MATH 1342
Elementary Statistics

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A full list of the committee can be found at
http://www.austincc.edu/mthdept5/mman05/Course%20Documents/CourseCommittees.htm

Notes for Instructors
2005-2006

FOR THE STUDENT:
Required Texts: The Basic Practice of Statistics, 3rd ed. by David S. Moore (with CD)
ACC Handout on Using Minitab (You distribute these.)
(This year, the new text is packaged with an Upgrade Pack, which includes an electronic version of the Minitab Manual and much more. See http://www.austincc.edu/mparker/1342/tf/ for details.)
Videotape series: Against All Odds. Available on the web and in the LRS.
Course website: http://www.austincc.edu/mparker/1342/tf/

Distance Learning sections: Use the same materials and also ActivStats by Paul Velleman. They must purchase Minitab to use at home. The package in the bookstore for this section DOES NOT have ActivStats, which must be ordered separately on the web. It does include everything else, including the Minitab software.

FOR THE INSTRUCTOR:
Instructor's Guide with Solutions
Test Banks
Instructor's Resource CD
Instructor's website: http://www.austincc.edu/mparker/1342/tf/instr/

Moore’s text focuses on statistical literacy. It has considerably more, and more sophisticated, material on descriptive statistics and data analysis than many texts. If you have not taught from one of his texts before, you will want to read the sections carefully because some of the material may be new to you, or at least not what you have come to expect in an elementary statistics text. We believe that this text is readable enough for you to give some assignments for students to read the material in advance of your lecture or instead of your lecturing. (This is more true in Chapters 1-8 than later in the text.)

SYLLABUS OVERVIEW
Chapters 1 – 10 and 13-21. Some of the starred material in individual sections is required, but most is optional. See the next section called “Syllabus Details.” Chapters 11, 12, 22, 23, and 24 are optional. It is very important to start Chapter 13 just before or at the midpoint of the semester in order to be able to complete the syllabus.

Do not cover Chapters 11 and 12 until the end of the course, if at all. Some time is allowed at the end of the course for optional chapters and you may decide which ones to cover. As the author of the text identifies, Chapters 11 and 12 cover interesting material that is not needed for the rest of the course. And Chapters 20-24 cover additional topics in inference, where the school may pick and choose. Our syllabus requires that you cover chi-square tests and inference in regression (Chs. 20...
and 21). After you have completed all of that, then you may choose what else to cover, including the possibility of spending some time having students present projects to the class, etc. Most teachers choose ANOVA, but some do other things. Talk with members of the course committee if you have suggestions about what additional material we should require.

Most teachers have found that students find the material on inference, beginning in Chapter 13, much more challenging than the earlier material. You can deal with that in various ways. Mary Parker makes the Test 3 questions from hypothesis testing fairly straightforward: showing the p-value on a graph, computing it, and writing a conclusion, saving the more difficult interpretation questions in the homework for Chapters 14, 15, and the Review II for Tests 4/5, when the students will have developed more sophistication with the material. She also has a practice test for students covering through the end of Chapter 19, which she will share with you if you ask.

SYLLABUS DETAILS:
The author identifies starred material as optional. This includes discussion of all the starred material in the text.

Chapter 6. Two-way Tables. This entire section is required in our syllabus.

Chapter 9. Probability. There is a short subsection on personal probability. It is optional but is easy to include. Use your own judgment about whether to include it.

Chapter 10. Sampling Distributions. The optional material at the end is basic material on control charts. Do include it.

Chapters 11 & 12. Probability. Do not include these until the end of the semester, if at all.

Chapter 15. Inference in Practice. It is probably not realistic to include power computations. We recommend that you include some short discussion of Type I and Type II error, just to help students understand that they are different and have different consequences. This is a very good answer to the question of “How should I choose a significance level?” But don’t get bogged down here – 20 minutes at most. Assign few, if any, problems in the homework and probably no problems on the test on Type I and Type II errors. The required material in the next four chapters is plenty challenging and students will need all the mental energy available to deal with those. Don’t let them bog down here.

Chapter 17. Two-sample inference. Please do include the two starred subsections explaining why to avoid pooled t-procedures and inference about standard deviations. We recommend omitting the subsection on use of the F test for comparing two standard deviations. However, if you are planning to do ANOVA as your optional chapter at the end of the course, you will want to cover the F test here or come back to it later.

