Course Introduction, Goals and Expectations:

Introduction. The focus of this course will support and enhance the use a number of instructional activities that are central to specific content in elementary, middle and high school mathematics, that are deeply embedded in the Common Core State Standards. You will have an opportunity to explore a variety of mathematical activities that are supported and anchored in commitments to high-quality mathematics instruction expressed by mathematics education policy documents such as Principles and Standards of Teaching Mathematics (National Council of Teachers of Mathematics, 2000), and the Common Core Content Standards Initiative (2010). By “doing” these instructional activities/projects, you will enhance the mathematical content that matters for teaching for understanding, as well as having an opportunity to listen to your colleagues ideas, and adjusting your teaching in response. Your knowledge of mathematics, your ability to represent ideas and hear others’ understandings of them, your skill in using mathematical tools like drawings, symbols, number lines, and your facility with language all matter greatly in teaching mathematics.

Mathematical proficiency. The underlying premise/questions is: What does it mean to be mathematically proficient? Drawing on the definition of mathematical proficiency, how would we design mathematics instruction so that all students would become mathematically proficient?

Mathematical content. The content for this course emphasize Algebraic Thinking and Algebra content (which includes Fractions/Fraction Decimals). Sub categories focused on reading and reflecting on text, as well as, journal-reviewed publications will be integrated within the activities and/or assignments.

This course supports the theme of the College of Education at Wayne State University of “The Effective Urban Educator: Reflective, Innovative and Committed to Diversity.” Accordingly, our course will focus on reflective teaching practice; innovation in mathematics instruction; and teaching diverse learners. These themes will be woven throughout the class.
We will explore a number of different ways for exploring content pedagogy. These include but may not be limited to:

1. **Doing of mathematics ourselves**, as a way to learn more about the mathematical content and the ways of listening and talking about mathematics that you will use in the classroom.
2. **Reading and reflecting about mathematics teaching** from the assigned and recommended readings and assignments. Our discussions of these readings, and your own responses to them in your Reflective Journal, will be a way to think about mathematics teaching in the classroom beyond what you experience in the course.
3. **Using videotaped examples and case studies of teaching** which provides the flexibility of using the pause button to stop the action, replay it, make conjectures about what you observed, and go back to watch again. Viewing student work and developing a case study will also provide an opportunity to reflect on how students think about and process the mathematics they are learning.
4. **Actively doing the mathematics and reflecting on the results.**
5. **Examining** the Common Core State Standards for Mathematics and the Standards for the Mathematical Practices.

**NOTE:** This course is specifically designed for Detroit Public School teachers participating in the CORE (Collaborative Opportunities for Reaching Excellence) grant.

**Goals:**

*Mathematical proficiency*. The underlying premise/questions is: What does it mean to be mathematically proficient? And then, drawing on the definition of mathematical proficiency, how would we design mathematics instruction so that students would become mathematically proficient?

**Innovation in mathematics instruction and Reflective teaching practice:** We will explore **innovative methods and materials for helping students learn mathematics** and what it takes to teach in innovative ways. Because innovation is a break from the past, it can be hard to adopt, challenging to teach, and difficult for parents and students to accept. And, not all innovation is necessarily good! So we will give close attention to analyzing innovations in mathematics education, their value, and how to put them into practice in productive ways. Also, the course content will promote reflection on teaching practice. Instruction involves meticulous planning, interactive work with “students”, and then reflecting after the interactions on what “students” learned, how the lesson/activity went, and what to do moving forward. Becoming a dispassionate observer of one’s own practice, and teaching practice in general, is not an easy charge.

In mathematics education, teaching diverse learners means focusing on **how to teach mathematics so that all children can learn**. Because mathematics is important in helping students express themselves mathematically and understanding the world around them, and because mathematics is a gatekeeper to higher education and employment, we are committed to enacting instruction so that all children can have these opportunities. Often this requires making mathematical reasoning explicit, rather than assuming that children can figure out on their own what is often taken for granted. We will have an opportunity to view several classroom scenarios and respond to them in respect to the following: the diverse students you teach and on how to develop many practices of teaching that are sensitive to and respectful of those differences.

**Instructional Activities**

These activities include but not limited to:

- Posing mathematical questions.
- Representing mathematical ideas in multiple ways.
- Writing and designing a unit/ Developing a PD plan.
- Examining Case Studies and conducting a Case Study.
- Integrating current technologies to enhance instructional practices.
Maintaining a Reflective Journal/Portfolio.

