

Math 103: "Theory of Arithmetic"

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Office Hours: 9-10am(W), 1:30-3pm (Th) 121 Altgeld

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Course Web Page: <http://www.math.uiuc.edu/~purkayas/math103>Lab SectionsSection **AB1**: 11:00am-12:40pm, W 14 Illini HallSection **AB2**: 3-4:40pm W, 14 Illini Hall

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Section **AB3**: 1:00 – 2:40pm Th, 14 Illini HallSection **AB4**: 4-5:40pm Th, 14 Illini Hall

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INTENT and PURPOSES of Math 103

From the UIUC Course Catalog: "Analyses the mathematical issues and methodology underlying elementary mathematics in grades K-5. Topics include sets, arithmetic algorithms, elementary number theory, rational and irrational numbers, measurement, and probability. There is an emphasis on problem solving. Priority registration will be given to students enrolled in teacher education programs leading to certification in elementary or childhood education."

Goals:

- To understand the mathematical ideas needed to provide a solid foundation for elementary students.
- To understand how the mathematical ideas connect to the "real world" and to other areas of study.
- [To analyze the pedagogical structures that teachers can use to teach the math to K-5 students of different learning styles.]
- To understand how to assess students in a mathematics classroom. Also, to understand the state and national assessment standards.

Objectives:

1. Develop a curriculum resource notebook containing topic information, materials, activities, and worksheets aligned with the Illinois State Learning Standards and apply the ISAT rubric to all materials.
2. Become familiar with the State Learning Standards and the National Standards.
3. **Attend and actively participate in all labs and attend all lectures.**
4. Learn to use the ISAT rubric

Required Materials:

Mathematics for Elementary School Teachers, by Bennett and Nelson. 7th edition. 2006. (note: the text is required in both Math 103 and Math 117. It is packaged with a manipulative packet to use in the labs.)

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

Calculator: *Use of a calculator is encouraged during class, on homework and on exams. Note: the TI-83 plus or TI-84 can be used in both Math 103 and Math 117.*

**3-ring binder, 2 or 3 inch, and dividers for binder
metric/English Ruler
scissors**

GRADING POLICY: Your final course grade is based on the following measures:

- 5 % Attendance (2.5% lab and 2.5% lecture)
- 20% Unit Test 1
- 20% Unit Test 2
- 5% Notebook
- 15% Papers (each paper 5%)
- 5% Lab participation
- 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 60.0
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 pre-k through grade 6 that will be useful when you begin teaching. Organize your notebook into topics, i.e., whole numbers, fractions, etc., to follow topics from each unit, or into grade levels, or any other scheme that 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 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: Three papers are required. The first two papers are lesson plans suitable for use in an elementary class. These lesson plans will be evaluated by your TA and/or myself. The lesson plans 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. Each paper is 5% of your course grade. The due date for your papers is listed in the syllabus.

Format/Requirements for papers 1 & 2: Each lesson plan you write must include the following information in the following order. Failure to meet all of the requirements will result in a reduced grade.

- 1) Educational/Instructional Goal clearly stated? (*Clearly state the intended goal or learning outcome of the activity, preferably in your own words*)
- 2) Approximate grade-level stated? (*State the intended grade level range and type of student - gifted, special ed - if appropriate*)
- 3) Tied to Illinois Learning Standard? (*State the Illinois Learning Goal, Standard, and Benchmark that is met with this activity*)
- 4) Source/Resource cited? (*Cite the source: text title and ISBN, Internet URL and author, practicing teacher's name and school, or your name if original: original = unique lesson idea, not previously published or used anywhere. Original = +0.25% extra credit points; writing a worksheet does not constitute extra credit.*)
- 5) Supply list included? (*List the materials/aids/manipulatives needed to complete the activity*)
- 6) Description of the activity and instructions for Teacher? (*Completely describe the activity and provide clear instructions for the teacher along with answer key*)
- 7) Copy of worksheet (if applicable) and example of a student response? (*Make sure there are instructions for students, and a provide a typical student response with comments to alert teachers for problems or grading*)
- 8) Evaluation instrument included? (*Provide an evaluation tool for the activity, which could be a quiz, follow-up questions, homework assignment, etc.. The tool should be appropriate for the intended grade level for which student progress/understanding can be assessed. The evaluation instrument should not be the activity itself.*)
- 9) Assessment rubric included? (*Provide either an adaptation of the State Rubric or one you created for assessing the student results of the evaluation instrument. The rubric should make sense for the activity.*)
- 10) Paper turned in on due date?