Chapters 18 and 19: Proportions. More accurate confidence intervals. These subsections are not required, but are rather interesting. Use your own judgment about how much to mention them in class. They will be good for increasing the sophistication for strong students, but, of course, may confuse the weaker students.

Chapter 20: Chi-Square tests. The material on goodness-of-fit tests is optional. It’s fairly easy to include if you have about 30 minutes to spare. Use your own judgment about whether to include it.

Chapter 21: Linear Regression. Notice that testing correlation is now included and is not optional. There are more problems for the confidence interval for the mean when x= – than there are
for forming a prediction interval when \( x = \_ \). Also note that there is more coverage of residual analysis here than before.

**EXTRA MATERIAL**

Lists of the videotapes and timetables, information about the software, and various handouts for students are available from the websites listed at the beginning of the previous page.

**PREREQUISITE**

Students who completed two years of high school algebra, even a number of years ago, rarely have trouble with the algebra in statistics. See the student handout for more information. Much more relevant is their skill in, and commitment to, reading carefully and doing problems that require several steps. It is particularly important that they be comfortable with calculator use, particularly with the order of operations and long calculations.

**HOMEWORK**

A suggested homework list is provided. Use it, modify it, or create your own assignment. The odd numbered problems have answers in the back of the textbook and the Study Guide has many worked out solutions of both odd- and even-numbered problems. You should require students to do some homework to which they do not have the answers. It is a good idea to grade at least some problems every week. Mary Parker accomplishes this by giving daily take-home quizzes of one or two even-numbered problems. See <http://www.austincc.edu/mparker/1342/tf/instr/> for a list of specific suggestions.

It is important to encourage the students to do computer homework. (A large percentage of our students use this for a requirement in the UT Business School. They accept it contingent on our use of the software in the course.) However, it is also important to keep students from getting too frustrated. Some tips include: (1) encourage them to work together on computer homework; (2) give them enough flexibility about computer hw due dates that if they are stuck on something one night, they don’t have to spend 3 hours that night figuring it out; (3) encourage them to ask questions about it in class; (4) since printing sometimes doesn’t work smoothly, don’t make a big deal about having pretty printout; (5) remind them that not every piece of a computer hw problem has to be done on the computer; (6) encourage them to think of the computer as a tool to make analysis of large data sets easier or to do messy calculations; (7) in grading, emphasize their written analysis of what they learned from the computer output rather than grading the output itself.

Make it clear to the students that their first obligation in the course is to do the non-computer work. Some students will distract themselves from the main points in the course by an overemphasis on the details of dealing with the software.

I (M. Parker) used to ask a test question or two about how to do something in MINITAB, but I have found that less satisfactory recently, since students use a mixture of commands and menus. So now I confine myself to questions that ask them about interpreting output on the tests and then I have them turn in problems done with MINITAB fairly often during the semester. I continue to assign regression problems as take-home quiz/project problems for several weeks after we finish that chapter. See the instructor website <http://www.austincc.edu/mparker/1342/tf/instr/>.

**TESTING AND GRADING**

It is important that your tests and other assessments reflect the objectives of the course. In particular, students should be required to communicate their understanding of the results of statistical
analyses in writing in the course. While some multiple choice questions can be quite useful, a majority of the grade in the course should be based on tests with problems like the homework, where students write out solutions and interpretations. Projects that require students to use the ideas on other data (possibly data that they collected themselves) are also useful experiences for the students.

Since the material in the course is comprehensive, it probably is a good idea to emphasize that to the students and maybe put an important problem from the previous chapters on each test. Ideally, students should review a few key ideas from earlier chapters at each stage. Statistics is not intended to be a memorization course. Feel free to let them use some notes on tests. For most students, preparing those notes contributes strongly to their learning.

We have found that some statistics students assume the course will be easy, don’t take the course seriously, and do poorly on the first test. Many of these will become good students if your grading system allows them to "make up" a grade. We encourage you to find a way to do that, by substituting the homework grade, or a later test grade, for a poor grade. Grading on a "curve", or simply adding extra points if many people do poorly on a test, doesn't send the correct message. Providing an extra incentive to do well on later assignments sends a better message. If a test score is below 60, some feel the student should be asked to completely correct that test to raise the score to 60 before the homework substitution could be made.

