Course Description: Fundamental concepts of algebra for a modern secondary school mathematics program; current trends and experimental programs; related research; methods and materials of instruction.

Course Outcomes: The student, as an innovative and reflective urban educator, will:

1. explore the algebra component for grades 6-8 and 9-12 of the Common Core State Standards for Mathematics and analyze its alignment with recommendations in Principles and Standards for School Mathematics (NCTM, 2000).

2. explore and analyze appropriate instructional materials and practices for the teaching and learning of algebra.
3. develop an awareness of a research base focused on the learning and teaching of algebra.

4. investigate classroom implications of the research base.

5. investigate teaching materials/lesson plans which emphasize the utilization of technology in algebra instruction

7. consider appropriate assessment strategies for a state-of-the-art algebra classroom.

(May be purchased directly from NCTM at www.nctm.org).

**Bibliography:** Common Core State Standards-Mathematics (online at [http://www.corestandards.org/Math/](http://www.corestandards.org/Math/))


**Class Policy:** This course will be presented partly in a workshop format and partly in a seminar format. Regular and punctual attendance is expected. Class will begin promptly at 4:30 p.m. All students are expected to be familiar with all assigned readings and to contribute to class
discussions of those readings. All assignments are due when indicated. *Any assignments that are submitted late will be graded-down one letter grade.*

**Course Assignments:** Students are responsible for all assigned readings, as well as for information and ideas presented and discussed in class. Course grades will be determined using the following assignments, which must be submitted by e-mail:

1. **Article Reviews (two at 13% each) (CO 1, 2, 3, 4, 5, 7) 26%**

   Each student will read and review two articles that relate to the teaching of algebra chosen from the separate reference list provided on Blackboard. A review consists of a *brief* abstract of the main point(s) of the article, as well as a critique of the article. Please note that statements like, "I enjoyed this article," or, "I thought this author was way off base," etc. do not, by themselves, constitute a critique. Tell me *why* you enjoyed the article. Tell me *why* you thought an article was off base. I am especially interested in how you view the article in relation to your own teaching.

   A well written, well-organized article review will probably run 3-4 pages in length (typewritten, double-spaced, 1" margins all around). Less than this risks being sketchy; more risks redundancy. Please use APA style in referencing the articles. The first review is due **18 May**; the second is due **8 June**. Using the four points in the grading criteria below, each student will also present the article review in class on 18 May and 8 June.

**Grading Criteria - The student:**

1. Abstracts the main points of the article in a coherent manner.
   a. Research question
   b. Lit. review
   c. Methodology
   d. Results
   e. Conclusions based on the results

2. Critiques the article.

3. Provides a rationale for the critique.

4. Discusses implications for teaching.

**Grading Scale -**

13: All four criteria are completely met.

12: Three of the criteria are completely met; the other is partially met.

11: Two of the criteria are completely met and the others are both partially met, or three of the criteria are completely met and the other is not met at all.
10: Two of the criteria are met completely, and one other is met partially.

2. Internet Resources (two at 10% each) (CO 2, 5, 6, 7) 20%

Each student will conduct an Internet search to identify and download from two different websites two specific resources for teaching algebra in middle or high school. For example, the resource might be a lesson plan, background information to support the teaching of a particular concept, or an entire unit. Whatever the resource is, you must submit by e-mail the URL, a critique of the resource, and a description of how you intend to actually use the resource. The Internet Resources are due on 30 May. Each student will share her/his Internet Resources and critique them on 30 May.

Grading Criteria: For each of the resources identified, the student:

• provides the URL of the site where the resource was found,
• critiques the resource, and
• describes how (s)he intends to use the resource.

In addition,

• the student submits resources from two different sites.

Grading Scale:

20: All four criteria are completely met.
19: Three of the criteria are met completely; the other partially.
18: Two of the criteria are met completely, the others partially.
17: Three of the criteria are met completely, the other is not met at all.
16: Two of the criteria are met completely, one partially, and the other not at all.
15: One of the criteria is met completely, and the others are met partially.
14: All of the criteria are met partially.

