

Math 117: "Elementary Mathematics"

Instructor: Carol Castellon

Office Hours: 1-2 M, 10-11 Th 121 Altgeld

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Lab SectionsSection **AB1**: 3-4:40 M, 14 Illini Hall

TA: O-Yeat Chan

E-mail: ochan@uiuc.eduSection **AB2**: 1-2:40 W, 14 Illini Hall

TA: Chunlin Wang

E-mail: cwang13@math.uiuc.eduLab SectionsSection **AB3**: 11-12:40 T, 14 Illini Hall

TA: Rosona Eldred

E-mail: reldred2@uiuc.eduSection **AB4**: 2-3:40 Th, 14 Illini Hall

TA: O-Yeat Chan

E-mail: ochan@uiuc.edu**INTENT and PURPOSES of Mathematics 117**

From UIUC Course Catalog: "Analyses the mathematical issues and methodology underlying elementary mathematics in grades 6-8. Topics include the Real number system and field axioms, sequences and series, functions and math modeling with technology, Euclidean and non-Euclidean geometry, probability and statistics. Priority registration will be given to students enrolled in teacher education programs leading to certification in elementary education."

Additional Goal: The course is designed as one of two math content courses for pre-service teachers. To reach this goal, you will be required to: 1) create and maintain a notebook containing topic information, materials, activities, and worksheets aligned with the State Learning Standards; 2) become familiar with the State Learning Standards (a copy will be provided); 3) write 2 papers related to middle school math curriculum; 4) attend and actively participate in all labs.

Required Materials:

Mathematics for Elementary School Teachers, Billstein, et.al. 8th edition. 2004 (*note: this text is required in both Math 103 and Math 117, and is packaged with Geometer's Sketchpad software, required for Math 117*)

Learning Mathematics in Elementary and Middle Schools, Cathcart, et.al, 4th edition. 2006

Calculator: TI-83 Plus or TI-84

3-ring binder: 2 or 3 inch, and **dividers for binder**; can use same binder in Math 103

metric/English Ruler

compass: Safe-T compass will be some available in lecture for you to purchase

graph Paper

scissors

GRADING POLICY: Your final course grade is weighted using the following measures:

5%	Attendance (2.5% lab and 2.5% lecture)
20%	Unit Test 1
20%	Unit Test 2
5%	Notebook
10%	Papers (<i>paper 1 = 5%, paper 2 = 5%</i>)
7.5%	Lab participation
7.5%	Homework
25%	Final Exam

The following scale will be used to determine final letter grades. Please note that these are firm cut-offs for determining final grades. No rounding will occur in borderline situations -- for example, a 70 is the lowest C; a percentage of 69.9 is a D+. (Note that the .9 is not .9 repeating):

A+ = 98.0 - 100+	B+ = 88.0 - 89.9	C+ = 78.0 - 79.9	D+ = 68.0 - 69.9	
A = 93.0 - 97.9	B = 83.0 - 87.9	C = 73.0 - 77.9	D = 63.0 - 67.9	F = below 60
A- = 90.0 - 92.9	B- = 80.0 - 82.9	C- = 70.0 - 72.9	D- = 60.0 - 62.9	

ATTENDANCE is REQUIRED in both lecture and lab and constitutes 5% of your final grade.

LECTURE (1 point/lecture)

LAB (1 point/lab)

Perfect attendance = 14 points

Perfect attendance = 14 points

You lose one point for each absence or for leaving early (before class has ended). More than two (2) absences in either lab or lecture constitutes a 0% attendance grade, regardless of excused absences. An "ex" will be entered for an excused absence up to a maximum of two.

NOTEBOOK: You will compile a math resource notebook for middle school grades 5 - 8 that will be useful when you begin teaching. Organize your notebook into topics, i.e., geometry, functions, etc., to follow topics from each unit, or you may choose to organize into grade levels, or any other scheme you feel would be useful to you as a teacher. Use section dividers clearly labeled. When you are given papers for your notebook, put them in an appropriate section. Put a table of contents in the front of the notebook. You may choose to insert your class notes into the sections, but not required. Put a cover/title on the notebook that identifies it as a math resource made by you. A maximum of 0.25% extra credit may be earned for a really great cover. Your notebook will be evaluated on or before the Final Exam and graded for organization and completeness, and constitutes 5% of the course grade.

PAPERS: You will be required to write two papers during the semester. Each paper constitutes 5% of the course grade. The papers will be evaluated by your TA and/or myself, must meet a required format, and your source must be cited if not original. Failure to cite a source will result in an F grade in the course. If papers are obviously copied from other students, the points will be divided. In lecture, you will be given specific requirements for each paper. Grading rubrics for each paper are on the course website. Please note the due dates for each paper in the course syllabus.

Paper #1 required: Geometry Paper (5% of course grade) Select one of the following topics:

- 1) Create an original construction using straightedge and compass.
- 2) Verify the existence of the Golden Ratio. (examples will be shown in lecture)
- 3) Create polyhedron models (if you make Platonic solids, you must do all 5)

Paper #2 required: Function Paper (5% of course grade) Required topic:

Get a picture or drawing and determine the specific functions that constitute the picture.