FIRST DAY HANDOUT
A standard first day handout is provided for you to edit and use. Also, you must distribute a handout about using MINITAB. See the course website and follow the links to the MINITAB material. Use that or write similar material for your students. When you submit materials from this course for your evaluation, you must include the enough material to make clear what you required students to do with software and how it was counted in the grade.

TECHNOLOGY
Calculators:
This textbook assumes that students have a calculator that does one- and two-variable statistical calculations. I (Mary Parker) am always reluctant to ask students to buy anything else, especially since they’re buying the MINITAB Guide. Also, I notice that virtually all scientific calculators do include one-variable statistical functions. I let students use these instead of buying a new one. I do tell them that, if they need to buy one, they should definitely buy one with two-variable statistics. They aren’t any more expensive, but you have to look carefully. (See below for how to describe one with two-variable statistics.) You should do whatever you think is appropriate. Notice that the student handout gives you flexibility on this.

You can’t give the entire class a specific description of how to use their calculators, since they differ. On day 2, (chapter 2) when I begin this, I tell them that they need to learn three things from their manual: (1) how to get it into statistics mode, (2) how to enter data, and (3) what buttons to punch to get the mean and standard deviation. I do an example of computing a standard deviation using the formula in the text and then assign one very easy standard deviation computation by hand at home. Also I tell them to read their manual about standard deviation computations, write a summary of what it says they should do, and then do the computation on the calculator that they have just done by hand. They won’t all succeed, of course, but it gets them to notice that they should be doing this and should bring to your attention anyone who needs help. By the next day, I make sure to mention the two different standard deviation keys on most calculators, with different denominators, and tell them to use the one with $\sigma_{n-1}$. 
Some students won’t have their manual. Often there will be another student in the class with the same calculator and a manual or they can figure it out by trial and error because it’s similar to the other calculators. Or you or the student can look at the course website for guidance.

In chapter 4 on correlation, I have a handout with a five-point data set of easy numbers and have them do a small piece of it by hand, while the rest is already filled in. Then I tell them we’ll never do this by hand again. In addition to the appropriate homework problems in the book, I tell them to read their manual and determine whether their calculator does two-variable statistics (hints: claims to do regression, has separate keys for $\bar{x}$ and $\bar{y}$). If it does, they should find out and write a short description of: (1) how to put it into two-variable statistics mode, (2) how to enter data, and (3) how to compute the correlation coefficient. I tell the students that it is OK if their calculator won’t do this because they can always use the computer to do it on the homework, or, on a test, I’ll give them the value for the correlation coefficient on each problem.

In the regression chapter, I continue my handout (of the previous paragraph) to compute the regression coefficients for the data, find a couple of predicted values, sketch the line, find a residual, etc. I tell them that those whose calculators do two-variable statistics can probably get the regression coefficients by just punching the appropriate buttons, but I expect them to know how to use the formulas given in the book (with $r$ given) to find the coefficients.

**Computers:**

Computer use is a required part of the course. Your first-day handout must indicate that it is required and include the *MINITAB Guide* as one of the required textbooks. The materials you submit for evaluation for this course must indicate how you require and evaluate computer use as part of the course.

Computer use is part of the syllabus of the course because there are many important statistical analyses that the inexpensive calculators won’t do, and because we jeopardize the transferability of the course if we do not include it. That transferability is really important. However, it is not the most important part of the course. On the first day of class, mention the computer part, but do not focus on it at all. Be sure to have the students doing other statistical work before you start with the computer work. When you plan a lesson that uses a computer for any part, it is absolutely crucial that you have a backup plan for what you will do with the class if there are any problems with the computer. The computer work will go much more smoothly if you hold several office hours in the computer lab during the first couple of weeks. In 20-45 minutes, students can go through an orientation and do one (or several) of the computer problems in the homework.

