Division: Teacher Education
Program Area: Mathematics Education
Course #: MAE 6210/MAT 6210
Course Title: Teaching Geometry, Probability & Statistics, and Discrete Mathematics from an Advanced Perspective
Course Credit: 3 semester hours
Section #: 001
Call #: 22163/22476
Term/Year: WI 2015
Course Location: 214 State
Day /Time: Thurs., 4:30-7:15 p.m.
Instructor: Kristen Meck, M.Ed.
Office Address: Education
Office Hours: By appointment
Office Phone: (313)577-0980
E-mail: E-mail is my preferred mode of communication; aw7218@wayne.edu

Course Description: Prereq.: Completion of a major in mathematics or secondary mathematics education. Historical perspectives, common conceptions and misconceptions, applications, technology, and mathematical connections relative to teaching geometry (including trigonometry), probability & statistics, and discrete mathematics in secondary schools.

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

1. learn to use a historical perspective in the teaching of mathematics.
2. identify unifying "big ideas" in geometry, probability & statistics and discrete mathematics.
3. demonstrate awareness of common misconceptions in geometry, probability & statistics, and discrete mathematics, as well as their implications for instruction.
4. learn to use applications of mathematics to teach mathematical content.
5. learn appropriate uses of technology to support instruction in geometry, probability & statistics, and discrete mathematics.
6. identify mathematical connections in geometry, probability & statistics, and discrete mathematics, and learn how to foster such connections in the classroom.

7. connect the collegiate mathematics they have studied with national and state standards for the teaching and learning of secondary school mathematics (e.g., NCTM’s *Principles and Standards for School Mathematics*, the *Michigan Curriculum Framework for Mathematics, Common Core State Standards*).


**References:**


Shaughnessy, J. M. (1992). Research in probability and statistics:

Class Policies: Regular and punctual attendance and active participation in class activities are givens for every course in the professional sequence. This course will be presented partly in a workshop format and partly in a seminar format. Because a seminar involves the free exchange of ideas, all students will be expected to actively participate in class discussions. Failure to participate in the discussion of any assigned readings will be interpreted as an indication of unfamiliarity with those readings. All assignments are due when indicated. Any assignments that are submitted late will be graded-down at least one letter grade. It will frequently be helpful to have in class a graphing calculator with statistical analysis tools (e.g., a TI-83/4).

Course Assignments: Students are responsible for all assigned readings, as well as for information and ideas presented and discussed in class. Detailed descriptions and grading criteria for each assessment item will be available via Blackboard. Course grades will be determined according to the following:

1. Article Reviews (3 @ 10% each) 30%
2. Activity Analyses (3 @ 10% each) 30%
3. Internet Resources (3 @ 5% each) 15%
4. Term Paper or Project (25%)

Article Reviews: Each student will review three journal articles, one that relates to the learning and teaching of geometry, one that relates to the learning and teaching of probability & statistics, and one that relates to the learning and teaching of discrete mathematics topics. Include a full reference citation for the article (if uncertain what that means, please ask), a brief synopsis of the article, a rationale for selecting the article for review, and an indication of how you intend, or do not intend, to use the ideas in the article in your teaching and why/why not. A well-written article review will probably run 2-3 typewritten, double-spaced pages. Students will briefly discuss their review in class the day it is due. The Article Reviews are due on January 29, February 26, and March 26. Electronic submission via Blackboard of the article reviews is required (the file attachment must include your last name).

Activity Analyses: During the course, students will participate in a number of “hands on” activities that relate to geometry, probability & statistics, and discrete mathematics. Once during each topic of study (three times total), students will be asked (unannounced) to analyze the activity. Students will be expected to situate each activity within an appropriate curriculum as well as relate it to a “big idea” in the subject area. Students will be expected to analyze the activity in terms of
research in teaching and learning, theories in teaching and learning, and/or the psychology of teaching and learning.

**Internet Resources:** Each student will identify three resources that were found on the Internet, one each for teaching geometry, probability & statistics, and discrete mathematics. For each resource, include the URL, a brief description of the resource, and how you intend to use it in your teaching (or why you would not use it in your teaching). Students will briefly discuss a resource in class the day it is due. The Internet Resources are due on April 16, and must be submitted via Blackboard (again, the file attachment must include your last name).

**Term Paper or Project:** Students will complete a term paper or project that will be personally useful to their teaching. 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 geometry, probability & statistics, or discrete mathematics.

