

## Elements of Mathematics III: Probability, Statistics & Problem Solving

Dr. Barry Spieler

### Class Meetings

\_\_\_\_\_ in room HT-204, Germantown Campus

### Instructor

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Office: HT-220 | Mailbox in HT-314

Student Help Hours: \_\_\_\_\_ Other times and online meetings available by request.

### Administrative Deadlines

Last Day to Drop with Refund: \_\_\_\_\_

Last Day to Drop with No Grade; Change Audit/Credit: \_\_\_\_\_

Last Day to Withdraw with Grade of W: \_\_\_\_\_

Final Exam: \_\_\_\_\_

### Catalog Description

This course covers descriptive statistics, sampling, standardized tests, basic probability, counting techniques, expectations, and problem solving in a variety of settings. Intended for elementary education majors, this course is also suitable for parents of school-age children. 4 semester hours.

*Prerequisite:* A grade of C or better in MATH 131, or consent of department.

### General Education

This course fulfills the Mathematics Foundation requirement for General Education (MATF).

**Course Philosophy:** This is a course in mathematical content, not in teaching methods. That said, I will try to model some techniques and principles that will hopefully prove helpful to you as you work and play with children who are learning mathematics. Some general guiding principles of the course will be:

- Mathematics is about sense-making, not memorization. Therefore, you should not consider your professor or a textbook to be the source of mathematical authority. Rather, a compelling, logical argument should be what convinces you that something is right.
- No one single (logically sound) way to solve a problem is any more correct than another. Therefore, be open to new ways of thinking about old problems, and don't give up on a method that seems to work for you unless you find out otherwise.
- The best teachers understand how people learn new things. Therefore, pay close attention to how you conceptualize a problem, gather evidence, and build strategies to solve it. This mirror on yourself is your best example as you develop an understanding of how people learn mathematics.

### **Course Outcomes**

During this course you will:

- Construct and interpret displays of data.
- Analyze misleading statistics.
- Compute, interpret, and apply measures of center and spread.
- Choose among representations and summary statistics to communicate information.
- Evaluate methods of collecting data for possible bias.
- Compute and interpret experimental and theoretical probabilities using sample spaces, tables, tree diagrams, and simulations.
- Solve problems that involve the Fundamental Counting Principle, permutations, or combinations.
- Compute and interpret experimental and theoretical probabilities using sample spaces, tables, tree diagrams, and simulations.
- Find and interpret expected values in insurance plans and games.
- Use a variety of strategies to solve problems, and reflect on the choice of strategies.
- Apply knowledge of number systems, sets, geometry, algebra, statistics, and probability to solve a variety of problems.
- Gain appreciation for mathematics as a means of empowering both children and adults to make sense of, and make critical judgments about the numerical information (and misinformation) they will encounter as citizens.

## Required Materials & Supplies

- **Mathematics for Elementary Teachers with Activities 5/e**, by S. Beckmann, Loose-Leaf Version Plus *MyLab Math* -- Access Card Package (Pearson). ISBN: 0134800192. Our class MyLab code is **spielerXXXXXX**. Includes a full ebook of the Beckmann text and activities. Registration information can be found at <https://registration.mypearson.com/>

*\*Note: if you have previously purchased the Beckmann book and MyLab access code for Math 130 or Math 131, you do not need to purchase the code again; your login credentials will still work for this course.*

- **Crossing the River with Dogs 2/e**, by Johnson, Herr & Kysh (Wiley, 2012). ISBN: 9780470464731
- **Calculator:** A scientific or graphing calculator (TI-84+ preferred) is required for this course. If you don't have access to one for the semester, you can borrow one for the term at the MAPEL Center in HT-229. There is a TI-84+ emulator on each computer desktop in the classroom for convenience.
- Supplementary material from **Mathematics for Teachers: An Interactive Approach for Grades K-8**, by T. Son nabend (Cengage), will be provided free of charge.