We have two versions of MINITAB available. As of Fall 2004, the full version of MINITAB 14 has been available, via the network, in all the main-campus classrooms and the ITFD labs and on the Learning Lab computers. Most of these also have the old version 12 available so that it can be used if the network is down or slow. The *Minitab Manual* describes how to use Version 14. There is a relatively complete set of instructions on the course website for using Version 12. (They aren’t really very different.) Each of the statistics instructors should be able to use the networked MINITAB 14 on the ACC computer in your office. If you don’t have that, contact our computer technician at mathlabs@austincc.edu to inquire about getting it set up. The networked version can’t be used at home, but we have a few copies of the old version 12 that we could lend you to use at home if you need that. Please contact Mary Parker, mparker@austincc.edu.

Before you suggest to the students that they try any extra problem on the computer (even if it is one listed in the *MINITAB Guide*) please do it yourself first. Many of the problems require the
students to learn more detailed commands than are really worth their time. We have tried hard to make sure that those on the Suggested Homework list are reasonable. If you disagree with any of these, please tell us. We need that information to prepare next year’s *Math Manual*.

If you have any problems with the Computer Centers or Learning Labs about MINITAB or any confusion about that, please contact Mary Parker, mparker@austincc.edu, as well as expressing your concern in the lab itself. As with any computer use, problems occur sometimes. But we can solve them.

More options are available for students using MINITAB at home than before. But **do not require them to buy the software.** Students can buy the package for the Distance Learning class which includes the student version of MINITAB and the electronic copy of the *MINITAB Manual* and is supposed to cost about $15 more than the textbook alone. Or they can rent the full version for a semester for under $30.

We have looked at Excel and decided that is was not a good idea to use it for this course. Mary Parker has some materials comparing the capabilities of Excel and MINITAB. Contact her for more information.

**VIDEOTAPES**

Please encourage all of your students to sample the videotape series *Against All Odds*, which they can do on the web at http://www.learner.org/resources/resource.html?uid=65 or in the LRS. A list of programs is included on our course website for you to hand out if you wish. This viewing is intended to supplement the course. This course is NOT being offered in a stand-alone television format. If you wish to show a videotape in class that is fine, but don't do it more than a couple of times. Otherwise, students will get the idea that this is a television course. Using the videotapes outside of class is particularly helpful for weaker students, who find it useful to be able to go over an explanation several times.
Suggested Homework, MATH 1342, BPS 3rd edition

Which problems:
The main homework problems are listed in bold type below. You are expected to read through the problems in brackets at the beginning of each chapter’s list and work any that aren’t obvious to you from the lecture or textbook examples.

Technology:
Problems with (M) have some part for which you are required to use MINITAB. You may use MINITAB on additional problems if you wish. Problems with a C require a statistical calculator (mean and standard deviation) or MINITAB. On the problems requiring technology, as on all homework, you should spend as much time and thought answering questions about what the results mean as you spend calculating. Your answers should reflect this. During the test, you will not have MINITAB and may not be allowed to use a graphing calculator. Test questions will be adjusted to reflect the tools you have available at that time. Ask your instructor in advance what you will be allowed to use on each test.

If it is more convenient for you to just go to the computer lab once a week (in a 16-week semester) to do the accumulated MINITAB homework, that will be fine.

