MATH 1350
Mathematics for Teacher Certification I

Chair: Allison Sutton aasutton@austincc.edu 223-3294
A full list of the committee can be found at
http://www.austincc.edu/mthdept5/mman06/cdocs/coursecommittees

Notes to Instructors
2006-2007


Computerized Test Bank (0-618-34893-X);

Course Purpose: MATH 1350 is the first semester of a two-semester sequence (1350/1351) designed for prospective elementary or middle school teachers. This course extends the foundational ideas of mathematics so that the prospective teachers (Early Childhood.-8) have an explicit understanding of these concepts. This sequence of courses transfers to UT-Austin as M316K and M316L, to Texas State University as 2311 and 2312, and to other four-year institutions.

Prerequisites: Students in MATH 1350/1351 must have completed College Algebra or its equivalent. This is not a course in basic mathematical skills. Students enrolling in this course are assumed to have basic arithmetic and algebra skills. If not, they should be steered to another course. If a student cannot show proof of having passed College Algebra with a C or better, they can remain in the course by passing the College Algebra Skills Test with a 70% or better (the review sheet is posted at Allison Sutton’s web site, http://www.austincc.edu/aasutton and you can request a copy of the skills test from Allison Sutton, aasutton@austincc.edu). It is important that students check with the institution to which they are transferring. UT does not accept College Algebra, so 1324 or higher might be a better prerequisite for UT, depending upon the student's mathematics background. Also, students are expected to have completed any TSI-mandated remediation in Reading and/or Writing.

Core Curriculum: In 1999, the Texas Higher Education Coordinating Board instituted a new plan to improve the transferability of basic courses. Each institution identifies 42-48 hours of "Core" courses and then those will transfer as a block. This must include a mathematics course, but MATH 1350/1351 were not allowed, because they are considered specialized courses rather than general courses. This should not be a problem for your students, because education majors will take another mathematics course. However, if you have a student in your class who is not an education major, please point this out to them. For more information, see http://www.austincc.edu/mathsci/ and follow the link to the Core Curriculum.

State Guidelines and National Standards: Many organizations are recommending changes in mathematics instruction at all levels K-16. The American Mathematical Association of Two-Year College (AMATYC) recommends that students in their first two years of college should engage in substantial problem solving, expand their mathematical reasoning, and learn to communicate mathematical ideas, in addition to knowing and understanding mathematics content. The National Council of Teachers of Mathematics (NCTM) has recommended similar changes for the K-12 curriculum. Many elementary teachers are not prepared to teach in a manner recommended by NCTM. To assist college instructors in better preparing prospective elementary & middle grade teachers, the Texas Statewide Systemic Initiative Action Team on Strengthening the Mathematical Preparation of Elementary Teachers has issued some guidelines for courses such as MATH 1350/1351. These guidelines address content, instruction and assessment and are a supplement to the brief notes found in this manual.
Committee members listed at the top of this document have copies of these documents and you may download your own copy from the http://www.utdanacenter.org/mathematics/highered/.


**Course Objectives:** MATH 1350 should:

a) increase students' explicit understanding (a level of understanding which allows one to clearly and accurately communicate mathematical ideas) of some elementary & middle grade mathematics including:

   1. number and number properties through experiences which emphasize sorting and classifying,
   2. operations for real numbers with explorations of multiple interpretations,
   3. problem solving,
   4. algebraic thinking with investigations of patterns and a focus on sets and functions,
   5. number theory,
   6. proportional reasoning

b) increase students' ability to independently increase their own understanding of mathematics (they need to be able to learn math and be confident that they understand it since we can't get to everything they will need to teach elementary or middle school students);

c) challenge students' beliefs about mathematics and, hopefully, enhance their attitudes in a positive way;

d) provide students with an opportunity to experience mathematics in a constructivist learning environment, as they may be expected to teach in this manner (for further information see NCTM's Professional Standards);

e) introduce common manipulatives; through use, rather than demonstration

f) begin to develop effective communication skills that will be useful to the student when they begin teaching.

**Environment:** MATH 1350/1351 instructors should foster a classroom environment in which students investigate mathematical ideas and discuss them amongst themselves. In exchanging ideas within a supportive environment, students are likely to confront their misconceptions and be willing to revise them. Students should be encouraged to observe patterns, make generalizations from those observations, and verify these generalizations with sound reasoning. A classroom where students "discover" mathematics rather than being led to mathematical facts more readily meets the course objectives.

