RUTGERS
Graduate School of Education

Learning and Teaching
Graduate School of Education
Rutgers, The State University of New Jersey
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Probability and Data, 2014 NJ PEMSM Institute

Welcome to the fourth and final summer course taken by the third NJ PEMSM cohort.

Several goals of NJ PEMSM Institute, which were stated last summer at the beginning of the Number, Operation, and Algebra course, are well worth recalling as this course begins:

- Deepening your own understanding of middle school mathematics
- Helping you become a more effective teacher in your own classrooms
- Preparing you for roles such as math coach or facilitator of a professional learning community.
- Engaging students in successful efforts to learn and use mathematics

For these reasons we will ask you to work with mathematics outside the particular grade level which you currently teach, and to learn for "pedagogical content knowledge". This means that you will cultivate your ability to explain mathematics in multiple ways and to recognize and correct common misconceptions. This also means that you will develop a deep enough understanding of where students' future coursework will take them, that the teaching you do will cohere with and support that future learning.

An important aspect of this course, and all the courses in the PEMSM program, is that they are part of your graduate education as such, and are intended to have a lasting impact on your entire professional life. These courses are not PD events in the narrow sense of the term! Although attention is certainly given to how you can implement what you learn in PEMSM when you return to your districts, providing ready-to-use classroom activities and lessons is not the primary goal of the program.

There are several conceptual viewpoints and pedagogic strategies which this course will employ, to place your learning experience within a larger context:

- We will emphasize the unity of statistics and probability as aspects of a single coherent subject, rather than as two separate ones.
- We will make frequent, explicit reference to the Common Core Standards in mathematics, and carry out activities cited in the CCSM.
- We will build upon and explicitly refer back to previous courses in the PEMSM sequence, especially Number, Operation, & Algebra, and Discrete Mathematics.
- In the spirit of all of the above, we will be attentive to ways in which teaching data analysis and probability provides natural opportunities to make connections with other mathematical topics.

Our partnership is really a partnership. The instructional staff of each course includes not only Rutgers mathematicians, but also experienced teachers and researchers on mathematics education. As you learn about mathematical content from university faculty, they have the opportunity to learn from you about mathematics in the schools. Rutgers has already made use of what it learns from the summer institute courses to improve the mathematical education we offer to prospective teachers, and will continue to do so. Rutgers also makes use of what it learns from the summer institute to contribute to research on mathematics education in ways that can be useful to practitioners. The opportunity to work with you is exciting. We believe that motivation and potential make a powerful combination and that you bring with you the best of both traits.

The NJ PEMSM Institute is made possible by the US taxpayer, via a generous grant from the National Science Foundation (DUE 0934079). We also appreciate the support provided by Rutgers University and our partner districts.

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Meeting Dates: July 7- July 18, 2014

Data Analysis & Probability Course Personnel

Faculty instructor:	Michael Weingart	weingart@math.rutgers.edu
Assistant instructor:	Jennifer Jacobs	jajacobs@math.rutgers.edu
Graduate Assistant:	Yusra Naqvi	ynaqvi@math.rutgers.edu
Teacher Peer Mentors:	Kelly Fifield, Emily Lalor, and Matthew Sequin	

Other NJ PEMSM Personnel

Amy Cohen, Project Director: acc@math.rutgers.edu
Lynda Ginsburg, Associate Director: ginsburg@rci.rutgers.edu
Robert Wilson, Assistant Director for the Summer Institute: rwilson@math.rutgers.edu

Karen Murray, Project Manager, Gail Nadonley, Business Manager
Debbie Sclafani, Administrative Assistant: (732) 445-4850

Typical Daily Schedule (not to be taken overly literally, and not to induce panic if altered)

8:45 am – 9:00am	Coffee and pastry in SERC 221—NJPEMSM Lounge (for Cohort 3 and Cohort 4)
9:00 am – 10:00am	Reports on previous day's workshop problems, with some discussion
10:00 am – 12:15pm	Follow up thoughts on the previous day's topics, exposition of new content, and explorations of new topics by teacher participants in groups. A break will be included.
12:15 pm – 1:00 pm	Lunch
1:00 pm – 2:00 pm	Classroom connections. Sometimes classroom connections will be interspersed with exposition/exploration time, according to what is most appropriate pedagogically.
2:00 pm – 3:30 pm	Workshop Session
3:30 pm – 4:00 pm	Wrap-up and preparation for the next day
4:00 pm	Partnership Fellows go home already. It's been a long day!

On Fridays there will be a working lunch, which means that pizza will be provided by NJPEMSM, we will work through the lunch period, and the day will end at 3:00 pm.

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Grading Policy

Since this course is a graduate course applicable to a Master's degree, we do need to submit grades. We will offer an engaging, accessible, and supportive course. The instructional team for each course will offer plenty of help – and the participants will provide mutual support and encouragement – so each Partnership Fellow can thrive and do well.