Paper #3 optional: Technology Paper (may replace grade from paper #1 or #2 or may be used for extra credit) Select one of the following:

- 1) Find a probability activity on the Internet and write a report on the site and the activity.
- 2) Create a Geometer's Sketch Pad file for an activity of your choice; must be original. You must turn in the GSP file on a floppy disk.
- 3) Write a web page for a math topic. You must turn in the html files on a floppy disk.
- 4) Write an classroom activity using the TI-83. You may "individualize" an activity from the TI website.

LAB PARTICIPATION: Lab activities include participation in group discussion and activities, graphing calculator and CBL data gathering experiments, problem-solving activities. At least once during the semester, you will be given a group evaluation form to complete confidentially which will allow you to evaluate the participation of other members of your group. Your lab participation grade will be based on input from this form, observations on the quality of your participation by your TA, plus lab activity papers you must complete and turn in after each lab. Your TA can give you suggestions to improve your grade in lab; however, their decision about your lab participation grade is final. You must complete a minimum of 12 lab activities; if you miss more than 12 labs, you will be required to make up missed labs for reduced points. The lab participation grade constitutes 7.5% of your course grade.

LECTURE & LAB HANDOUTS: Any extra copies of handouts are placed on the shelving outside 121 Altgeld. Lecture notes may be downloaded from the course webpage. Copies of the Illinois Learning Standards and the Illinois Teaching Standards are also on the shelving outside 121 Altgeld.

HOMEWORK: Readings and problems will be assigned each week. It is *strongly* suggested that you carefully read the text material in the section where the problems are assigned BEFORE working any problems. Complete all of the problems even though some may seem unrelated to the class material. Many of the suggested problems complement the lecture and labs, but some will supplement the discussions and provide one more way for you to become competent with the material. Homework assignments are not graded in entirety, but a homework check will be given weekly, and constitutes 7.5% of your course grade. TA's decide how they will do the homework check. The intent of the homework check is to encourage students to complete the homework sets on time. A teacher's edition of the text with solutions is available in the Math Library; a student resource book containing solutions is available for purchase; answers to homework problems are posted on the course website; and the 24-hour tutor line is available with a new text purchase. You may make up a maximum of 2 homework checks for excused absences only.

TESTS and ABSENCES: In the event that you miss a TEST for a valid and verifiable reason, the instructor (Carol Castellon) must be notified ***in advance*** by a phone call to my office or at home (answering machine will **always** take messages). Failure to notify me ***in advance*** constitutes acceptance of a **zero** for that test. In the event that approval is given for you to make up a test, you must make an appointment to do the make-up within 3 days from the time it is held. Any exception to the 3-day time limit must be cleared in person or speaking to **me** (not the TA) directly (not through messages from a secretary). Only in rare cases will you be allowed more than one make-up. Make-up tests will be substantially different from the original test. I reserve the option to give the make-up test at the same time as the final exam. Each unit test is 20% of your course grade. A note from the Emergency Dean is required for excused absences.

EXTRA CREDIT: A maximum of 2% toward the overall course grade can be earned by extra credit. Extra credit can be earned from: 0.25% on the notebook; 1.5% for submitting the optional paper #3; and 0.25% on the papers #1 & 2. The intent of extra credit is to allow you to get your grade above a borderline grade. Because extra credit is available, course grades are **not** rounded up.

FINAL EXAM: The Math Dept. requires a final exam in this course. Conflict Exams must be approved by the Assoc. Chair of the Math Dept., Dr. Muncaster. The final exam constitutes 25% of the course grade.

ACADEMIC INTEGRITY: This course adheres strictly to the University's policy on Academic Integrity, Code of Policies and Regulations Applying to All Students, Section 33.

JAMES SCHOLAR: You will be required to observe a math class in University Laboratory High School, and write an observation report. Please send me email and I will respond explaining how to arrange the observation.

MATH 117 COURSE SYLLABUS: This course syllabus ***does not*** allow time to discuss the homework problems at each class meeting. You are encouraged NOT to rely on in-class discussion of these problems, but instead, to work with a partner or group, attend ALL LABS and to take advantage of our office hours. We want to meet with you and work one-to-one if this will benefit you. *If our hours conflict with other classes for you, consult with us about meeting with us at other times.* It is your responsibility to attend all classes to make sure that you are informed of any changes in this syllabus.

