Mathematics for Measurement, MATH 1333

<table>
<thead>
<tr>
<th>Section: 1333.001</th>
<th>Office Hours: MW 4:35 – 5:35 p.m. RVS 8131</th>
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<tbody>
<tr>
<td>Synonym: 42165</td>
<td>TTh 10:30 a.m. – noon NRG 2147</td>
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<tr>
<td>Time: MW 5:40 – 6:55 p.m.</td>
<td>By appointment: (Email at least a day in advance to ask for an appointment)</td>
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<tr>
<td>Classroom: RVS 8131</td>
<td>MW 4:05 – 4:35 p.m. RVS 8131</td>
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<tr>
<td>Instructor: Dr. Mary Parker</td>
<td>Mon 7:00 – 8:00 p.m. RVS as arranged</td>
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<tr>
<td>Office Number: NRG 2147</td>
<td>TTh 8:40 – 9:10 a.m. &amp; 1:20 p.m. – 2:20 p.m. NRG 2147</td>
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<tr>
<td>Office Phone: 223-4846</td>
<td>Additional times for appointments may be available for students who cannot attend these and for whom email and phone conversations have proved to be inadequate to resolve problems.</td>
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<tr>
<td>(fax 478-6814)</td>
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<tr>
<td>Email: <a href="mailto:mparker@austincc.edu">mparker@austincc.edu</a></td>
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<td>Web: <a href="http://acconline.austincc.edu">http://acconline.austincc.edu</a> &amp; <a href="http://www.austincc.edu/mparker/">http://www.austincc.edu/mparker/</a></td>
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Course Description: A course designed for non-mathematics and non-science majors. Topics include logic, variation, functions, equivalence, congruence, right triangle geometry, and other measurement topics. Prerequisites: A passing score on the mathematics portion of the THEA test or a satisfactory score on the ACC Mathematics Assessment Test or MATD 0360 with a C or better and completion of TSI mathematics requirements.

Required Materials:

1. *Mathematics for Measurement*, by Mary Parker and Hunter Ellinger. (The first few chapters will be handed out in class. Later ones will be available from ACC bookstore at a date to be announced.)
2. Student Geometry Kit from an office supply store with compass, protractor, drafting triangle (with a 90° angle), ruler (with both cm. and inches) and a box to keep them in so they don’t break or get lost.
3. Scientific calculator with trig functions
4. Graph paper
5. Loose-leaf notebook and at least 30 dividers
6. Device to punch holes so that you can put computer output into your looseleaf notebook.
7. Access to a computer spreadsheet program, in the ACC Learning Lab or at home

Instructional Methodology: This is a lecture/discussion course, taught in a computer classroom so that students can sometimes use computer spreadsheet software in class.

Course Rationale: This course is designed to introduce topics of variation in measurement, right-triangle trigonometry, and mathematical modeling for students who won't take higher-level mathematics courses. It satisfies the Core Curriculum requirement for mathematics.

Course Objectives

1. Increase/improve students' quantitative literacy.
2. Understand the innate variation in measured values and the various standard mathematical ways to communicate that variation.
3. Understand the complexities involved with using measured numbers in computations and be able to compute and communicate the resulting variability in the computed values.
4. Provide students with an opportunity to experience connections between geometry and algebra to increase their flexibility and confidence in problem-solving.
Syllabus / Calendar / Testing Schedule

- Algebra Review, including use of formulas, graphing, calculators, and solving equations.
- Spreadsheets
- Angles and Construction of Diagrams
- Linear Models
- Propagation of Errors in Measurement through Calculations

Part II. Math with approximate numbers, right-triangle trigonometry, and bias in measurement (4 weeks) Sept 25 – Oct. 18.
- Introduction to Data, Modeling, and Curve Fitting
- Trigonometry of Right Triangles
- Measurement Sensitivity
- Comparison of methods of reporting the accuracy of computed values from measured input
- Calibration – Removing Bias from a Measurement Process

Part III. Random measurement error and general trigonometry (4 weeks) Oct. 23 – Nov. 15
- Separating “Signal” from “Noise” in Curve Fitting
- Standard Deviation
- Propagation of Noise – Empirical Method
- Comparison of “Noise” and “Rounding Errors”
- Sine and Cosine on Larger Intervals
- Solving General Triangles

Part IV Propagation of measurement error and general trigonometry (4 weeks) Nov. 20 – Dec. 13
- Propagation of Noise – Averaging Multiple Measurements
- Propagation of Noise – Empirical Method for Multiple Inputs
- Solving General Triangles – the “Ambiguous Case”
- Applications
- Propagation of Noise – Rules for Multiple Inputs

There is a test at the end of each of the four parts of the course. The material in the course is cumulative – the later topics use the skills developed in the earlier topics. Thus, all tests are cumulative and cover material from the beginning of the course.