Chapter 1: [1, 5, 7, 9, 10(M)], 15, 17, 19, 21, 26, 28, 29(M)
Chapter 2: [1(C), 3, 5, 8(C)], 13(M), 14, 15, 19(M), 23(M), 29, 30, 31
Chapter 3: [1, 2, 3, 5, 7, 9, 10, 11, 12, 13], 15, 17, 19, 21, 23, 25, 27, 29
Chapter 4: [1, 3, 4&5(M), 7, 8ac(M), 9(M), 11], 15, 17, 19, 25, 27(M), 29
Chapter 5: [3(M), 5, 6] 7, 9(M) (you’ll need to draw at least one line by hand), 11, 13, 15(M), 17, 19(M Type in the data values yourself), 21, 25, 31, 35, 39(M), 41
Chapter 6: [3, 5, 7(M)], 9, 11, 13, 15, 19, 23
Review I: 6(M The data file is numbered by the table, not the problem number), 7(M), 8(M), 9(M), 13, 15, 16, 17, 18, 19, 20, 25, 29, 31
Chapter 7: [1, 3, 5, 7, 9, 11, 13, 15], 17, 19, 23, 29, 33, 34(M), 37
Chapter 8: [1, 3, 5, 7, 11, 13], 17, 21a, 23, 25, 31, 35, 39
Chapter 9: [7, 9, 15, 17, 19, 21, 22], 25, 27, 29, 33, 35, 36(M), 37, 40, 41
Chapter 10: [1, 3, 5, 7, 9], 11, 13, 15, 17, 19, 21, 23, 25, 27, 31(M), 33, 37
Chapters 11 and 12: If these chapters are covered, assignments will be provided.
Chapter 13: [1, 3, 5, 7, 9, 11], 15, 19(M), 21, 23, 25, 27
Chapter 14: [1, 3, 5, 7, 11, 13, 14, 17, 19], 27, 28, 31, 34, 37, 39, 43, 45
Chapter 15: [1, 3, 5, 6(M), 7, 9, 13], 17, 19, 21, 25, 27, 29
Review II: 1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 27, 29, 33
Chapter 16: [1, 3, 5, 7, 9, 11(C or M), 13(C or M), 15(M)], 17, 19, 21(use sample mean=224.002), 23(C or M), 25, 31, 35, 37(M)
Chapter 17: [1, 2, 3, 4, 5, 7(M), 13(verify only t, not df), 15], 25, 29(C or M), 31, 33(C or M) 41, 42, 43
Chapter 18: [1, 3, 5, 7, 9, 11, 13(optional), 17, 19], 21, 23, 27(optional), 29, 33, 35
Chapter 19: [1, 3(optional), 7], 15, 21(M), 25(M)
Review III: 1, 3, 5, 11, 13, 18, 19, 20, 31, 33
Chapter 20: [1, 3, 5, 7, 9, 13(optional)] 17, 21, 23, 25(M), 29, 33(M)
Chapter 21: [1ab(M), 3(M), 5, 7, 8(M), 11, 12, 13, 15, 16], 17, 18, 19, 21, 25, 26, 27, 29(M), 31(M), 35(M)
**First-Day Handout for Students**  
**MATH 1342 Elementary Statistics**  
**Session: Fall 2005 / Spring 2006 / Summer 2006**

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<th>Synonym and Section:</th>
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**Course Description:** A first course in statistics for students in business; nursing; allied health; or the social, physical, or behavioral sciences; or for any student requiring knowledge of the fundamental procedures for data organization and analysis. Topics include frequency distributions, graphing, measures of location and variation, the binomial and normal distributions, z-scores, t-test, chi-square test, F-test, hypothesis testing, analysis of variance, regression, and correlation.  
Prerequisites: Two years of high school algebra or the equivalent or a satisfactory score on the appropriate placement test. (MTH 1563)

**Statement of Prerequisite Requirements:** Students who have passed the TSI math or COMPASS math to be eligible for college-level courses have satisfied the math prerequisite requirement. Students should also have college-level reading skills. Students who are exempt from TSI should have had two years of high school algebra to satisfy the prerequisite.  
Students in MATH 1342 will be expected to:  
1. understand material from the text after reading it.  
2. do homework using fairly complicated formulas after seeing one example  
3. do some, but not much, algebraic manipulation of formulas

**Required Texts:**  
- *The Basic Practice of Statistics*, 3rd ed., by David S. Moore  
(The new text is packaged with an Upgrade Pack, which includes an electronic version of the *MINITAB Manual* and much more. See http://www.austincc.edu/mparker/1342/tf/ for details.)

**Required Technology:**  
1. Calculator with statistical functions. If you are buying a calculator, you might want to buy one that does both one-variable and two-variable statistical functions. (Can be purchased for under $20.) If you already have a calculator and don’t know whether it is adequate, ask your instructor.  
2. Access to MINITAB computer software. For classroom sections, **you are not expected to buy this.** It is available in the computer labs. Your instructor will give you a handout about using MINITAB at your campus. For information about the availability of MINITAB at other campuses, check the course website <http://www.austincc.edu/mparker/1342/tf/>. If, after you have become familiar with the software in the lab, you want to buy a copy, please see the appropriate section of that website for information. Or contact mparker@austincc.edu)

**Optional Material:**  
- *Study Guide*, etc. (Included in the Upgrade pack.)

**Instructional Methodology:** This course is taught in the classroom as a lecture/discussion course.  
**Course Rationale:** Students will learn to
1. Determine the aspects of a question, if any, for which statistics can provide relevant information.
2. Analyze statistical studies, particularly regarding appropriate sampling and experimental design.
3. Select and use appropriate statistical analyses to get useful information from data.
4. Communicate knowledge using standard statistical language and also interpret it in non-technical language.