*The development of a unit (5 – 7 lessons) in probability & statistics or discrete mathematics that you will develop with students for the first time or in 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.

*Outline a one or two semester discrete mathematics course, including a rationale for teaching it at the secondary level.

*Outline a set of probability & statistics and discrete topics for inclusion into the current algebra 1, geometry, and algebra 2 sequence. Indicate what your topics would replace or how they fit in.

The above list is a suggestive list; feel free to use your imagination! This assignment is due by April 30th and will include a short presentation to the class. Due to the nature of some of the projects you may submit this assignment via Blackboard or turn it in in class.

Regardless of the option chosen, a **one-page outline** of what you plan to do must be submitted **no later than March 12th** so I may provide some feedback. Due to the fact that the papers/projects will vary, I will negotiate individual grading criteria with students on the basis of the outlines that are submitted. Early admission of the outline is strongly encouraged. Submit your outline via Blackboard (the file attachment must include your last name).
**Grading System:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>3.68-4.00</td>
<td>Outstanding grasp of the course content, demonstration of critical analysis, creativity and/or complexity in completion of assignment.</td>
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<tr>
<td>A-</td>
<td>3.34-3.67</td>
<td>The difference between A and A- is the presence of some occasional weaknesses in one or two areas.</td>
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<tr>
<td>B+</td>
<td>3.01-3.33</td>
<td>Mastery of subject content beyond expected competency, but has not demonstrated additional critical analysis, creativity or complexity in the completion of the assignment.</td>
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<tr>
<td>B</td>
<td>2.68-3.00</td>
<td>Mastery of subject content at level of expected competency – meets course expectations.</td>
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<tr>
<td>B-</td>
<td>2.34-2.67</td>
<td>Less than adequate competency, but demonstrates student learning and potential for mastery of subject content; work has some significant weaknesses.</td>
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<tr>
<td>C+</td>
<td>2.01-2.33</td>
<td>Demonstrates student learning with a minimal understanding of subject content. Significant areas needing improvement.</td>
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<tr>
<td>C</td>
<td>1.68-2.00</td>
<td>Demonstrates minimal understanding of subject content and unsatisfactory work. Significant areas need improvement to meet course requirements.</td>
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<tr>
<td>F</td>
<td>&lt;1.67</td>
<td>Student has failed to demonstrate minimal understanding of subject content.</td>
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<tr>
<td>Week</td>
<td>Date</td>
<td>Topic(s)</td>
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<tr>
<td>1</td>
<td>15 Jan.</td>
<td>Review syllabus; What does “an advanced perspective” mean? ; Geometric constructions and their applications</td>
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<tr>
<td>2</td>
<td>22 Jan.</td>
<td>More geometric constructions; Classic construction problems from antiquity; The parallel postulate (Euclid’s vs. modern version)</td>
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<td>3</td>
<td>29 Jan.</td>
<td>Matrix representations of isometries of the Cartesian plane; Distance metrics</td>
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<td>4</td>
<td>5 Feb.</td>
<td>Non-Euclidean geometries; Geoboard areas; Common Core tasks</td>
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<td>5</td>
<td>12 Feb.</td>
<td>Proof and argument in geometry</td>
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<td>6</td>
<td>19 Feb.</td>
<td>The nature of randomness; judgmental heuristics and biases</td>
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<tr>
<td>8</td>
<td>5 Mar.</td>
<td>Conditional probability and independence</td>
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<td>9</td>
<td>12 Mar.</td>
<td>Statistical inference; regression to the mean; a model for teaching stochastics effectively</td>
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<td>19 Mar.</td>
<td>Spring Break</td>
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<tr>
<td>10</td>
<td>26 Mar.</td>
<td>Fair elections, apportionment, and fair division</td>
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<tr>
<td>11</td>
<td>2 Apr.</td>
<td>Graph theory–shortest path algorithms, minimal spanning tree; Euler and Hamiltonian paths &amp; circuits</td>
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<tr>
<td>12</td>
<td>9 Apr.</td>
<td>Iteration and recursion; location problems; queuing theory</td>
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<tr>
<td>13</td>
<td>16 Apr.</td>
<td>Linear programming, integer programming and why it makes a difference. (If you have a laptop with Excel, please bring it to class for this week.)</td>
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<tr>
<td>14</td>
<td>23 Apr.</td>
<td>Open</td>
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<tr>
<td>15</td>
<td>30 Apr.</td>
<td>Term Paper/Project Presentations</td>
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</tbody>
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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.