Grading: Your six grades will be averaged: four tests, one homework grade, and one daily quiz/attendance grade.
(See the homework discussion on the next pages to see how to “opt out” of the homework grade.)
A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: below 60

If you believe that I have made a mistake on grading anything, write a note of explanation on a separate sheet of paper, staple it to the paper, and turn it in for re-grading. I am happy to discuss this with you outside of class, but grades will never be changed or corrected “on the spot”. Such corrections must be made very soon after the paper was originally graded. No grades will be corrected except through this procedure.

Attendance: Attendance is required in this course.

Withdrawals: It is the student’s responsibility to initiate all withdrawals in this course. The instructor may withdraw students for excessive absences (4) or failure to meet course objectives but makes no commitment to do this for the student.
After the withdrawal date each semester (Fall 2006: November 27, 2006) neither the student nor the instructor may initiate a withdrawal.

Withdrawals can cause unexpected consequences, including increasing the tuition to be paid when the course is taken again and eligibility for financial aid. Review information about withdrawals at http://www.austincc.edu/withdraw/

**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 have a personal tragedy occur after the last date to withdraw which prevents course completion on time. An incomplete must be completed promptly or it will turn in to F.

**Students with Disabilities:** Each ACC campus offers support services for students with documented physical or psychological disabilities. Students with disabilities must request reasonable accommodations through the Office of Students with Disabilities on the campus where they expect to take the majority of their classes. Students are encouraged to do this three weeks before the start of the semester. Students who are requesting accommodation must provide the instructor with a letter of accommodation from the Office of Students with Disabilities (OSD) at the beginning of the semester. Accommodations can only be made after the instructor receives the letter of accommodation from OSD.

**Scholastic Dishonesty:** Acts prohibited by the college for which discipline may be administered include scholastic dishonesty, including but not limited to, cheating on an exam or quiz, plagiarizing, and unauthorized collaboration with another in preparing outside work. Academic work submitted by students shall be the result of their thought, work, research or self-expression. Academic work is defined as, but not limited to, tests, quizzes, whether taken electronically or on paper; projects, either individual or group; classroom presentations; and homework.

Students who violate the rules concerning scholastic dishonesty will be assessed an academic penalty that the instructor determines is in keeping with the seriousness of the offense. This academic penalty may range from a grade penalty on the particular assignment to an overall grade penalty in the course, including possibly an F in the course. ACC’s policy can be found on page 33 of the Student Handbook under Policies and Procedures or on the web at http://www.austincc.edu/handbook

**Academic Freedom:** Institutions of higher education are conducted for the common good. The common good depends upon a search for truth and upon free expression. In this course the professor and students shall strive to protect free inquiry and the open exchange of facts, ideas, and opinions. Students are free to take exception to views offered in this course and to reserve judgment about debatable issues. Grades will not be affected by personal views. With this freedom comes the responsibility of civility and a respect for a diversity of ideas and opinions. This means that students must take turns speaking, listen to others speak without interruption, and refrain from name-calling or other personal attacks.

**Student Discipline:** Classroom behavior should support and enhance learning. Behavior that disrupts the learning process will be dealt with appropriately, which may include having the student leave class for the rest of that day. In serious cases, disruptive behavior may lead to a student being withdrawn from the class. ACC’s policy on student discipline can be found in the Student Handbook or on the web at http://www.austincc.edu/handbook/

**Student Services:** Classroom behavior should support and enhance learning. Behavior that disrupts the learning process will be dealt with appropriately, which may include having the student leave class for the rest of that day. In serious cases, disruptive behavior may lead to a student being withdrawn from the class. ACC’s policy on student discipline can be found in the Student Handbook under Policies and Procedures or on the web at: http://www.austincc.edu/handbook
Course-specific support services: ACC main campuses have Learning Labs which offer free first-come first-serve tutoring in mathematics courses. At RVS it is in room 9100. Students should bring their course handouts, notes, and work on the homework when they come to the Learning Lab. For locations, contact information and hours of availability of the Learning Labs, see http://www.austinity.edu/tutor/.