The development of a student’s power to use mathematics involves learning the signs, symbols and terms of mathematics. This is best accomplished in problem situations in which students have an opportunity to read, write, and discuss ideas in which the use of the language of mathematics becomes natural. As students communicate their ideas, they learn to clarify, refine, and consolidate their thinking. -Curriculum and Evaluation Standards for School Mathematics

Course Focus/Outcomes:
The focus of the 2013-2014 CORE course is designed to enhance the content knowledge of the participants’ in mathematics, specifically in algebraic thinking and algebra and adhere to the content and activities described in the CORE grant.

The grant specifies teachers:
- explore and design classroom lessons and activities based on the content identified in the Common Core State Standards Mathematics (CCSSM) and the Standards for the Mathematical Practices, which includes the integration of current technologies and applications where applicable.
- enhance pedagogical content knowledge
- gather and analyze student data and use the data to plan a instructional plan for the student.

In the elementary grades, student experiences include recognizing and extending patterns, analyzing and describing patterns, and creating patterns. For example, given a pattern, elementary students might be asked to continue the pattern and discuss its characteristics or to generate a pattern from a simple situation. By the sixth and seventh grades, students can begin to generalize the patterns in words or in symbols. The elementary school experience lays a solid foundation for patterning to be used as a tool to solve problems in the middle grades. Thus, the middle grades experience continues to explore patterns and functions that provide opportunities for students to represent problems in a variety of ways and to translate among these representations as stories or problems, concrete objects, pictures, charts, tables, graphs, verbalizations, and symbols. Furthermore, such explorations provide opportunities for students to analyze, conjecture, generalize, extend, reverse, evaluate, and reflect.


Text Materials


Recommended References/Resources:
iPad and/or graphing calculator if applicable

**Professional Opportunities:**
If you are not a member consider joining one or all of the following professional organizations:
National Council of Teachers of Mathematics (NCTM) www.nctm.org
Michigan Council of Teachers of Mathematics (MCTM) www.mictm.org
Detroit Area Council of Teachers of Mathematics (DACTM) www.dactm.org

**Class Policies:**
Your learning in this class will be dependent on your active engagement and participation in activities. The expectation is participants arrive on time, attend class on a regular basis, complete all assignments on time and be prepared to share work in class. During the semester, participants are encouraged to work cooperatively with other students.

The development of a student’s power to use mathematics involves learning the signs, symbols and terms of mathematics. This is best accomplished in problem situations in which students have an opportunity to read, write, and discuss ideas in which the use of the language of mathematics becomes natural. As students communicate their ideas, they learn to clarify, refine, and consolidate their thinking.

**Class Communication:**
Class communication will utilize WSU’s student user ID (e.g., ab6960@wayne.edu). Unless you use your WSU user ID as your email, you will miss any communication sent to you. You may connect your WSU email to another email address by going to http://webmail.wayne.edu, click on “Options” and then on “Forwarding.” Enter the email address that you want your WSU email to be forward to and click on “Start.”

**ASSIGNMENTS (as identified in the CORE grant)**

**Homework**
Your homework will consist of text/article readings including a reflection on the reading in your Reflective Journal and on Blackboard.

**Unit Plan**
CORE participants will submit one unit mathematics lesson plan. (The plan will be directly directed to the student in your case study.) The unit plan will be connected to what you experience in the CORE session and that you use with your case study student to teach a critical mathematics standard (fractions). The submission will include plans and modified versions of the plans based on what the teacher has learned in the CORE program. The teacher will describe the following as part of the lesson plan submissions: original lessons, suggested modifications, how the lesson will be implemented, how changes will benefit your case study student and how student learning will be assessed. Teachers will be encouraged to actually teach the lesson sand report their actual experience with using it in the classroom. For identified sessions in the Course Schedule, you will be asked to bring examples of your case study student work.

**Case Study**
In addition to your unit plan, for your case study you will select and
interview a student. Record his/her responses on a separate sheet. This will become the student’s mathematics autobiography or mathography that is a personal description of his/her feeling about and experiences in mathematics (in and out of school). Use the following prompts to write your student’s mathography (you may want to have them write it and you could word process their responses is illegible). If they write their response have them write no more than one paragraph/page (typewritten, double-spaced, 12 pt font, w/o legs).

1. Are you “good” at mathematics? Explain.
2. Do you like some areas (geometry, adding, fractions...) of math better than others? If so, which ones do you like or dislike? Why do you like or dislike them?
4. Describe how you feel when you are learning something new in math.
5. What do you think it means to learn mathematics?
6. Is math important to know? When would you use math?
7. Tell me everything you know about fractions?
8. What would you like to tell me that I didn't ask?

