Division: Teacher Education

Program Area: Mathematics Education

Course #: MAE 7200

Course Title: Advanced Studies in Teaching Statistics and Probability

Course Credit: 3 semester hours

Section #: 001  Call #: 28399

Term/Year: Winter 2014

Course Location: 114 Education Building

Day: Wednesdays  Time: 4:30-7:15

Instructor: Dr. S. Ash Özugün-Koca

Office Address: 295 Education

Office Hours: Mondays, 3:00–4:00 p.m., or by appointment

Office Phone: (313) 577-0944  e-mail: aokoca@wayne.edu
n.b., e-mail is my preferred mode of communication

Course Description: Techniques for teaching statistics and probability in grades K-12; promising materials and activities; research on the learning and teaching of statistics and probability; related resources; review of basic concepts.

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

1. explore and analyze appropriate instructional materials and practices for the teaching and learning of statistics and probability,
2. develop an awareness of and critique current research on the learning and teaching of statistics and probability,
3. explore, identify, and analyze classroom implications of the research base, and
4. evaluate teaching materials/lesson plans for statistics and probability instruction.

**Required Text(s):**


Additionally, various reading materials (chapters from various books and research papers) will be used throughout the semester.

**Class Policy:**

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. 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.

**Academic Dishonesty/Plagiarism**

The College of Education has a “zero tolerance” approach to plagiarism and other forms of academic dishonesty. (See Student Code of Conduct [http://doso.wayne.edu/codeofconduct.pdf](http://doso.wayne.edu/codeofconduct.pdf). 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. Specific examples of academic dishonesty, including what constitutes plagiarism, can be found in the University’s Undergraduate Bulletin ([http://bulletins.wayne.edu/ubk-output/index.html](http://bulletins.wayne.edu/ubk-output/index.html)), the Undergraduate Student Handbook ([http://comm.wayne.edu/files/undergradhandbook.pdf](http://comm.wayne.edu/files/undergradhandbook.pdf)), and in print and online versions of the Graduate Catalog ([http://www.bulletins.wayne.edu/gbk-output/index.html](http://www.bulletins.wayne.edu/gbk-output/index.html)) under the heading “Student Ethics.” It is every student’s responsibility to read these documents to be aware which actions are defined as plagiarism and academic dishonesty. Sanctions could include failure in the course involved, probation and expulsion, so students are advised to think carefully and thoroughly, ask for help from instructors if it is needed, and make smart decisions about their academic work.
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:

1. Attendance/Participation 15%

   Attendance is crucial. The student is expected to be punctual in attending class.

   a) Whole Class Discussion 5%

      Grading Criteria:
      • The student participates in class activities and discussions.
      • The student is eager to participate in activities & discussions.
      • The student demonstrates knowledge of assigned readings.

   b) Group Discussions 5%

      Grading Criteria: Group members are going to be graded by other members of the group by the following criteria.
      • The student participates in group discussions.
      • The student is eager to participate in group discussions.
      • The student demonstrates knowledge of assigned readings.

   c) Blackboard Discussions 5%

      Grading Criteria:
      • The student participates in Blackboard discussions.
      • The student starts new discussion threads and responds to other ones.
      • The student demonstrates knowledge of assigned readings.

   Grading Scale for All Discussions:
   5: All 3 criteria are met completely.
   4: Two of the criteria are met completely; the other is met partially.
   3: One of the criteria is met completely; the other two are met partially or two of the criteria are met completely and the other is not met at all.
Be aware that the following assignments will be connected and work together towards a common goal. First you need to choose an issue related to teaching or learning statistics or probability; such as misconceptions that students have, the use of technology in statistics instruction or the use of manipulatives or simulations in teaching statistics or probability. Then you need to choose a grade level. You will be asked to locate and read research articles about the teaching or learning of the chosen topic at the chosen grade level. And then you will locate, critique and improve a lesson plan or activity to teach the chosen topic, again at the chosen grade level. The next task will be conducting a case study in which you will interview students at the chosen level using the activity that you critiqued and improved. Finally, you will synthesize your learning from the previous assignments in the term reflection assignment.

2. **Article Reviews (2 Reviews 15% Each)**

Each student will read and review two research articles that relate to the teaching or learning of a statistics or probability topic and grade level that you chose. For instance if you chose teaching probability using simulations at middle school level, you will search for related research articles for your review such as how the use of simulations might help or hinder students’ probabilistic thinking.

A review consists of an 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. Your comments should also be reflective rather than simply descriptive. Your reflections should include three key points from the article and comments. The following questions are suggested to help guide your comments.