Tests.

Some of the tests will be in the Testing Center and some in class. See this website for locations, hours, and rules for the Testing Center: http://www.austinity.edu/testctr/. YOU MUST READ THE RULES on that website and follow those rules when you take a test in the Testing Center. The last test will be in class on the last day of class. (You will need your ACC student ID and a picture ID, like your driver’s license, to use the Testing Center.)

Tests and make-up tests must be done entirely on your own, with no help from anyone else. Violating the rules of the testing center, or giving or receiving help on tests is scholastic dishonesty, and the punishments are severe.

For Tests 1--3, a student who misses a test or who makes below 60 on a test may do make-up work. That make-up work includes re-working all the problems on the test and taking another similar make-up test in the Testing Center before the next test is assigned. When that work is satisfactorily completed, the test grade will be raised to a 60. **Test grades of above 60 can only be earned by taking the regular test on time.** Such make-up work can be done on no more than two tests.

Deadlines for the tests will be enforced very strictly. When the test is in the testing center from Monday through Wednesday, you are expected to take the test on Monday or Tuesday, and then there is an extra day for you to take it late if your car broke down on Tuesday.

Daily Quizzes/Attendance:

Each class day, attendance for the entire class period earns 2 points on this grade. In addition, a short take-home quiz, worth 3 points, is assigned each day and is due at the beginning of the following class. (No quiz is due on the first class day, of course, or on any day we have a test in class.) That gives a total of about 150 points. A maximum of 120 points will be counted, so a student with five absences can still make a perfect grade. That is certainly more absences than any student should accumulate. The final total (capped at 120) will be divided by 120 for a percentage grade, which will be the daily quiz/attendance grade.

Students may not earn the attendance grade in ANY WAY except by actual attendance. Students who must miss class may earn the quiz grade if the quiz problems are received before the beginning of class by email or in the campus mailroom (where the time is recorded.) **Do not send the quiz to class with another student.**

Students who miss class may ask another student for the quiz assignment or obtain the quiz assignment for the next day from the course web page at http://www.austinity.edu/mparker/1333/. Students who miss class should come to my office hours very soon to ask their questions over the homework or to get any materials that were handed back during the class.

Homework:

Each page of homework must be clearly labeled and they must be organized in order in your homework folder. On top must be the cover sheet for the entire homework set. You are responsible for doing the problems over the material covered in class each day by the next class, checking your solutions, and asking your questions during the next class or office hours. Each of the four homework sets will be graded on a scale of 0 – 25 and the four grades are combined for one homework grade of 0 – 100.
One major theme of this course is to learn to work problems confidently, including checking your answers by some other method than “looking in the back of the book.” Thus, for the Part II problems, answers “in the back of the book” are not provided. Your homework assignment is usually the Part II problems. However, some students need to practice working problems for which they have answers in order to work up to working problems confidently. For that reason, the Part I problems are provided. After you work a Part I problem, look back in the examples and find the solution to that problem. Use that to check all your work as well as your final answers.

To earn full credit on the homework, do the assigned homework, which will usually be all the Part II problems on each Topic and provide the required cover sheet. If you are struggling with the material and unable to do a particular Part II problem, look back and find a similar Part I problem to practice on. Work that problem and include it in your homework. (Homework problems must be turned in in order, so you will need to use as many separate sheets of paper as needed to do put them in order. You can leave blanks for problems that you skip and will fill in later.)

If you do not do all the Part II problems in a section, I’ll look at what you did on the Part I problems and give some credit. Basically, you’ll earn about half as much credit for doing all the Part I problems as you would have earned for doing all the Part II problems in a particular topic. If you do some mixture of Part I and Part II problems, I’ll assign a grade based on what proportion of the problems were done.

A student may substitute the Test 3 grade for his homework grade if he has
- made at least 80 on Test 1 and
- earned at least 10 points on each of the four homework assignments and
- kept an organized notebook of materials and work for the entire course.
This is to provide an option for doing less homework for students who don’t need to do the entire homework assignment in order to learn the material well. Test 3 is a quite comprehensive test over all the material in the course up to that point.

