

Abilene Christian University

Department of Mathematics



MATH 120.01: Quantitative Reasoning

MTWR 8:00 – 11:50

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Required Text(s): The course text is required¹ and may be purchased in the campus book store, or ordered online at the student's discretion. Please bring this text with you to each class meeting.

Course Materials: A calculator is required for this course. At a minimum, students should have access to a calculator for use on tests, quizzes, and homework. Calculators will not be loaned out during class and cannot be exchanged between students during tests or quizzes. The department strongly recommends the TI-83 or TI-84 series of calculator. This will be the calculator supported during in class lectures.

Course Description: In MATH 120 and MATW 120, students use algebraic, graphical, and numerical reasoning to recognize patterns and structure, to model information, and to solve real-life problems. Students develop and use mathematical models to solve problems involving function relationships, chance, statistics, and finance. A graphing calculator is used to link modeling techniques and purely mathematical concepts. In addition, students analyze real-life problems within the context of a Christian world view. The ACU course catalog describes MATH 120 as follows:

MATH 120 Quantitative Reasoning (3-0-3), fall, spring, statistics and data analysis, mathematics of finance, probability, models including ratios and proportions, linear exponential, calculator intensive. Prerequisite: MATH SAT score of 500; MATH ACT score of 20; or COMPASS placement into MATH 120. For non-science, non-business majors. Will satisfy the Mathematics University Core requirements.

Although it is important to remember the basic material for a test, you will find that **memorizing without understanding** is not very useful. Throughout the text, we will use many diagrams, analogies, and examples to help you understand mathematical terminology, formulas, equations, and solution methods. If you work at understanding the intuitive meaning behind mathematical concepts, those ideas will become more engrained in your memory.

¹ **Mathematics All Around**, Pirnot, Thomas L., Addison Wesley, 4th edition, 2010.

Mission Statement: This course supports ACU’s mission statement of preparing students for Christian service and leadership throughout the world by providing students with a foundational understanding of mathematical principles such as problem solving and decision making, as well as exposing students to the role of mathematics in a Christian worldview.

Departmental Mission: The mission of the Department of Mathematics is to educate students to be quantitative and analytical thinkers in preparation for Christian service and leadership throughout the world.

Graded Components: The course grading components are listed below. The course will use a standard grading scale

90-100	80-89	70-79	60-69	Below 60
A	B	C	D	F

Component	Number of	Percent of Grade
Exams	3	60%
Quizzes	12 (best 10 taken)	20%
Reflection Papers	2	20%

Exams: There will be three exams given in the second session of each Thursday class meeting. The structure of each exam is basically the same: there will be a section devoted to problems that have appeared on quizzes, in class, or on the assigned homework, and there will be a section of open-response questions which challenge the student to think critically and examine the problem solving process. Each exam is worth 20% of your course grade. These exams may not be taken at another time except with prior permission by the instructor.

Quizzes: At the beginning of each session on Tuesday/Wednesday we will take a quiz over the previous day’s session’s content. This will result in 4 quizzes per week for a total of 12 quizzes during the Summer I session. Quizzes are designed to test the “major” topics and provide some feedback for your progress in the course.

Reflection Papers: Over the course of the semester there will be two reflection papers assigned. The topics for discussion are briefly described below. More information on these assignments will be made available at the appropriate time. Each reflection paper is worth 10% of your course grade.

Topic 1: Reasoning with Uncertainty (Due on the date of Exam 2)

Topic 2: What the Stats Tell Us About Christianity (Due on the date of Exam 3)

Attendance Policy: Your regular attendance is both necessary and expected. You are responsible for all material covered if absent and will be expected to take regularly scheduled exams at their designated times except under extraordinary circumstances at the discretion of the instructor. You may miss no more than 4 classes before you are dropped from the course. Due to the pace of the course it is recommended you miss no days.

Make Up Policy: Because quizzes serve to enforce attendance they cannot be taken at another time except with prior permission from your instructor. **After an assignment has been graded and handed back in class, it will not be accepted for a grade under any circumstance.** In the case of an university excused absence, it is the students' responsibility to make arrangements with the instructor regarding due dates. Exams cannot be made up if missed except under extraordinary circumstances at the discretion of the instructor.

Academic Integrity Policy: The university policy regarding academic integrity is available online at <http://www.acu.edu/campusoffices/provost> . Students found guilty of an act of academic dishonesty will be subject to the following discretionary actions in this course.

First Occurrence: A first violation will result in no credit for that particular assignment (even if it is an exam). No makeup will be allowed. The appropriate campus office(s) will be notified of the incident, and a notice of the incident will accompany your university records.

Second Occurrence: A second violation will result in your withdrawal from the course with a grade of F. A recommendation for suspension from the university will be made by the department.

Due to the usage of mobile devices on tests and quizzes, academic honesty will be closely monitored this semester. It is never permissible to use your mobile device to text, copy, or photograph any portion of the class work including but not limited to tests, quizzes, homework assignments, etc... Students found doing so will be guilty of an act of academic dishonesty and are subject to the above actions. Should you wish to use your device for one of these purposes please clear this with your instructor first.

Electronic Devices Policy: Please keep all phones on silent and turn off or silence beepers, pagers, alarms, .mp3 players etc... Headphones, listening to music, texting and other uses of these devices, not intended for class

purposes are strictly prohibited during class. Frequent disruptions or failure to abide by this policy will be viewed as disruptive behavior and are subject to being dismissed from the class and counted absent. If the disruptions continue you will be dropped from the course.