**Mathematical Tasks:** The tasks given to MATH 1350/1351 students should be worthwhile, college-level tasks which help the students make sense of mathematics. These tasks should increase their problem solving abilities and help them see the connections among mathematical topics.

**Assessment:** Skill-oriented exams are not sufficient to garner a clear picture of students' knowledge and understanding of mathematics. Alternate assessments such as written work (both short response and more developed essays/explanations), presentations, portfolios, group activities, etc., reveal more about students' understanding as well as being beneficial to the students' attitudes and providing opportunities for self-assessment. The use of these different assessments is strongly encouraged for MATH 1350/1351. Chapter exams, either as take-home or in-class are still given, but count as a smaller percentage toward overall grade. Several of us see a need to give all or part of one or two exams in class instead of making
the chapter exams all take-home. Nancy Miller and Allison Sutton have started doing this, if you would like to talk with either about that.

Some instructors require a skills test on the algebra that students should know when they enter the course, because many students need to refresh previous mathematics knowledge. Ask Nancy Miller (nmller@austincc.edu) if you want a few copies of one that has been used by some other faculty members. A review sheet can be found on Allison Sutton’s web page at http://www.austincc.edu/aasutton. Skill-oriented exams can be given in the Testing Center; any exam administered in the Testing Center should have multiple versions.

**Manipulatives:** Manipulatives should be used by students as tools for understanding mathematical ideas. Demonstrating how to use manipulatives to teach mathematical ideas to children is covered in methods courses in the education college of the university. Each campus has different manipulatives available; check with a committee member to see what is available on your campus and where they are located.

**Text and Supplements:** The text and explorations manual are closely correlated and should be used in tandem. Instructors are encouraged to read the preface of both texts and the Instructor's Resource Manual to get additional insight to the nature of MATH 1350/1351.

**Assignments:** It is recommended that you assign text problems, text investigations, reflective writing, and explorations. The explorations are good group activities, some of which could be completed in class and a few as out-of-class group or individual activities. These should be assessed regularly and count as a portion of the semester grade. Be sure to keep up with your grading and feedback to the students. That is very challenging and important in these courses. You may want to streamline the suggested assignment sheet to 22-29 Explorations (you can also assign parts of some of the longer explorations) and reduce text homework depending on how many text Investigations you use, how many writing assignments you use, and how time consuming your assessments are. **Do not assign all** suggested Explorations and all suggested homework.

**Graphing Calculators:** Classroom sets of TI-73’s (Middle Grades Graphing Calculators) are available. Please contact Nancy Miller at NRG, Allison Sutton at RGC or Bob Quigley at CYP if you would like to use them in your class.

**Videos:** You may want to supplement the course with an occasional film. Several used in the past for 1350 include *Weird Numbers, Powers of Ten, Ms Toliver (The number fro the Kay Toliver videos is QA39.2K39),* and *Donald in Mathmagicland.* Most of these films can be ordered through the media department in the LRC on short notice.

**Additional Help:** You should be aware that tutors are available for most mathematics courses in the Learning Lab on your campus. Although MATH 1350/1351 are somewhat unusual courses for the tutors, your students should be able to get help with most questions by dropping by the Learning Lab at your campus during most hours of the day and evening.

**First-Day Handout to Students:** You should provide a first-day handout to your students that provides information on the following points:
- a) your name, office number, office hours, office phone, main campus or division phone
- b) all the information on the departmental handout
- c) your grading policies and assessment calendar

**CONCLUSION:** Prospective elementary and middle school teachers appreciate this course more if you show that the concepts in the course are taught in elementary and middle school and are not merely an obstacle to their graduation. If you establish a supportive environment in which they can experience mathematics and acknowledge their interest in children, they can and will work diligently to learn more about mathematics. While this is NOT a methods course, you shouldn't avoid discussing children or teaching children. Some faculty members have an elementary or middle grade teacher who is enthusiastic...
about active mathematics learning speak in a class. Keep in mind that MATH 1350/1351 are college mathematics courses, which should be challenging but not overwhelming, aimed at increasing the students' understanding of mathematics concepts.

Chapter Notes
*Be sure to assign reading both book prefaces the first day.*

**Chapter 1:** This chapter is mostly reading for the students. Class time can be spent doing explorations as groups with some lecture. Problems from Chapter 1 may be spread throughout the course. The chapter now has two exercise sets instead of one. The main goals of this chapter are to familiarize the students with the NCTM Standards and Polya’s 4-step problem solving process.