3. Lesson Presentation (CO 1, 2, 3, 4, 5, 7) 20%

In groups of 2, students will present an innovative algebra lesson that is aligned with the vision of school mathematics that underlies Principles and Standards for School Mathematics (PSSM) and the Common Core State Standards - Mathematics (CCSS-M), and that accommodates the research base on the learning and teaching of algebra. Your lesson must be situated in the algebra curriculum for middle or high school, and must indicate how student learning would be assessed. Each person in class (including the instructor) must be provided with a lesson plan and any supporting materials.
Lessons will be presented in class on June 13, and 15.

Grading Criteria: The lesson

- is innovative.
- is aligned with *PSSM*.
- is aligned with the *CCSS-M*.
- accommodates the research base.

In addition, the student:

- clearly situates the lesson in the algebra curriculum for middle or high school.
- indicates how student learning would be assessed.
- provides a copy of the lesson plan and supporting materials to each person in class.

Grading Scale:

20: All seven criteria are met completely.
19: Six of the criteria are met completely; the other partially.
18: Five of the criteria are met completely, the others partially.
17: Four of the criteria are met completely, the others partially; or six of the criteria are met completely, the other is not met at all.
16: Five of the criteria are met completely, one is met partially, and the other is not met at all.
15: Four of the criteria are met completely, two are met partially, the remaining one is not met at all.
14: Five of the criteria are met completely, and the remaining two are not met at all.

4. Term Project (CO 1, 2, 3, 4, 5, 6, 7) 20%

Students will complete a term project that will be personally useful to their teaching of algebra. Some possible examples are:

- a paper in which you investigate the efficacy of one particular teaching strategy over another for a *specific* piece of content in algebra.

- the development of a unit (5-7 lessons) which cover some piece of algebra content that you will develop with students for the first time or in a way(s) different from what you have done in the past. Students choosing this option will need to discuss the fact that the content is new for you or describe how you are doing it differently.

- compiling a resource file for teaching algebra.
The above listing is meant to be suggestive, not exhaustive, so feel free to use your imagination here.

Regardless of the option chosen, a one-page outline must be submitted no later than 25 May, so that I may provide some feedback. Because the papers/projects submitted will probably differ greatly from one another, I will negotiate individual grading criteria with students on the basis of the outlines that are submitted. Early submission of the outline is strongly encouraged.

The term paper or project is due in class on 22 June. Each student will make a 10-minute presentation of her/his term project in class that day.

5. Attendance/Participation (CO 1, 2, 3, 4, 5, 6, 7)  
14%
Grading Criteria:
- The student is not absent without a reason deemed valid by the instructor.
- The student is punctual in attending class.
- The student participates in class activities.
- The student demonstrates knowledge of assigned readings.
Grading Scale: Points will be assigned proportionally.

**Grading System:** The following grading scale will be used:

A: (92–100%]  C+: [78–80%)
A-: [90–92%]  C: (72,78%)
B+: [88–90%)  C-: [70,72%]
B: (82–88%)  F: [0–70%)
B-: [80,82%]
**Class Schedule:** (Subject to possible revision.)