UNIT 1

- January 17 Lecture #1: Course Info, Problem Solving & Polya, Venn Diagrams
 * Read course syllabus; check out course website
 * Read sections 1-1, 1-2, 1-3 in the Billstein text
 * Read pp 40-51 in the Cathcart text
 • Homework set #1: p 15 # 2,3,7,8,10,13,15,16,20,21,23,32
 p 32 # 6,8,12,14,17,21,23,26
 p 45 #10,14
 Lab #1: Problem-Solving in groups
- January 24 Lecture #2: Truth Tables, Logic, Sequences and Series
 * Read sections 1-4, 2-1, 2-2 in the Billstein text
 • Homework set #2: p 54 #2ad,4ag,5,6,7fi, 9cd,10,11a,12,13,18,19
 p 82 #10,19,20,22,24
 p 95 #12b
 p 200 #18
 p 212 #24
 logic and sequences worksheets
 Lab #2: Attribute Blocks; homework check on homework set #1
- January 31 Lecture #3: Axiomatic Systems, Pythagorean Theorem, Geometry in 3-dimensions
 * Read sections 9-1, 9-2, 9-3, 9-4 in the Billstein text
 * Read pp 290-302 in Cathcart text
 • Homework set #3: p 509 # 2,3,4,7cd,9b,18
 p 520 # 5efgh,9,18
 p 530 # 5a,8,9,10,11ac,13-16,24
 p 541 # 1,4,5,8,10,13,14,15,17,20,21,22
 Lab #3: Geoboards & dot paper; homework check on homework set #2
- February 7 Lecture #4: Geometry Constructions, Congruence, Similarity, Proofs, GSP software
 * Read sections 10-1, 10-2, 10-3, 10-4 in the Billstein text
 • Homework set #4: p 574 #2,4,7,11,12,14,22,30
 p 580 #5,17,20,23,25
 p 591 #4,8,10,11,16,17,20
 p 604 #8,9,10,13,16,17a
 constructions using Geometer's Sketchpad
 Lab #4: constructions using protractor and straight-edge; homework check on hw set #3
- February 14 Lecture #5: Area, Perimeter, Volumes, Surface Area
 * Read sections 11-2, 11-3, 11-4, 11-5 in the Billstein text
 * Read pp 330-340 in the Cathcart text
 • Homework set #5: p 655 #19,20,26,29
 p 672 #7,8,9ac,10ce,15ab,18,20,24,25,29
 p 688 #1,2abc,5ab,12a,19,21,24
 p 699 #1,5,8,11,12,14,18
 p 721 #5,10,16,22,25,26,29,34
 Lab #5: Volumes Lab; homework check on homework set #4
Paper #1 due on or before Friday, February 17, by 3:00 p.m. in 121 Altgeld
- February 21 Lecture #6: **Unit 1 EXAM**
 Please seat yourself in every other seat. Bring your calculator, ruler, protractor.
 Lab #6: Taxicab Geometry Lab; homework check on homework set #5

UNIT 2

- February 28 Lecture #7: Intro to the TI-83; Math Modeling with Linear Functions
 * Read p 450-451 "scatterplots" in the Billstein text,
 * Read section 2-5 in the Billstein text
 • Homework set #7: p 123 #2,4,8,12,18,21,27,34
 p 456 #21,22

- p 636 #1,2,5,6,10,13,25
calculator & linear problems worksheet
Lab #7: TI-83 worksheet; CBL "Pennies"; no homework check
- March 7 Lecture #8: Math Modeling with Quadratic Functions; Inverse Variation
* Read pp 407-413 in the Cathcart text
* Read sections 5-4 and 10-4 in the Billstein text
• Homework set #8: p 311 #2,13,21,24,27
p 604 #12,13,14,16
quadratic problems worksheet
inverse variation problems worksheet
Lab #8: CBL "Function Walk"; homework check on homework set #7
- March 14 Lecture #9: Exponential Function Models
• Homework set #9: exponential problems worksheet
Lab #9: CBL "Chill Out"; homework check on homework set #8
- March 21 No class; Spring Break
- March 28 Lecture #10: Trig Models
• Homework set #10: trig function worksheet
Lab #10: CBL "TUNE"; homework check on homework set #9
Paper #2 due on or before Friday, March 31 by 3:00 p.m. in 121 Altgeld
- April 4 Lecture #11: **Unit 2 EXAM**
Please seat yourself in every other seat. Bring your calculator.
Lab #11: Spherical Lab; homework check on homework set #10

UNIT 3

- April 11 Lecture #12; Probability; Binomial Experiments
* Read chapter 7 in the Billstein text
* Read pp 369-275 in the Cathcart text
• Homework set #12: p 384 # 5,6,10,22
p 401 # 2,6,7,8,18,26,28
p 411 # 2,6,9a
p 421 # 3,6,13,14,17
p 431 # 3,5,18,20,22,23
probability worksheet
Lab #12: using the TI-83 to simulate probability distributions; no homework check
- April 18 Lecture #13: Algebraic Reform
* Read p 41-44 in the Billstein text
* Read chapter 17 in the Cathcart text
• Problem set #13: p 108 #13
Lab #13: Algebra tiles; homework check on homework set #12
- April 25 Lecture #14: Metrics, Exact vs. Approx., Precision; Bar Codes; course evaluation
* Read section 11-1 & 11-5 in the Billstein text
• Homework set #14: p 655 # 1,4,7,9,10,11,16
p 721 #1,2,4,7,36-43
Lab #14: Metric Lab; Bar Codes handout; homework check on homework set #13
Paper #3 due on or before Friday, April 28 by 3:00 p.m. in 121 Altgeld
- May 2 Lecture #15: Review for Final Exam; attendance optional

Final Exam Thursday, May 11 1:30-4:30 PM 119 MSEB

Please seat yourself in every other seat. Bring your calculator; there are no loaners.
Bring your notebook to be checked while you take the final; pick it up as you leave.