Mathematics for Modern Technology

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1 Course Description

Course: 2030:161 Mathematics for Modern Technology
Credits: 4
Prerequisite: Placement test or completion of 2010:052, 054, 057, or 084 with a grade of C or better.
Bulletin Description: Prerequisite: Placement test or completion of 2010:052, 054, 057, or 084 with a grade of C or better. Lines, linear regression, sets, counting, basic probability, basic statistics, binomial and normal distributions, mathematics of finance, symbolic logic, arguments, logic circuits.

2 Course Outcomes

After completing this course the student should have the following competencies:

1. the ability to graph lines, find equations of lines, and use linear regression lines in applications;
2. an understanding of the mathematics of finance including simple interest, compound interest, annuities, present value, future value, the APR, and consumer loans;
3. an understanding of sets and basic counting techniques and their uses;
4. the ability to compute simple probabilities and odds;
5. the ability to compute and apply modes, medians, means, expected values and standard deviations;
6. an understanding of the binomial and normal distributions and their applications;
7. an understanding of basic symbolic logic, arguments, and logic circuits.

3 General Education Learning Outcomes

Students will demonstrate foundational competency in creating and evaluating reasoned arguments and employing quantitative, qualitative, and normative information in such arguments. In particular, students employ the appropriate analysis and application of quantitative information, such that they:

1. Identify the value and limitations of magnitude (i.e., how large) and multitude (i.e., how many) measures;
2. Manipulate and express such measures with arithmetic, algebraic, geometric, and statistical methods;
3. Manipulate and express such measures with graphs, charts, and tables;
4. Manipulate and express such measures to solve practical and multistage problems.

In the course outline given below, a bold number indicates that the associated topic addresses the general education learning outcome with that number.

4 Course Outline

1. Lines
   (a) The concept of slope **1**
   (b) Graphing a line using its slope **1**, **3**
   (c) The point-slope, slope-intercept and general forms of a line
   (d) Mathematical modeling using linear functions **1**, **3**, **4**
   (e) Systems of linear equations and their applications
   (f) Linear regression and its applications **3**, **4**
2. Mathematics of Finance
   (a) Simple and compound interest: compound amount, present value, effective rate **1**, **2**
   (b) Ordinary annuities: present value, future value **1**, **2**
   (c) Amortization of loans **2**, **3**, **4**
   (d) Sinking funds **2**
   (e) IRAs, discount points, variable-rate mortgages, interest-only mortgages, the add-on method (all optional)
   (f) Difference equations (optional)
   (g) Financial mathematics using difference equations (optional)
3. Sets and Counting **1**
   (a) Basic set theory
   (b) The inclusion-exclusion principle
   (c) The multiplication principle
   (d) Permutations
   (e) Combinations
4. Probability
   (a) Experiments, outcomes, sample spaces, events **1**

     (b) The definition of probability **1**, **3**
     (c) Basic probability rules
     (d) Computing probabilities **1**, **2**
5. Statistics
     (a) Random variables, probability distributions, histograms **3**
     (b) The mean, expected value, and odds **1**, **2**, **4**
     (c) The median and mode **1**, **2**
     (d) Variance and standard deviation **1**, **2**, **4**
     (e) The binomial distribution **1**, **2**
     (f) The normal distribution and applications **1**, **2**, **4**
6. Logic
     (a) Symbolic logic: statements, and, or, not, implication
     (b) Truth tables
     (c) Logical equivalence
     (d) Arguments, rules of inference
     (e) Logic circuits

5 Textbook

Finite Mathematics: For the Managerial, Life, and Social Sciences. Soo T. Tan. Cengage Learning, Eleventh Edition, 2012.

The following sections of the text should be covered in this course:

Chapter 1: 1.1 (review), 1.2, 1.3, 1.4, 1.5
    Note: There is no need to cover the distance formula or the equation of a circle in section 1.1.
Chapter 6: 6.1, 6.2, 6.3, 6.4
Chapter 7: 7.1, 7.2, 7.3, 7.4
Chapter 8: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6
Chapter 5: 5.1, 5.2, 5.3
    Note: The text does not contain material on IRAs, discount points, variable-rate mortgages, interest-only mortgages, the add-on method, or difference equations.
Appendix A: A.1, A.2, A.3, A.4, A.5, A.6

6 Calculator Policy

All students are **required** to have a **scientific** or graphing calculator with minimum functionality equivalent to that of the **Texas Instruments TI–30X IIS** calculator. Every student is **required** to have possession of their calculator by the end of the first week of classes. No exceptions to this policy will be made by the instructor.

7   Artifacts

During selected semesters, a student-produced artifact to be used for formative assessment of the effectiveness of the university's general education program will be collected, scanned, and stored securely. The artifact is an exam covering counting, probability, and basic statistics.