daniel J. *Teaching Secondary and Middle School Mathematics*, 5th ed.
Routledge.
ISBN 13: 978-1138922785
ISBN 10: 1138922781
Common Core Curriculum for Mathematics.

Additional Required Materials

Mathematics for Human Flourishing by Francis Su
Mississippi College Teacher Education Handbook
NCTM membership

Assessment

Assessment of students' progress will be made based on total points accumulates through the following activities: homework, professional journal article summaries, a midterm examination, a final examination, lesson presentations, lesson plan unit, and software use

Attendance

The policy for the number of allowed absences is set by the college. In TR classes students receiving 8 absences **(excused or unexcused)** will automatically receive a course grade of F. Please note that three tardies constitute one unexcused absence.

You are responsible for all material covered in class whether present or not. Make-up work is the responsibility of the student. If you are absent, check Moodle to obtain your assignment.

Special Accommodations:

If you have a documented disability please contact the Office of Counseling and Disability Services. Students are responsible to obtain appropriate documentation and information regarding accommodations from the Office of Student Counseling and Disability Services (SCDS). Student Counseling and Disability Services are located in 400 Alumni Hall. You can contact their office as follows: Scds@mc.edu or at 601-925-7790. The Student Counseling and Disability Services website can be accessed by going to https://www.mc.edu/offices/counseling/. Further instructions and explanations regarding disability services can be accessed through the Disability Handbook https://www.mc.edu/offices/counseling/application/files/5115/7868/8987/DSHandbook2020.pdf

Reading List

To receive full credit (7 points) for each reading assignment on must:

1) present a summary with your name and the date due in the upper right-hand corner of the first page.
2) present a complete citation prior to the article summary using the example below.
3) present a summary of the information in the article. (I expect the purpose of the article to be clear and the summary to be well stated in more than one paragraph.)
4) use good writing skills. Plagiarism will earn you a zero.
5) hand in the summary and a copy of the article at the beginning of the class period on the date due (or earlier).
6) you must use each of the four journals at least once. (Two of the articles may come from a source other than an NCTM journal.

NCTM journals:

1) The Mathematics Teacher
2) Mathematics Teaching in the Middle School
3) Teaching Children Mathematics
4) Journal for Research in Mathematics Education

Structure:

Author's last name, Author's first initial. Author's middle initial. (Year, Month Date published).

Article title. *Journal Name, Volume*(Issue), page number(s).

Example:

Harris, J. (2012). Using literature to investigate transformations. *Teaching Children Mathematics*, *4*(2), 510-513. https://doi.org/10.2307/2111407

See: https://www.easybib.com/guides/citation-guides/apa-format/how-to-cite-a-journal-apa/

Topics of Articles:

Problem solving
Common Core for Mathematics
Distance Learning/Technology Use
Teaching an algebraic concept
Teaching a geometric concept
Teaching a topic in advanced mathematics
Assessment