This course meets the Core Curriculum requirement in mathematics. It meets the requirement for an introductory statistics course for students in many majors such as business, health sciences, and social sciences.

**Calendar:**

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<th>16-week semester</th>
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<th>5.5-week semester</th>
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<td>Week 5: 20, 21</td>
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<td>Week 6: 8, 9</td>
<td>Week 6: 14, 15, Review</td>
<td>1/2 week: optional chap., Final Exam</td>
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<td>Week 7: 10, 13</td>
<td>Week 7: 16, 17, 18</td>
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<td>Week 8: 14</td>
<td>Week 8: 19, Review, 20</td>
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<td>Week 9: 15, Review</td>
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<td>Week 10: 16, 17</td>
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<td>Week 11: 17, 18</td>
<td>Week 11: Final Exam</td>
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<td>Week 12: 19, Review</td>
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<td>Week 16: Final Exam</td>
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**Suggested Testing Scheme**

- Test 1: through Chapter 4
- Test 2: through Chapter 8, including the Part I Review after Chapter 6
- Test 3: through the Part II Review after Chapter 15 (omitting Chs. 11 & 12)
- Test 4: through the Part III Review after Chapter 19
- Test 5: through the end of the course

**Course objectives:** The departmental course objectives will be provided to the students as a part of the first-day handout. Find them at http://www.austincc.edu/mthdept2/tfcourses/obj1342.htm

**Grading policy:** The instructor’s grading criteria will be clearly explained in the first-day handout. The criteria will specify the number of exams and other graded material (homework, assignments, projects, etc.). Guidelines for other graded materials, such as homework or projects, should also be included in the syllabus. This must include an appropriate amount of work using MINITAB. These guidelines must also specifically include:

- Missed exam policy
- Policy about late work
- Class participation expectations

**Additional course policies:**
1. Course policies on the following topics will be included. Recommendations by this course committee and the mathematics department are listed below and may be modified by the instructor.
   - Incomplete Grades
   - Attendance
   - Withdrawals (must include withdrawal date)
   - Reinstatement policy (if the instructor allows this option)
   - Testing Center policies (if the instructor uses the Testing Center)
   - Course-specific support services

2. The following statements will be included and instructors must use the statements provided by the college/mathematics department and found in the front part of this Manual. Go to www.austincc.edu/mthdept5/mman05/statements.html Insert full statement for each of the following in your syllabus.
   - Statement on Students with Disabilities
   - Statement on Scholastic Dishonesty
   - Recommended Statement on Scholastic Dishonesty Penalty
   - Statement on Academic Freedom
   - Student Discipline Policy

Suggestions:

   - **Incomplete Grades**: Recommended version: “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.”

   - **Attendance Policy**: Following is the mathematics department’s recommended attendance policy for classes that meet two days per week in a 16-week term. Modifications should be made for classes of different lengths. Instructors must include some attendance policy, even if it is that attendance is not required.
     “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): Recommended version: “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 (include specific date), neither the student nor the instructor may initiate a withdrawal.”

   - **Reinstatement Policy**: If the instructor chooses to allow reinstatements, he must include a statement about the circumstances under which it is allowed. One possible statement is: “In order to be reinstated, the student must demonstrate that he is caught up with the required work as of the date on which he wishes to be reinstated. This must be done before the official last date to withdraw for the semester.”

   - **Testing Center**: Include “ACC Testing Center policies can be found at: http://www.austincc.edu/testctr” Then add any instructor-specific policies on the use of the testing center.

   - **Course-specific support services**: Recommended version: “ACC main campuses have Learning Labs which offer free first-come first-serve tutoring in mathematics courses. Students should bring their text, course handouts, and notes when they come to the Learning Lab. The locations, contact information and hours of availability of the Learning Labs are available from http://www.austincc.edu/tutor”