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Topic(s)</th>
<th>Assignments¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>05/09</td>
<td>What is algebra? Algebra in school mathematics; <em>Principles and Standards for School Mathematics</em>; the <em>Common Core State Standards for Mathematics</em>.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>05/11</td>
<td>Supporting concept development in algebra with concrete referents: integer arithmetic, variables and algebraic representation</td>
<td>Discussion of Usiskin (1988)</td>
</tr>
<tr>
<td>3</td>
<td>05/16</td>
<td>Supporting concept development in algebra with concrete referents: operations with variables, factoring, solving equations</td>
<td>Discussion of Kieran (1989)</td>
</tr>
<tr>
<td>4</td>
<td>05/18</td>
<td>Oral reports of first article reviews</td>
<td>Discussion of Herscovics (1989)</td>
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<tr>
<td></td>
<td></td>
<td><strong>First Article Review due</strong></td>
<td></td>
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<tr>
<td>5</td>
<td>05/23</td>
<td>Developing algebraic concepts in context: A linear programming model.</td>
<td>Discussion of Tall (1989)</td>
</tr>
<tr>
<td>6</td>
<td>05/25</td>
<td>Developing algebraic concepts in context: A queueing model.</td>
<td>Discussion of Markovits et al. (1989); <strong>Term Paper outline due</strong></td>
</tr>
<tr>
<td>7</td>
<td>05/30</td>
<td>Sharing of Internet Resources</td>
<td>Discussion of Vinner &amp; Dreyfus (1989); <strong>Internet Resources due</strong></td>
</tr>
<tr>
<td>8</td>
<td>06/01</td>
<td>GeoGebra in school algebra</td>
<td>Discussion of Sfard (1991)</td>
</tr>
<tr>
<td>9</td>
<td>06/06</td>
<td>Graphing calculators in school algebra</td>
<td>Discussion of Dunham (2000)</td>
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<tr>
<td>10</td>
<td>06/08</td>
<td>Oral reports of second article reviews</td>
<td>Discussion of Hembree &amp; Dessart (1986, 1992)—two short papers <strong>Second Article Review due</strong></td>
</tr>
<tr>
<td>11</td>
<td>06/13</td>
<td>Lesson Presentations</td>
<td>Discussion of Heid &amp; Blume (2008)</td>
</tr>
<tr>
<td>12</td>
<td>06/15</td>
<td>Lesson Presentations</td>
<td>Discussion of Kieran &amp; Saldanha (2008)</td>
</tr>
<tr>
<td>14</td>
<td>06/22</td>
<td>Oral reports on Term Projects; SET forms</td>
<td><strong>Term Project due</strong></td>
</tr>
</tbody>
</table>

¹ Readings are for the date listed; i.e., be prepared to discuss each reading on that particular date.
**Plagiarism:**

Plagiarism includes copying material (any more than 5 consecutive words) from outside texts or presenting outside information as if it were your own by not crediting authors through citations. It can be deliberate or unintended. If you’re in doubt about the use of a source, cite it. Students caught plagiarizing information from other sources will receive a failing grade in the course. University policy states that students can be subject to multiple sanctions, from reprimand to expulsion as a consequence of academic dishonesty.

**Withdrawal Policy**

Students who withdraw from a course after the end of the 4th week of class will receive a grade of WP, WF, or WN.

- WP will be awarded if the student is passing the course (based on work due to date) at the time the withdrawal is requested.
- WF will be awarded if the student is failing the course (based on work due to date) at the time the withdrawal is requested.
- WN will be awarded if no materials have been submitted, and so there is no basis for a grade.

- Students must submit their withdrawal request on-line through Pipeline. The faculty member must approve the withdrawal request before it becomes final, and students should continue to attend class until they receive notification via email that the withdrawal has been approved. Withdrawals can be requested at any point from the fifth week of class through the study day.

**Attention Students with Disabilities:**

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 at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, SDS staff will be glad to meet with you privately during office hours 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.

**Religious Observance Policy:**

Because of the extraordinary variety of religious affiliations represented in the University student body and staff, the Wayne State University calendar makes no provision for religious holidays. It is University policy, however, to respect the faith and religious obligations of the individual. Students who find that their classes or examinations involve conflicts with their religious observances are expected to notify their instructors well in advance so that alternative arrangements as suitable as possible may be worked out.

**Last Date to Add a Class:**

Students are now required to complete adding classes to their schedule by the end of the first week of classes. They will no longer be able to add classes in the second week of classes.

**Withdrawal Deadline:**

The deadline to withdraw from a course has been moved forward from the end of the 14th week of classes to the end of the 10th week of the semester. Therefore the course withdrawal deadline for Fall 2011 is Saturday, November 12th.