Topics for paper #1: (choose one or a topic of your choice approved by me): Problem-solving, Venn diagrams, +, -, x, or ÷, estimation, mental math, signed numbers, divisibility, primes, rational or irrational numbers, ratio or proportions.

Topics for paper #2: (choose one, or a topic of your choice approved by me) Algebraic thinking, functions, probability, statistics geometry, polygons, angles, similarity, area, tessellations, metrics.

Papers evaluation: During lab, your group will read, evaluate and offer suggestions for improvement of your paper, and you will be given the opportunity to edit and improve your paper before it is graded using the grading rubric (stated above as well as on the course website). Papers that are selected for everyone's notebook receive the highest grades. Minimal credit will be given to papers that are merely copied from a source without individualizing. If papers are obviously copied from other students, the points will be reduced by at least 50%. TA's may give 0.25% extra credit for exceptional papers, however, this must be approved by the instructor.

Topics for paper #3: The third required paper must be from one of these choices: 1) create an original Escher-type tessellation, or 2) write a book report on an elementary library book with math content (check the list of approved books on the course website), or 3) evaluate a math website. Check the rubric for these choices to maximize your points (no extra credit for choice 3).

LAB PARTICIPATION: Lab activities include participation in group discussion and activities including manipulatives, and possible evaluation of activities/lessons using the ISAT rubric. 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 as well as 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 5% of your course grade.

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 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 (Sue Purkayastha) must be notified *in advance* by a phone call to my office or at home (answering machine will *always* take messages. Plan ahead, the phone maybe tied up with dial up internet use). 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. 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 constitutes 20% 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 Illinois Teaching Standards are also on shelving outside 121 AH.

EXTRA CREDIT: A maximum of 2% toward the overall course grade can be earned by extra credit; the intent of extra credit is to allow you to get your grade above a borderline grade. Extra credit can be earned from: 0.25% on the notebook cover; 0.25% for original work on papers 1 & 2, and for earning more than 10 points on paper 3; and 1.5% for submitting an extra paper. Topic for extra paper: create a bulletin board plan for an elementary math classroom on regular-size paper with a materials list attached.

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 study a unit in an elementary math text and write a report on your research. Please send me email and I will respond explaining the details.

MATH 103 SYLLABUS: This course syllabus *does not* allow time to discuss the assigned 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 you are informed of any changes in this syllabus.*