Disability Accommodations: If you have a documented disability and wish to discuss academic accommodations, please feel free to contact me. The ACU Student Disability Services Office (a part of Alpha Academic Services) facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Disability Services and you must complete a specific request for each class in which you need accommodations. Contact Disability Services at 674-2667 for further information or to set up an appointment.

Course Competencies: The course competencies, written in student performance terms, for this course are outlined in the table below. The competencies represent the skills a student should expect to master over the course of the semester.

Competency	Measurement Instrument	Measurement Standard
The student uses financial concepts to solve financial problems, to analyze financial situations, and to make financial decisions.	Exams Quizzes Assigned Readings In-Class Activities	<ol style="list-style-type: none"> 1. The student will solve a variety of financial problems involving simple and compound interest. 2. The student will solve annuity problems such as loans/mortgages, saving for retirement, and refinancing.
The student uses counting methods to calculate probabilities and interprets probabilities in real-world applications.	Exams Quizzes Assigned Readings In-Class Activities	<ol style="list-style-type: none"> 1. The student will apply the most appropriate counting techniques and calculate probabilities requiring counting techniques. 2. The student will interpret theoretical and empirical probabilities. 3. The student will calculate and interpret compound probabilities and use the results to interpret expected value.
The student uses graphs, measures of central tendency and spread, margin of error and confidence intervals, and concepts of the normal distribution to analyze data.	Exams Quizzes Assigned Readings In-Class Activities	<ol style="list-style-type: none"> 1. The student constructs frequency tables and various graphs to interpret data. 2. The student will compute measures of central tendency and spread as well as margin of error and confidence interval to interpret results of experiments.
The student uses techniques of mathematical modeling to analyze real world problems.	Exams Quizzes Assigned Readings In-Class Activities	<ol style="list-style-type: none"> 1. The student gathers data or information about a particular problem and sets up linear and exponential models describing the data. 2. The student uses models to predict or answer questions about real world problems.

Course Schedule: The lecture topics for this semester are listed below. Tests dates are announced in this schedule. The daily schedule will consist of the following basic schedule:

- 8:00 – 8:15 Quiz
- 8:15 – 9:00 Lecture
- 9:00 – 9:30 Group Problem Solving Session
- 9:30 – 10:00 Break
- 10:00 – 10:15 Quiz
- 10:15 – 11:00 Lecture
- 11:00 – 11:30 Group Problem Solving Session
- 11:30 – 11:55 Homework Help (if needed)

8:00 – 9:30		10:00 – 11:30	
5/16	Introduction to Sets and Counting	5/16	Permutations and Combinations
5/17	Empirical vs. Theoretical Probability, Odds	5/17	Complements and Unions
5/18	Conditional Probability	5/18	Expected Value
5/19	CD: Reasoning with Uncertainty	5/19	Exam 1
5/23	Measures of Center: Mean, Median, Mode	5/23	Measures of Spread: Standard Deviation
5/24	Normal Distributions: Z-Scores, 68-95-99.7	5/24	Normal Distributions: Normal CDF, InvNorm
5/25	Linear Models and Correlation	5/25	Linear Regression Analysis
5/26	CD: What the Stats Tell us About Christianity	5/26	Exam 2
5/30	Percent Change, Simple Interest	5/30	Compound Interest, Continuous Compounding
5/31	Annuities	5/31	Annuities and Retirement
6/1	Loan Amortization Schedules	6/1	Home Mortgages
6/2	CD: Credit Cards	6/2	Exam 3

Suggested Homework Problems: The following is a list of homework problems from the textbook. Each problem is tied to one or more course objectives and should be considered practice for exams and quizzes. For some students, being well prepared will mean working many more problems than those listed below as this is a minimal list.

Test 1

13.2 #9, 11, 13, 15, 17, 19, 21, 29

13.3 #35, 37, 41, 44, 47, 51, 55

14.1 #15, 21, 23, 25, 29, 31, 35, 45

14.2 #9, 11, 13, 15, 19, 21, 23, 29, 33

14.3 #5, 9, 13, 15, 23, 25, 27, 29, 45, 47

14.4 #11, 19, 21, 23, 25, 27

14.5 #15, 17, 19, 21, 23, 27

Test 2

15.1 #1, 13, 14, 17, 19, 21, 29, 41

15.2 #7, 13, 17, 21, 23, 25, 31, 43, 45, 57

15.3 #7, 15, 19, 21, 23, 27, 33, 37

15.4 #5, 9, 17, 27, 35, 57, 61, 63, 68, 71, 75, 87

15.5 #3, 4, 5, 7, 13, 15, 17, 20

7.2 #19, 21, 23, 25, 27, 31, 33, 41

Test 3

9.1 #37, 41, 51, 53, 55, 61, 79, 80

9.2 #7, 11, 19, 27, 31, 35, 39, 49, 53, 61, 73, 75

9.4 #1, 3, 11, 17, 19, 35, 37, 39, 41, 51, 61, 62, 63

9.5 #11, 15, 17, 19, 21, 25, 27, 29, 31, 37, 49

7.4 #5, 19, 25, 47, 49, 51, 53, 55, 57, 59