## Approximate Calendar (Tentative!)

Dates	Sections	Content
	Beckmann, Ch. 15 Son nabend, §12.5	Statistics
2/14	Test 1	
	Beckmann, Ch. 16 Son nabend, §13.2 – §13.3	Probability
3/21	Test 2	
	Johnson, Ch. 1,3,5,6,7	Problem-Solving
4/30	Test 3	
	Johnson, Ch. 8,12 Review	
5/7	Final Exam 5:00-7:00 PM	

## Content Elements

- Statistical questions
- Random sampling
- Structure and types of data
- Graphical and numerical summaries of data
- Measures of center and variability
- Normal distributions and the Empirical Rule
- Percentiles
- Basic probability principles and simulations
- Probability of compound events
- Counting outcomes
- Counting permutations and combinations to compute probabilities
- Problem-Solving strategies and techniques

## Assessment

- **Classwork/Written Work:** You will be asked to engage in group and/or individual activities throughout the semester, some of which may result in written work to be submitted. No late work will be accepted, and students absent during the activity will not have opportunity to make up that grade.
- **Online Homework:** Regular practice homework assignments will be found in *MyLab Math*. You will complete these assignments by the specified due dates; no deadline extensions will be made. While you will enter your answers to the homework online within *MyLab Math*, you are not expected to do them in your head! You will benefit from working through the problems and keeping your work in a homework notebook.
- **Presentations/Participation:** I will frequently randomly select a student to present solutions to homework or in-class problems. If you are absent on the day your name is randomly called for a presentation, your name will go back into the queue to be called again. I will assess your cooperative engagement in the activities, presentations, and participation in the discussion. Each day I will record a participation grade. If you are late, absent, and/or don't contribute to the group, you will not receive credit for the day.
- **Tests & Exam:** You will have four in-class tests and a two-hour cumulative final exam. Attendance during all tests and exams is mandatory. Make-up tests will, in general, not be given. However, in the case of a documented emergency, notify me prior to end of the test period for consideration of a make-up. This should only be necessary in extreme circumstances.
- **Course Grades:** Your numerical score will be determined as follows:

<u>Assessment</u>	<u>Weight</u>
Tests & Quizzes	45 pts.
Final Exam	25 pts.
HW in <i>MyLab Math</i>	10 pts.
Classwork & Participation	10 pts.
<u>Presentations</u>	<u>10 pts.</u>

**Total**

**100 pts.**

Course grades are then assigned as follows:

<b>Numerical Score</b>	<b>Letter Grade</b>
At least 90	A
At least 80 but below 90	B
At least 70 but below 80	C
At least 60 but below 70	D
Below 60	F

In order to protect your privacy, grades will not be given out via email or phone. Course grades will be posted on MyMC as soon as they are known. Do not consider grade information in Blackboard or *MyLab Math* to be an accurate assessment of your current grade in the class! If you wish to know more about your progress at any point, please ask.

#### **Student Email & Blackboard Use**

MC Email is the predominant venue for communication between student and instructor. You are expected to check your MC email at least daily. When contacting me, I prefer that you email me from your MC email account whenever possible. Please write your email messages in a style appropriate for professional communication; email between you and your professor is subject to a different set of norms than text messages between friends! Always identify yourself, reference this course, and if you ask a question or make a request, check back for a response in a timely manner.

Similarly, you are expected to login to the course Blackboard site at least daily to see if there are any new postings or updates. I will post frequent summaries and assignment information on this site with the expectation that you will see and act on them within a day of my posting them.

#### **Classroom Policies**

*Take Ownership.* My job is to help you learn, and I will try to do so creatively and enthusiastically. But the responsibility for learning is yours. Learning new concepts can be difficult, and it is impossible to do without time, energy, and struggle, no matter how helpful your professor is! You are expected to take responsibility for your own learning.

*Attend & Participate.* You are expected to attend and participate in all class meetings. Asking questions, contributing to discussions, and respectfully listening to classmates are examples of ways to contribute positively. Absence, being inattentive, and dominating the conversation are not. If you do have to miss a class meeting, you are still responsible for all assignments, announcements, and content discussed in your absence, so please make arrangements accordingly. Getting notes will definitely not adequately substitute for your presence in class. If you are late to class, please come in as discreetly as you can so as not to be disruptive; however, I will not be able to accommodate you with extra time to complete in-class work or tests.