- How does what you read “fit” with what you already know?
- How and why do you think what you have read will contribute to your professional preparation?
- Were you confused or surprised by any of the information presented in the readings?

A well written, well organized article review will probably run 3-4 pages in length (typewritten, double-spaced, 12 font in Times New Roman, 1” margins all around). Please use APA style in referencing the articles. *Due on Jan. 29 and Feb 12.*
Grading Criteria:
- Selects a research article about teaching probability/statistics in middle or high school.
- Abstracts the main points of the article in a coherent manner.
- Critiques the article and provides a rationale for the critique.
- Connections to experiences and other readings are included.

Grading Scale:
15: All 4 criteria are met completely.
14/13: Three of the criteria are met completely; the other is met partially.
12/11: Three of the criteria are met completely and the other is not met at all. Or two of the criteria are met completely, the others partially.
10/9: Two of the criteria are met completely, one is met partially and the remaining one is not met at all. Or one of the criteria is met completely; the other three are met partially.

3. Evaluation and Critique of Teaching Material 15%

You will evaluate a lesson plan, activity, rich task, or any other teaching material that is aligned with the vision of school mathematics that underlies Principles and Standards for School Mathematics and Common Core State Standards. Remember that your lesson, activity, or teaching material should be on the topic in the statistics or probability curriculum that you chose at the grade level that you chose.

A well written, well organized paper will probably run 3-4 pages in length (typewritten, double-spaced, 12 font in Times New Roman, 1" margins all around). Due on March 5.

Grading Criteria: The student
- describes the teaching material and provides a copy of it,
- critiques and evaluates the teaching material while making connections to research articles that s/he read,
- indicates how the teaching material could be improved in the light of research articles that s/he read,
- explains how this lesson plan could help students learn statistics or probability, and
- discusses how s/he would use this material in his or her teaching in the future.
Grading Scale:
15: All five criteria are completely met.
14/13: Four of the criteria are met completely; the other partially.
12: Three of the criteria are met completely, the others partially or
four of the criteria are met completely, the other is not met at all.
11/10: Two of the criteria are met completely, the others partially or
three of the criteria are met completely, one is met partially,
and the remaining one is not met at all.
9/8: Three of the criteria are met completely; the others are not met
at all or two of the criteria are met completely, two are met
partially, and the remaining one is not met at all.
7/6: Two of the criteria are met completely, one is met partially,
and the remaining two are not met at all.

4. Case Study

The purpose of this assignment is to provide you with an opportunity to
take a closer look at three students in terms of their statistical or
probabilistic thinking around the theme that you chose to study and
using the teaching material that you evaluated. You can either choose to
observe/interview three students all together in a small group activity or
individual interviews. You will be using the Livescribe pen to record the
interview if applicable.

Grading Criteria: You should include the following components in your paper:

Activity:
Briefly re-describe your activity, re-discuss your rationale for your
selection shortly, mention the rationale for the improvements that you
did. Identify any adaptations you made to fit your interview setting.
Describe the setting you used to conduct your project.

Selection and Description of Students:
Briefly describe the students you have selected and your rationale for
selecting them. You will want to include the students’ age, grade and
general ability level (as an ethical researcher use pseudonyms). If you
are conducting a group activity, you might want to select three students
at different ability levels. If you are interviewing individual students you
might want to try the same activity with students at different grade or
ability levels.

Observations/Documentation/Analysis:
Describe your observations for each student. Your documentation should
include student responses, either oral or written and/or other artifacts
that document the students’ thinking. Your analysis should address the
students’ statistical or probabilistic thinking and references including the articles that you reviewed or class readings or materials. Appropriate citations and references should be included using the APA style manual.

Summary Reflections
Your summary reflections should address the following questions:
• What did you learn from these students?
• How will what you learned inform your teaching?
• How could you improve the material as a result of the case study?

A well written, well organized case study paper will probably run 5-8 pages (not including the artifacts) in length (typewritten, double-spaced, 12 font in Times New Roman, 1" margins all around). Due on March 26.

Grading Scale:
25: All four sections are completely written.
24/22: Three of the sections are written completely; the other partially.
21/19: Two of the sections are written completely, the others partially.
18/17: Three of the sections are written completely, the other is not written at all.
16/14: Two of the sections are written completely, one is written partially, and the remaining one is not written at all.
13/12: Two of the sections are written completely; the others are not written at all.
11/9: One of the sections is written completely, one is written partially, and the remaining two are not written at all.