**Chapter 2:** This chapter should emphasize sets as a means of classifying and de-emphasize extensive work with formal set notation. Venn diagrams should be introduced as an organizational strategy to assist in classification. Section 2.2 includes material on algebraic thinking. If scheduling permits, you should start 2.3 during Week 3 to allow more time for Exploration 2.7.

**Chapter 3:** Pre-service elementary and middle school teachers need to understand the connections between the arithmetic operations. They should study the properties of addition, subtraction, multiplication, and division, and understand why addition and multiplication share properties that subtraction and division do not.

In Chapter 3, students will learn and use algorithms for performing the arithmetic operations different from the standard algorithms used in the United States. Using and understanding unfamiliar algorithms will deepen their understanding of arithmetic. Chapter 3 now has 4 sections, one for each arithmetic operation, and mental math techniques are now incorporated throughout the chapter.

One of the most important lessons learned from Chapter 3 is that it is not good enough for our pre-service teachers to understand the "how's" of an algorithm, but they must understand the "why's."

Base 10 blocks are very effective for Chapter 3. Exploration 2.7 (Alphabitia) should be done before chapter 3 is started. This exploration is referred to repeatedly throughout Chapter 3 and beyond.

Investigation 3.19 on "Understanding Long Division at the Symbolic Level" on p. 192 is very meaningful if you move through it with student participation using small groups of 3 students at a time using the base 10 blocks.

**Chapter 4:** The explorations for this chapter should precede the textbook material. You will probably want to allow 3 1-hour classes for exploration 4.4 if you use it. The instructor's manual has very helpful information on this exploration.

The investigations in chapter 4 can be done either as homework or as group activities to turn in. You may want to emphasize the Sieve of Eratosthenes.

While there are interesting homework problems in the text, they may be best done only if there is extra time after completing the explorations and investigations.

The units blocks or color tiles can be used to form rectangles from a given number of blocks/tiles. Use graph paper to record the various rectangles after they are built with the manipulatives. Cuisenaire rods are very useful for determining greatest common factor and least common multiple, in addition to use with operations, and fractions.

**Chapter 5:** Students need to develop strong understandings of the connections between the subsets of numbers in the real number system. They need to deepen and expand their understanding of the uses and meanings of the operations with these subsets. Exploration 5.16 is especially good for demonstration by groups of 3 students that have each prepared one of the questions.
Chapter 6: Emphasize proportional reasoning, rather than computational proportions. If students understand proportions, they will find themselves reasoning proportionally more often. Discuss and develop the idea that percents are ratios that are based on 100 rather than some other number.
First Day Handout for Students

MATH 1350 Math for the Middle Grade Teacher Certificate I
2006-2007

Section Number & Synonym:  Time of class:  Campus & Room #:

Instructor's Name:
Phone numbers (including ACC voice mail for adjuncts)
office hours and location of office
information on how conferences outside of office hours can be arranged
e-mail address
web page (if any)

COURSE DESCRIPTION
MATH 1350 MATHEMATICS FOR MIDDLE GRADE TEACHER CERTIFICATION I (3-3-0).
Concepts of sets, functions, numeration systems, number theory and properties of the natural numbers, integers, rational and real number systems with an emphasis on problem solving and critical thinking.

Prerequisites: College Algebra or the equivalent, and completion of any TSI-mandated reading and writing requirements.

REQUIRED TEXTS/MATERIALS
The required textbook for this course is:


Package of both texts, ISBN 0-618-50539-3

PREREQUISITES: Students in MATH 1350/1351 must have completed College Algebra or its equivalent, and have complete any TSI remediation requirements in reading and writing. This is not a course in basic mathematical skills. Students enrolling in this course are assumed to have basic arithmetic and algebra skills. If not, they should be steered to another course. It is important that students check with the institution to which they are transferring. UT does not accept College Algebra, so 1324 or higher might be a better prerequisite for UT, depending upon the student's mathematics background.

INSTRUCTIONAL METHODOLOGY
This course is taught through investigations of mathematical ideas through explorations in a supportive, cooperative learning environment.

COURSE RATIONALE
MATH 1350 is the first semester of a two-semester sequence (1350/1351) designed for prospective elementary and middle school teachers. This course extends the foundational ideas of mathematics so that the prospective teachers (Early Childhood - 8) have an explicit understanding of these concepts. This sequence of courses transfers to UT-Austin as M316K and M316L, to Texas State University as 2311 and 2312, and to some other four-year institutions.
COMMON COURSE OBJECTIVES
Course Objectives are listed at: http://www.austincc.edu/mthdept2/tfcourses/obj1350.htm
Include these in your First Day Handout to Students.