Later you will interact with and observe the student solving problems. The problems are focused on an identified standard with variations. Also, include in your Reflective Journal, describe the student and his/her background.

Begin by providing a description of the student (no names) and the problems. Things to watch for as you observe the student solving the problems is based on Marilyn Burns Math Reasoning Inventory:

- How does the student organize his/her work?
- Does the she/he understand the problem?
- Does she/he develop a plan?
- What strategies does she/he use?
- As solving the problem does she/he exhibit the behaviors in the Standards for Mathematical Practice?

Evidence and samples of the student work (a pre assessment/day 1 prior to instruction) will be shared and analyzed in class to gain an insight into what new ideas, methods, strategies used with the student.

After the implementation of the instructional plan you will use the same procedure listed above and observe if and what changes the student makes in solving the second version of the problem and the effectiveness of the research and evidence based strategies used.

**Reflective Journal**

CORE participants will reflect on their own thinking and instructional practices by writing about what they are learning, how the CORE program is enhancing their classroom teaching and lesson planning, how CORE is
influencing their ability to connect with students and any other thoughts and experiences they feel are relevant. The journal will also include reflections from assigned text and journal readings. The

**Conference Report**

This is a 1-2 page report about your DACTM conference attendance. Provide the title, the name of the presenter(s) and a detailed summary of two sessions that you attended. Include two plusses and a wish for each session. Describe one thing that you will try or have tried as a result of what you learned.

**Discussion Board:**

During the semester selected readings, activities or focus questions will be assigned. The readings, activities or focus questions are intended to extend your understanding of class topics and provide classroom examples that support the teaching and learning of problem solving. Readings are posted in the reading folder on Blackboard and are listed alphabetically by author. You will be assigned to an online discussion group during our 3rd class meeting. Assignments and questions will be posted on Bb. I will “drop in” to visit the discussions, but the purpose of the discussion board is for students to actively engage in conversations with their group members. You will want to think about how you can contribute to our learning community through this online discussion. Discussion board forums will remain posted during the semester for your reference, but you will not be able to submit comments after the deadline date. Therefore, you should plan to make your contributions in a timely manner.

**Evaluation and Grading:**

Grades for this course will be based on the following assignments:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Study/unit plan</td>
<td>30%</td>
</tr>
<tr>
<td>Conference Report</td>
<td>10%</td>
</tr>
<tr>
<td>Reflective Journal Entries</td>
<td>35%</td>
</tr>
<tr>
<td>Discussion Board</td>
<td>10%</td>
</tr>
<tr>
<td>Preparation/Participation/Attendance</td>
<td>15%</td>
</tr>
</tbody>
</table>

**Grades:**

Final grades for graduate students will be assigned based on the following distribution:

- **A:** $92\% < x\% \leq 100\%$
- **A-:** $90\% \leq x\% < 92\%$
- **B+:** $88\% \leq x\% < 90\%$
- **B:** $80\% < x\% \leq 88\%$
- **F:** Below 80%

**General Note on Grading:**

The College of Education faculty members strive to implement assessment measures that reflect a variety of strategies in order to evaluate a student's performance in a course. For graduate students B grades will be awarded for satisfactory work that satisfies all course requirements; B+ grades will be
awarded for very good work, and A grades will be reserved for outstanding performance. An Incomplete grade is not an option for this course.

Religious holidays (from the online Academic Calendar):
Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:
If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adaman Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University. Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Plagiarism and Cheating:

- Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.
- Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.
- Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.
- Plagiarism: To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.
- Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any
attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

Student services The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit www.success.wayne.edu for schedules and information on study skills, workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit http://clasweb.clas.wayne.edu/writing to obtain information on tutors, appointments, and the type of help they can provide.