*Keep Informed.* Instructions for assignments, class handouts, and important announcements will be posted our course Blackboard site. The homework problems themselves and the ebook readings will be found in MyLab Math. It is the student's responsibility to check Blackboard and MyLab Math frequently for the most up-to-date information, and read their MC email. If you have difficulty accessing Blackboard, email or other College-supported technologies, call the Montgomery College IT Service Desk at 240-567-7222.

*Academic Honesty:* All students are expected to achieve their goals with academic honor. Cheating, plagiarism, and/or other forms of academic dishonesty or misconduct, examples of which can be found in the Student Code of Conduct, will not be tolerated. Any student found to be cheating on any graded work for this class will receive zero credit for the assignment, and, at my discretion, a failing course grade. Students are strongly encouraged to work and study together, but any work submitted for a grade should be the student's own work in the student's own words, and should not be identical to another student's work. I reserve the right to ask for explanation of any submitted work, and may take the quality of the explanation into account when assigning a grade.

*Classroom Conduct:* Students are expected to adhere to the Student Code of Conduct. As a community of people with common learning goals, we will benefit from an atmosphere of collegiality and mutual respect. You are expected to act in a way that promotes this atmosphere. This includes contributing meaningfully to discussions and listening thoughtfully to others' contributions. It also includes avoiding disruptive, distracting, or disrespectful behaviors such as eating, using phones, wearing headphones, etc. Please turn off phones and other devices that make noise or might distract you, your colleagues, or your professor. Texting during class is rude. Silence your phone and put it away during class.

*Accommodations:* If you have a disability or other condition requiring an accommodation, please contact me during the first week of class. In order to receive accommodations, you will need to obtain a letter from Disability Support Services (SA189, 240-567-7770).

*Auditing:* Students auditing the class are expected to attend regularly and participate in discussions; those who do not may be dropped. Auditing students may take tests, but are not required to do so.

## **Getting Help**

There are many resources that can help you to be successful in this course. You will need to attend class and participate actively, work hard, and do practice and homework problems on your own. In addition, you can do the following:

- Ask (and answer) questions in class!
- Attend my office hours or make an appointment to talk with me
- Send me email. Be specific!
- Meet with classmates outside of class for study groups
- Visit the MAPEL Center (HT 229). They offer free one-on-one tutoring. For hours, go to <http://www.montgomerycollege.edu/Departments/mathlclgt/index.html>
- Consult the many online resources available

- Get help from friends & colleagues

### **Note on Responsibility**

This is a college level course. The responsibility for learning is yours. Tests will include problems that require students to apply principles and concepts. While some exam questions will “look like homework questions,” others will not. It is expected that you will demonstrate your ability to synthesize skills and concepts covered throughout the course by applying those skills and concepts to new problems. You can best prepare yourself for such questions by doing a great variety of problems and studying and discussing the reasoning behind your solutions.

Memorization will not be a successful strategy for most of this course. Get in the practice of writing clear, concise explanations of each step of your work to earn full credit on assignments and tests.

### **Changes to this Syllabus**

This syllabus is tentative. I reserve the right to make changes to the content herein as the semester continues. Any changes will be published on our Blackboard site and announced in class.

### **Important Student Information Link**

In addition to course requirements and objectives that are in this syllabus, Montgomery College has information on its web site to assist you in having a successful experience both inside and outside of the classroom. It is important that you read and understand this information. The link below provides information and other resources to areas that pertain to the following: student behavior (student code of conduct), student e-mail, the tobacco free policy, withdraw and refund dates, disability support services, veteran services, how to access information on delayed openings and closings, how to register for the Montgomery College alert System, and finally, how closings and delays can impact your classes. If you have any questions please bring them to your professor. As rules and regulations change they will be updated and you will be able to access them through the link. If any student would like a written copy of these policies and procedures, the professor would be happy to provide them. By registering for this class and staying in this class, you are indicating that you acknowledge and accept these policies.

<http://cms.montgomerycollege.edu/mcsyllabus/>