COURSE EVALUATION/GRADING SCHEME
Explain grading criteria clearly here. The criteria should specify the number of exams and other graded material (homework, assignments, projects, etc.), with percentage allocation. Instructors should discuss the format and administration of exams. Guidelines for other graded materials, such as homework or projects, should also be included in the syllabus.

COURSE POLICIES
The syllabus should contain the following policies of the instructor:

- missed exam policy
- policy about late work (if applicable)
- class participation expectations
- reinstatement policy (if applicable)

Attendance Policy (if no attendance policy, students must be told that, but the course committee believes that students must be in class to experience a constructivist learning environment, use manipulatives, and develop effective communication skills.) The Math Department's Attendance Policy follows. Instructors who have a different policy are required to state it. "Attendance is required in this course. Students who miss more than 4 classes may be withdrawn."

Withdrawal Policy (including the withdrawal deadline for the semester)
It is the student's responsibility to initiate all withdrawals in this course. The instructor may withdraw students for excessive absences (4) but makes no commitment to do this for the student. After the withdrawal date, neither the student nor the instructor may initiate a withdrawal.

Incomplete Grade Policy
Incomplete grades (I) will be given only in very rare circumstances. Generally, to receive a grade of "I", a student must have taken all examinations, be passing, and after the last date to withdraw, have a personal tragedy occur which prevents course completion.

Course-Specific Support Services
ACC main campuses have Learning Labs which offer free first-come first-serve tutoring in mathematics courses. The locations, contact information and hours of availability of the Learning Labs are posted at: http://www.austincc.edu/tutor

The following policies are listed in First Day Handout section in front part of the Math Manual. Go to www.austinec.edu/mthdept5/mman06/statements.html. Insert the full statement for each of the following in your syllabus.

Statement on Scholastic Dishonesty

Recommended Statement on Scholastic Dishonesty Penalty

Recommended Statement on Student Discipline

Statement on Students with Disabilities

Statement on Academic Freedom
Course Outline and Calendar:

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<td>Wrap-Up, Final Assessment</td>
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Instructors are encouraged to add a statement, such as “Please note: schedule changes may occur during the semester. Any changes will be announced in class.”

TESTING CENTER POLICY
ACC Testing Center policies can be found at: http://www.austincc.edu/testctr/
Instructor will add any personal policy on the use of the testing center.

STUDENT SERVICES
The web address for student services is: http://www.austincc.edu/rss/index.htm
The ACC student handbook can be found at: http://www.austincc.edu/handbook

INSTRUCTIONAL SERVICES
The web address is: http://www.austincc.edu/faculty/newsemester/.
then click on “Campus Based Student Support Overview”. 
### Suggested Problems and Explorations  Bassarear, 3rd ed, 2004

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<td>p. 53: 9, 10, 12, 15, (13)</td>
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<td>Explorations 1.1*, 1.2*, 1.5*</td>
<td>Exploration 2.1</td>
<td>Explorations 2.3, 2.6 pp. 30-31 only</td>
<td>Exploration 2.7 (do before starting section 2.3 of the text)</td>
<td>Explorations 3.1, 3.2, 3.3</td>
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<td>Exploration 3.7, 3.10, 3.11 (1 and 2 only), 3.12</td>
<td>Exploration 3.13, 3.16, 3.17 (1 only)</td>
<td>Exploration Factor Game/Product Game Activity (Optional)**</td>
<td>Exploration 4.2</td>
<td>Exploration 4.4 (optional)</td>
<td>Explorations 5.1, 5.2 or Red &amp; Yellow Chip Activity if time</td>
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<td>Explorations 5.14 (5.13)</td>
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### Final assessment

Problems and Explorations above in Parentheses are problems that another instructor assigned. Choose a set that best fits you and your emphases. You should not assign all of the listed explorations and text problems; choose a set that best fits you and your emphases.
Explorations 1.1, 1.2, and 1.5 have been changed and combined with explorations from the previous edition. You may wish to assign only parts of some of them.

**The Factor Game/Product Game Activity is taken from the NCTM website’s Illuminations for grades 6-8 (http://illuminations.nctm.org/pages/68.html). Contact Allison Sutton (aasutton@austincc.edu) if you would like a copy of the activity packet. The activity requires the use of a computer classroom or lab, so you should reserve space ahead of time.