Homework Cover Sheet and Guidelines:

When you study for the test, you must think about the completeness and correctness of your homework. To assist in this, record your progress on each problem. As you do your homework, keep a record of your work ON EACH PROBLEM on a cover sheet. There should be one cover sheet for the entire homework assignment.

List all the problem numbers in each assignment and put symbols beside it to summarize your work.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
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<tr>
<td>OK ✔️</td>
<td>I worked the problem, was unable to check it myself by another method, but another student or a tutor or the teacher agreed that it was correct.</td>
</tr>
<tr>
<td>🍀 🍁</td>
<td>I worked the problem, checked it using an algebraic or geometric or numerical method we used in class, and believe it is worked correctly.</td>
</tr>
<tr>
<td>OK</td>
<td>I worked the problem and have not checked it, but I believe it is worked correctly.</td>
</tr>
<tr>
<td>H (used with other symbols)</td>
<td>I got help from a person (another student, tutor, or instructor) on this problem.</td>
</tr>
<tr>
<td>blank</td>
<td>I just didn’t get it done.</td>
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**Organization of Materials**

I have found that there is a strong relationship between how organized a student keeps his course materials and work in the course and how well he learns the material. So I am requiring you to organize your materials in the following way.

1. Use a looseleaf notebook with about 30 tabbed dividers. Use notebook paper with holes so that the individual pages can be inserted into the looseleaf notebook. Here are the various sections of the notebook that should be separated by dividers.
   - Daily handouts and class notes.
   - Quiz problem that is due next time. (Blank notebook paper to do the quiz on.)
   - Old quizzes that have been returned. (Maybe you will want a divider with a pocket or an envelope so that you can just slip the papers in it.)
   - Homework cover sheet(s)
   - Printed Topic A and blank notebook paper for working these homework problems.
   - Printed Topic B and blank notebook paper for working these homework problems.
   - Printed Topic C and blank notebook paper for working these homework problems.
   - etc. (through Topic Z)

2. Your class notes should have the date on each page, and the printed daily handout and the class notes for that day should be together to make a “package” for that day. Then put those packages in order by date. (I keep the most recent on top, but it’s also OK to keep the most recent at the back. Just make sure they are in order.)

3. If your notebook gets larger than you want to carry with you each day, then get a second looseleaf notebook to leave at home. Keep about three weeks worth of the current material in the notebook you take to class, and leave the older material in the notebook at home, but still organized as described, with the dividers.

4. When it is time to turn in your homework folder, remove the relevant homework cover sheets and the homework pages (carefully labeled by Topic) from the various sections of your notebook, and put them together, in order of the Topics, in your homework folder.

5. When your homework is returned to you, take it out of the folder and store it. You may keep it all together as you turned it in, or you may choose to redistribute it with the Topics it came from. (If it were me, I’d just keep it all together as I turned it in.)

6. If you miss a class, go to the course webpage and print the daily handout for the day you missed and add it to your notebook in the correct place. And do the quiz to turn in at the next class meeting.
Class Rules:
1. In accordance with school policy, you may not bring food or drink into class.
2. Please turn off or mute volume on beepers and cellular phones so as not to disrupt class.
3. Arrive for class a few minutes early so that you can have your materials out and be ready to start class on time.
4. Disruptive behavior (talking to others while I am lecturing, rudeness, etc.) will not be tolerated.
5. Class discussion will focus on the material being presented and will be about matters relevant to the entire class. Discussion of your individual situation belongs in office hours or, occasionally, in the part of the class time that I have identified as devoted to working individually with students.
6. Children are not allowed to attend class with you.
7. Remember you are here to learn; be prepared to participate in class discussion. We are all unique individuals and in this class everyone's opinion will be respected whether we agree or disagree.
8. Counseling services are available to help you with a variety of needs, if you would like more information please ask.
9. Office hours are before class, but I am also available for a short time after class. Ask immediately if you need help! I am here to help you learn. Getting behind even one day will cause you to be confused and frustrated.
10. Quiz problems will never be accepted late. A moderate amount of extra credit is available to everyone.
11. Tests may not be taken late. There is a provision for making up low test grades and that will be used to deal with a missing test grade.
12. All students must take the final exam at the scheduled time. There are no exceptions.
13. If you enroll in the class late, you are subject to the same rules as students who enrolled in the class before the class began. The standard grading scheme allows enough flexibility for all students to make up a reasonable number of absences.
14. Cheating will not be tolerated.