Grading

33% on classroom participation (part oral reports, part the rest of each day's work)
35% on written workshop reports (see below)
32% on "final assessment" (see below)

Workshop problems

Teacher participants will work in groups of three or four. Each day, they will work on a set of workshop problems, one or two of which they will either present orally the next morning, or write up for submission the next morning.

Oral presentations of workshop problems

Each afternoon, half the groups will be assigned one or two workshop problems to present the next morning. Typically, the same problem will be assigned to two groups, each of which will solve the problem on its own. These two groups will confer with one another near the end of the day to check each other's work, and to coordinate how, as a combined "supergroup", they will make an oral presentation of their solutions the next morning. Since some workshop problems are longer than others, the presentation may be of one or two of the previous day's workshop problems, but the assignment will be made clear to each group during the afternoon before the presentation. Over the two weeks of Data Analysis & Probability, each teacher will make four of these presentations.

The approach to oral presentations just described is new in PEMSM, and we reserve the right to change it while the course is in progress, for practical or pedagogic reasons. But we have several reasons to hope and expect that it will be a success, and believe in particular that the process of two groups conferring and coordinating at the end of the day will be beneficial both to the group members' learning process, and to the quality of their presentation the next day.

- Presentations should include detailed explanations of your thinking and your solutions, presented in a way that is understandable to your peers. We encourage you to be prepared for questions from instructors and the class and be open to classroom dialogue about the mathematics.

- Groups may choose a variety of formats for presentations, including the use of the chalkboard, overhead projector, LCD projector, poster paper, handouts, etc.

Written reports on workshops

- Groups which do not do oral presentations on a given day will submit written solutions of specific workshop problems assigned the previous day.

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- Each write-up is to be turned in the day after it is assigned. You can use the wrap-up period to do most, or even all, of this writing-up.

- Each write-up will be scored on a scale of 0 to 7: 1 point for format (see below), 3 points for correctness of mathematical content, and 3 points for clarity and correctness of your explanation and justification. Details for write-ups are on page 6 of this handout.

Final Assessment

The final assessment will consist of several problems for which solutions are to be written-up with particular care and thoroughness. The written final assessment may be submitted in person on the last day of the course (August 2), or may be submitted electronically by uploading to the Dropbox on Sakai by Monday, August 5. If you submit your final assessment electronically, it must be by uploading a document to the Sakai Dropbox, not by emailing an attachment! Moreover, the document must be in one of the formats .doc, .docx, .pdf, or .jpg.

Each of these problems will be scored on a scale of 0 to 8: 1 point for format, 4 points for mathematical content, and 3 points for clarity of explanation and justification. These problems will be selected so a clear and complete solution should take no more than 2 pages.

Note We will also ask you for a Final Reflection to be submitted with the final assessment. The Final Reflection will not be graded! This reflection, at most 2 pages double spaced, should be a self-assessment of your understanding of the material of the course. Discuss the knowledge you had prior to beginning the course, what you have learned in the course, and topics you will want to strengthen in the future. You may also include comments on what was (or wasn't) hard, engaging, supportive, or useful.

Academic Integrity

We expect for NJPEMSM teacher-fellows to uphold the highest level of academic integrity. It is your responsibility to be familiar with the university's academic integrity policy, available at

http://academicintegrity.rutgers.edu/

In particular, please be aware of the following definition of plagiarism from Rutgers University:

Plagiarism: Plagiarism is the use of another person's words, ideas, or results without giving that person appropriate credit. To avoid plagiarism, every direct quotation must be identified by quotation marks or appropriate indentation and both direct quotation and paraphrasing must be cited properly according to the accepted format for the particular discipline or as required by the instructor in a course.

Some common examples of plagiarism are:

- Copying word for word (i.e. quoting directly) from an oral, printed, or electronic source without proper attribution.
- Paraphrasing without proper attribution, i.e., presenting in one's own words another person's written words or ideas as if they were one's own.

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- Submitting a purchased or downloaded term paper or other materials to satisfy a course requirement.
- Incorporating into one's work graphs, drawings, photographs, diagrams, tables, spreadsheets, computer programs, or other nontextual material from other sources without proper attribution.

If you have questions about how to appropriately cite references, how to quote and paraphrase authors, or what is acceptable in terms of working with other teachers, please ask us!

Remark: This document is adapted, with some modifications, from Mike Beals' wording of the syllabus for Number, Operation, and Algebra. Most of this syllabus is quoted directly from that of the NOA course.

Grades

We recognize that teacher-participants are drawn from different grade levels, have different teaching certificates, and different educational backgrounds. Thus, we believe it is appropriate to have an assessment system that, in addition to mathematical knowledge, values effort, teamwork, progress in learning mathematics, and the development of mathematical understanding and mathematical communication skill.