MAE 7100 Tentative Class Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Topic(s) Explored in Class</th>
<th>Assignments Due (on the date listed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept 21</td>
<td>1</td>
<td>- INTRODUCTIONS&lt;br&gt;- SYLLABUS/COURSE EXPECTATIONS&lt;br&gt;- PROBLEM SOLVING ACTIVITY&lt;br&gt;- CORE PRE TEST</td>
<td></td>
</tr>
<tr>
<td>Oct 12</td>
<td>2</td>
<td>CCSS-MATHEMATICS&lt;br&gt;- STANDARDS FOR MATHEMATICAL PRACTICE&lt;br&gt;S-BAC REFLECTIVE JOURNAL ENTRY</td>
<td>REVIEW THE CCSS-M</td>
</tr>
<tr>
<td>Oct 26</td>
<td>3</td>
<td>QUANTITATIVE AND QUALITATIVE LITERACY: WHAT? WHY?&lt;br&gt;REFLECTIVE CONVERSATION: MATH DISABILITIES IN CHILDREN AND ACCESSIBILITY STRATEGIES&lt;br&gt;VOCABULARY EXCURSION&lt;br&gt;Making Mathematics Visible REFLECTIVE JOURNAL ENTRY</td>
<td>BLACKBOARD DISCUSSION FORUM 1&lt;br&gt;CHAPTER INTRODUCTION AND CHAPTER 1 READINGS: PUTTING ESSENTIAL UNDERSTANDING OF FRACTIONS INTO ACTIONS</td>
</tr>
<tr>
<td>Nov 16</td>
<td>4</td>
<td>DACTM/MDSTA ANNUAL CONFERENCE</td>
<td></td>
</tr>
<tr>
<td>Nov 23</td>
<td>5</td>
<td>DEVELOPING CONCEPTUAL UNDERSTANDING FOR FRACTIONAL NUMBER CONCEPTS&lt;br&gt;REFLECTIVE JOURNAL ENTRY</td>
<td>CONFERENCE REPORT&lt;br&gt;CHAPTERS 2/3 READINGS: PUTTING ESSENTIAL UNDERSTANDING OF FRACTIONS INTO ACTIONS</td>
</tr>
<tr>
<td>Dec 7</td>
<td>6</td>
<td>DEVELOPING STRATEGIES FOR FRACTIONAL NUMBER COMPUTATIONS: ADDITION AND SUBTRACTION&lt;br&gt;REFLECTIVE JOURNAL ENTRY</td>
<td>IDENTIFY AND INTERVIEW STUDENT FOR YOUR CASE STUDY (INCLUDE STUDENT “MATHOGRAPHY”)&lt;br&gt;CHAPTERS 4/5 READINGS:</td>
</tr>
<tr>
<td>Date</td>
<td>Week</td>
<td>Topic</td>
<td>Resource</td>
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<tr>
<td>Dec 14</td>
<td>7</td>
<td>DEVELOPING STRATEGIES FOR FRACTIONAL NUMBER COMPUTATIONS: MULTIPLICATION AND DIVISION REFLECTIVE JOURNAL ENTRY</td>
<td>BLACKBOARD DISCUSSION FORUM 2 CHAPTERS 6 AND 5 READINGS: PUTTING ESSENTIAL UNDERSTANDING OF FRACTIONS INTO ACTIONS</td>
</tr>
<tr>
<td>Jan 11</td>
<td>8</td>
<td>EXPLORING NUMBER THEORY</td>
<td>REFLECTIVE JOURNAL ENTRY</td>
</tr>
</tbody>
</table>
| Jan 25   | 9    | MAKING CONNECTIONS FRACTIONS AND ALGEBRA PATTERNS, FUNCTIONS, AND ALGEBRA  
  o ALGEBRAIC THINKING  
  o THE PATTERN AND FUNCTION CONNECTION  
  o FUNCTIONS AND ALGORITHMS INITIAL CASE STUDY CONVERSATIONS REFLECTIVE JOURNAL ENTRY | BLACKBOARD DISCUSSION FORUM 3 |
| Feb 8    | 10   | CASE STUDY CONVERSATIONS PATTERNS, FUNCTIONS, AND ALGEBRA  
  o PROPORTIONAL REASONING REFLECTIVE JOURNAL ENTRY | CASE STUDY STUDENT (PRE ASSESSMENT) REFLECTIVE JOURNAL ENTRY |
| Feb 15 (date change) | 11 | PATTERNS, FUNCTIONS, AND ALGEBRA  
  o LINEAR FUNCTIONS AND SLOPE REFLECTIVE JOURNAL ENTRY | BLACKBOARD DISCUSSION FORUM 4 |
| Mar 8    | 12   | PATTERNS, FUNCTIONS, AND ALGEBRA  
  o SOLVING EQUATIONS REFLECTIVE JOURNAL ENTRY | CASE STUDY PRE TEST REPORT |
| Mar 22   | 13   | PATTERNS, FUNCTIONS, AND ALGEBRA  
  o NONLINEAR FUNCTIONS REFLECTIVE JOURNAL ENTRY | BLACKBOARD DISCUSSION FORUM 5 |
| Mar 29   | 14   | PATTERNS, FUNCTIONS, AND ALGEBRA  
  o NONLINEAR FUNCTIONS REFLECTIVE JOURNAL ENTRY | CASE STUDY REPORT UNIT PLAN |
| Apr 12   | 15   | | CORE POST TEST |
| Apr 26   | 16   | HOLIDAY-NO CLASS | |
| May 10   | 17   | END OF CLASS | |