UNIT 1

- August 29 Lecture #1: Course Info, Problem Solving & Polya, Patterns & Strategies
 * Read course syllabus; check out the course website
 * Read sections 1-1, 1-2, 1-3 in the Bennett text
 * Read chapters 3 and 4 in the Cathcart text
 • Homework set #1: p. 13 #1abc,2,3,7,9,15,19
 p. 30 #1abc,2abc,4abc,7ab,9,12,14,22,23
 p. 49 #5,9ab,10abcd
 Lab #1: ISAT Rubric Training; no homework check
- September 5 Lecture #2: Sets, Venn diagrams, Conceptual Models for $+$ $-$ \times \div of whole numbers
 * Read sections 2-1, 3-2, 3-3, 3-4 in the Bennett text
 * Read chapters 5, 7, & 8 in the Cathcart text
 • Homework set #2: p. 73 #5,6,7,17a
 p. 158 #13,14,19,20,21,23,25abc
 p. 180 #3,4,5a,6a,9a,13abc,45
 p. 203 #1ab,4ab,6ab,7,16,20ab
 Lab #2: Pattern Blocks; homework check on set #1
- September 12 Lecture #3: Numeration Systems, Bases, Mental Math, Estimation
 * Read chapter 3 in the Bennett text
 * Read chapters 6 & 9 in the Cathcart text
 • Homework set #3: p. 138 #3,4,9a,11ab,15,16ab,18,22abc,26,32ab
 p. 158 #31,33abc,36ab,40
 p. 180 #20ab,24ab,26ab,28ab,30ab
 p. 203 #28ab,30abc,32ab
 Lab #3: Base Ten Blocks; hw check on set #2
- September 19 Lecture #4: Divisibility & Primes, LCD, GCF, Integer Ops with Signed Numbers
 * Read chapter 4 and section 5-1 in the Bennett text
 * Read chapter 10 in the Cathcart text
 • Homework set #4: p. 229 #2,4,6abcd,7,8,12,18,20,28abc,31a
 p. 248 #2abc,4abc,6abc,10abc,12abc,14abc,18,28
 p. 276 #1,4,6,8ab,18ab,20abcd,24ab,32,35,36
 Lab #4: Two Color Counters; homework check set #3; Paper #1 due to discuss in lab groups
- September 26 Lecture #5: Real, Rational Numbers, $+$ $-$ \times \div Rational Nos., Fractions, Proportions
 * Read chapter 5 in the Bennett text
 * Read chapter 11 in the Cathcart text
 • Homework set #5: p. 303 #3abc,6ab,12abcd,14abcd,22,24,39
 p. 329 #8,13all,16,24,32,36,46
 Lab #5: Fraction Circles; homework check on set #4; **Paper #1 due in lab 5**
- October 3 Lecture #6: Real, Rational, Irrational numbers, Decimals, Percents
 * Read chapter 6 in the Bennett text
 * Read chapters 12,13 in the Cathcart text
 • Homework set #6: p. 359 #5abcd,8abcd,16,abc,22abcd,23,26abc,30,43
 p. 382 #3abcd,10ab,12abcd,14abcd,16ab,26ab,30

p. 406 #2ab,6,abc,7abc,10abc,12abcd,14abcd,16ab,26ab,30

p. 427 #1abcd,5abcd,8abc,17,21abc

Lab #6: Cuisenaire Rods; homework check on set #5

October 10 Lecture #7: **Unit 1 Test:** Please seat yourself in every other seat. Bring your calculator.
Lab #7: Spinners; homework check on set #6

UNIT 2

October 17 Lecture #8: Probability
* Read chapter 8 in the Bennett text
• Homework set #8:

Lab #8: Dice; no homework check

October 24 Lecture #9: Descriptive Statistics
* Read chapter 7 in the Bennett text
* Read chapter 16 in the Cathcart text
• Homework set #9:

Lab #9: Tangrams; homework check on set #8

October 31 Lecture #10: Intro to Geometry, Polygons, Areas, Angles, Networks
* Read chapter 10 in the Bennett text
* Read chapter 14 in the Cathcart text
• Homework set #10:

Lab #10: Geoboards; homework check on set #9; Paper #2 due to discuss in lab groups

November 7 Lecture #11: Constructions, Congruence, Similarity
* Read chapter 11 in the Bennett text
• Homework set #11:

Lab #11: Myras and Mirrors; homework check on set #10; **Paper #2 due in lab 11**

November 14 Lecture #12: Tessellations, Measurement & metric system, Exact vs. Approximate, Precision
* Read chapters 9 & 10 in the Bennett text
* Read chapter 15 in the Cathcart text
• Homework set #12:

Lab #12: Color Cubes; homework check on set #11

Break

November 28 Lecture #13: **Unit 2 Test:** Please seat yourself in every other seat. Bring calculator & ruler.
Lab #13: Grocery Store Math; "Sir Cumference"; homework check on set #12

December 5 Lecture #14: Algebraic thinking, Functions, math video; Course Evaluation
Lab #14: Transparent Color Chips; no homework check

Paper #3 due on or before Friday, December 8 by 3:00 p.m. in 121 Altgeld**Final Exam Monday, December 11, 2006 1:30- 4:30pm**

Please seat yourself in every other seat. Bring your calculator. Bring your notebook to be checked while you take the final; pick it up as you leave.

PLEASE UNDERSTAND THAT ALL CELL PHONES AND ELECTRONIC DEVICES MUST BE TURNED OFF DURING LABS AND LECTURES. THESE INCLUDE CELL PHONES, EARPHONES, BEEPERS, ETC. YOU WILL NOT BE ALLOWED TO USE CELL PHONES AS CALCULATORS. YOU WILL BE ALLOWED A CALCULATOR ONLY.**THANK YOU.**