Grade	***Evaluation:*** **Expectations, characteristics of achievement at that level**
A	*Very, very good:* Excellent understanding of material. Regular attendance and active participation in class work. Work going beyond minimum expectations on work in class. Good communication skills in presentations and written work.
B+	*Very good:* Progress in deepening understanding and improving communication. Regular class attendance, active participation. Helpfulness and support for colleagues. Timely completion of work.
B	*Good:* Shows effort to understand, learn, and communicate mathematics. Regular class attendance. Reasonable participation in class. Cooperation with peers. Completes most work on time.
C, C+	*Fair:* (We don't expect to use these grades.) These grades count towards completing the Institute and toward the Middle Grades Math Specialization, but will not count toward a masters degree. It may reflect insufficient progress in mastering course material due to any of the following: irregular attendance; insufficient effort to improve understanding; poor communication skills; assignments often incomplete, late, or missing.

Display your professionalism

- Show a positive attitude
- Be a team player – mathematics need not be a competitive sport – work in groups
- Be an active participant – mathematics should not be a spectator sport
- Attend daily, be punctual
- Be committed, take your work seriously
- Be/become a "risk taker" – offer suggestions and conjectures even if you aren't sure
- Improve yourself as a mathematician; be willing to learn more

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- Help others – if you know the mathematics being studied, practice your mentoring skills
- Work to the best of your ability
- Celebrate your colleagues' learning
- Be patient with yourself – there is a time delay between exposure to new ideas and the ownership of those ideas, and that time delay will vary from person to person
- Complete evaluation forms to help us improve the Institute

Directions for writing up problem solutions

- Write on one side only. Put your name on each page. Number pages. Maintain at least a one-inch margin on all four sides. You may use pencil, pen, or a word processor.

- Your write-ups to turn in, both the assigned workshop problems and the final assessment problems, should be professional, not a first draft. Edit carefully for correct spelling and grammar. We prefer to read typed material, but we will read neat hand-written work. You can type the words and enter symbols and diagrams by hand if your computer won't do that kind of thing easily.

- Start each new problem or big part of a problem on the top of a new page. Begin by stating the problem. The reader should not have to search back to an assignment sheet or handout. You may want to use the caption "Task" to show that you are stating your problem.

- Usually the problem asks for a piece of mathematical "work" and then asks for an explanation or a justification. If there is some kind of result (other than the explanation or justification) use the caption "Result" to help the reader find your result. Then use the caption "Explanation" or "Justification" to indicate the start of that part of your work.

- The solution should be a self-contained exposition with enough detail to be explanatory to another participant in this course.

- Include diagrams or graphs if these will help the reader follow the work. Include special cases if that will help. Lay out your computations and your reasoning clearly. Where your work relies on results already discussed in this course, be sure to cite them. You do not need to cite reasons for basic arithmetic.

- We welcome any questions or concerns as an optional, additional part of your report.

- Keep in mind that there is no set length for the write-ups, but they should address the bullet points above.

- If you submit your final assessment electronically, it must be by uploading a document to the Sakai Dropbox, not by emailing an attachment! Moreover, the document must be in one of the formats .doc, .docx, .pdf, or .jpg.

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The Course Notebook

Your 3-ring binder can be used to create a **course notebook** that you can reference after you leave the Institute**.** We hope that your notebook will provide documentation of your work and intellectual growth as a participant in the NJPEMSM Institute. We suggest that your notebook include your notes for the course, handouts from exposition or classroom connections, and solutions to problems on which you have worked. The wrap-up session at the end of the day can be used to clarify your notes from earlier sessions and write complete versions of your mathematical solutions. Some of these solutions may be turned in to "final drafts" that you can use for presentations or workshop assignments. The remaining solutions can be a valuable reference for you both as you work on the Final Assessment and after you leave this course. The goal is to provide you with a complete set of notes and solutions that you could read and understand for years to come.

In your notebook, you may also include personal reflections on the mathematical skills and concepts that are clear to you and those which may still be confusing. These can remind you of questions that you may want to ask the following day or later in the course. You may also wish to reflect on any fresh insights or ideas for teaching that you received from working on the problems. These daily reflections are for your reference, and we will not read them. However, you may find them helpful for preparing the Final Reflection that is due at the end of the course.

Textbooks and References

We will not use a textbook. Materials will be posted on the Sakai website, and paper copies will be handed out when possible. Supplementary resources have been posted on Sakai, and more may be posted during the two weeks of the course. Much inspiration is drawn from Sybilla Beckmann's *Mathematics for Elementary Teachers*, the NCTM-published *Navigating Through Data Analysis: Grades 6-8*, and materials developed over the years here at Rutgers for the pre-service course Math 104: Introduction to Probability.

Disclaimer: Details described above are subject to change as practical and pedagogic needs dictate. This applies in particular to the logistics of workshop problems and their oral and written presentations.