5. Term Reflection 15%

You will complete your semester long project by synthesizing your learning and experience according to your case study results, teaching material critique, and previous article reviews. You will explain how you would revise this lesson plan for better teaching and learning results. You are expected to discuss the reasoning behind your revisions and how you used the case study results and article reviews during this process. Due on April 23.

Grading Criteria: The student
• reflects back on the whole project.
• describes the revised lesson plan.
• discuss the reasoning behind his or her revisions and how s/he used the term project during this process.
• synthesizes the whole project for future actions.
• presents the term reflection in class with a PowerPoint presentation, a poster, in a movie format, or any other innovative way.
Grading Scale:
15: All five criteria are completely met.
14: Four of the criteria are met completely; the other partially.
13/12: Three of the criteria are met completely, the others partially or four of the criteria are met completely, the other is not met at all.
11/10: Two of the criteria are met completely, the others partially or three of the criteria are met completely, one is met partially, and the remaining one is not met at all.
9/8: Three of the criteria are met completely; the others are not met at all or two of the criteria are met completely, two are met partially, and the remaining one is not met at all.
7: Two of the criteria are met completely, one is met partially, and the remaining two are not met at all.

Grading System: The following grading scale will be used:

A: (92–100%] B-: [80–82%]
A-: [90–92%] C+: [78–80%]
B+: [88–90%] C: (70–78%)
B: (82–88%) F: [0–70%)

Enrollment/Withdrawal Policy
Beginning in Fall 2011, students must add classes no later than the end of the first week of classes. This includes online classes. Students may continue to drop classes (with full tuition cancellation) through the first two weeks of the term.
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. Beginning in Fall 2011, the last day to withdraw will be at the end of the 10th full week of classes. The withdrawal date for courses longer or shorter than the full 15-week terms will be adjusted proportionately.
**Attention Students with Disabilities:**
If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) 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 313-202-4216 (video phone). Once you have your accommodations in place, I will be glad to meet with you privately during my 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.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.

**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.

**Wayne State University Writing Center:**
The Writing Center (2nd floor, UGL) provides individual tutoring consultations free of charge for students at Wayne State University. While the center serves both graduate and undergraduate students, undergraduate students in General Education courses, including composition courses, receive priority for tutoring appointments. The Writing Center serves as a resource for writers, providing tutoring sessions on the range of activities in the writing process – considering the audience, analyzing the assignment or genre, brainstorming, researching, writing drafts, revising, editing, and preparing documentation. The Writing Center is not an editing or proofreading service; rather, students are guided as they engage collaboratively in the process of academic writing, from developing an idea to correctly citing sources. To make an appointment, consult the Writing Center website: http://www.clas.wayne.edu/writing/.

To submit material for online tutoring, consult the Writing Center HOOT website (Hypertext One-on-One Tutoring) http://www.clas.wayne.edu/unit-inner.asp?WebPageID=1330.
## Class Schedule (Subject to Change):

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Topic(s)</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 Jan.</td>
<td>NCTM’s Data Analysis and Probability Standard Introduction</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>15 Jan.</td>
<td>Data Analysis and Probability Standards in: <em>Principles and Standards for School Mathematics</em> [3-5 (pp. 176-181), 6-8 (pp.248-255) and 9-12 (324-333)] <em>Common Core State Standards</em> (pp. 79-83)</td>
<td>Read NCTM and CCSS</td>
</tr>
<tr>
<td>7</td>
<td>19 Feb.</td>
<td><strong>Class will meet on Blackboard</strong></td>
<td>Nicolson (2005)</td>
</tr>
<tr>
<td>8</td>
<td>26 Feb.</td>
<td>Probabilistic Thinking</td>
<td>Konold et al. (1993) Busadee et al. (2011/20112)</td>
</tr>
<tr>
<td></td>
<td>12 March</td>
<td><strong>Spring Break-University Closed-No Class</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>19 March</td>
<td>The Use of Technology in Statistics and Probability Instruction</td>
<td>Computers Fathom, Spreadsheets</td>
</tr>
<tr>
<td>11</td>
<td>26 March</td>
<td>The Use of Technology in Statistics and Probability Instruction</td>
<td>Internet- Data Sources Virtual Manipulatives</td>
</tr>
<tr>
<td>13</td>
<td>9 Apr.</td>
<td><strong>Class will meet on Blackboard</strong></td>
<td>Batanero &amp; Serrano (1999)</td>
</tr>
<tr>
<td>15</td>
<td>23 Apr.</td>
<td>Term Reflection Presentations</td>
<td></td>
</tr>
</tbody>
</table>
Readings:


