



## Course Syllabus

### **Math 1324 – Mathematics for Business and Social Sciences I**

*Revision Date: 01/11/2017*

**Catalog Description:** The application of common algebraic functions, including polynomial, exponential, logarithmic, and rational, to problems in business, economics, and the social sciences are addressed. The applications include mathematics of finance, including simple and compound interest and annuities; systems of linear equations; matrices; linear programming; and probability, including expected value.

**Lecture hours = 3, Lab hours =0**

**Prerequisites:** TSI Math Complete

**Semester Credit Hours: 3**

**Lecture Hours per Week: 3**

**Lab Hours per Week: 0**

**Contact Hours per Semester: 48**

**State Approval Code: 27.0301.52 19**

#### **Core Components and Related College Student Learning Outcomes**

This course counts as part of the academic requirements of the Panola College Core Curriculum and an Associate of Arts or Associate of Science degree.  Yes  No: If no, skip to Instructional Goals.

The items below marked with an X reflect the state-mandated outcomes for this course **IF this is a CORE course:**

- Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information
  - CT1: Generate and communicate ideas by combining, changing, or reapplying existing information
  - CT2: Gather and assess information relevant to a question
  - CT3: Analyze, evaluate, and synthesize information
- Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication
  - CS1: Develop, interpret, and express ideas through written communication
  - CS2: Develop, interpret, and express ideas through oral communication
  - CS3: Develop, interpret, and express ideas through visual communication
- Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
  - EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion
  - EQS2: Manipulate and analyze observable facts and arrive at an informed conclusion

- Teamwork – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
  - TW1: Integrate different viewpoints as a member of a team
  - TW2: Work with others to support and accomplish a shared goal
- Personal Responsibility – to include the ability to connect choices, actions, and consequences to ethical decision-making
  - PR1: Evaluate choices and actions and relate consequences to decision-making
- Social Responsibility – to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities
  - SR1: Demonstrate intercultural competence
  - SR2: Identify civic responsibility
  - SR3: Engage in regional, national, and global communities

**Instructional Goals and Purposes:**

The purpose of this course is to demonstrate:

1. Competence in solving  $m \times n$  linear systems and in solving problems leading to an  $m \times n$  system.
2. Competence in solving a linear programming problem given an objective function and a system of constraints.
3. Competence in formulating the objective function and a system of constraints necessary to solve a stated problem.
4. Competence in graphing functions which are not linear, in the algebra and composition of functions, and their application to problem solving.
5. Competence in solving problems involving compound interest, compound discount, ordinary simple annuities, and debt extinction by amortization and sinking funds.
6. Competence in solving problems involving permutations, combinations, and probability.

**Learning Outcomes: [from the ACGM catalog]**

After studying all materials and resources presented in the course, the student will be able to:

1. Apply elementary functions, including linear, quadratic, polynomial, rational, logarithmic, and exponential functions to solving real-world problems.
2. Solve mathematics of finance problems, including the computation of interest, annuities, and amortization of loans.
3. Apply basic matrix operations, including linear programming methods, to solve application problems.

4. Demonstrate fundamental probability techniques and application of those techniques, including expected value, to solve problems.
5. Apply matrix skills and probability analyses to model applications to solve real-world problems.

**Course Content:**

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will learn the following content:

Sets, Linear Equations, and Functions

1. Give an example of and/or use in an applied situation the following symbols and terms a. set builder (set specification) notation b. null or empty set c. element d. universal set e. subset f. proper subset g. equality of sets h. total number of possible subsets (and proper and nonempty) of a given set
2. Define the following terms: a. relation b. domain c. range d. function
3. Apply (identify) the above terms in applied problems.
4. Sketch the graph of a relation and determine by using the function vertical line test if it is the graph of a function.
5. Determine the domain and range of a relation that is specified via a graph.
6. Determine the slope of a line given two ordered pairs.
7. Determine the slope of any given horizontal line.
8. Identify the slope of any given vertical line as **undefined**.
9. Given two sets of ordered pairs, determine if the indicated line segments are parallel, perpendicular, or neither.
10. Graph an equation of the form  $y = c$  or  $x = c$ , where  $c$  is a constant.
11. Graph an equation of the form  $y = mx + b$ .
12. Write the equation of a line when given a point and the slope.
13. Write the equation of a line when given a point and the equation of a line parallel or perpendicular to the desired line.
14. Write the equation of a line when given two points on that line.
15. Write the equation of a line when given the x- and y-intercepts of that line.
16. Write a linear cost function when given the variable cost and the fixed costs.
17. Write a cost function when given that (i) the function is linear and (ii) ordered pairs  $(q,p)$
18. Solve a system of equations using the addition/elimination method.
19. Translate word problems into systems of equations and solve.
20. Find the breakeven point when given a linear cost function and a linear revenue function. **1**

21. Find the market equilibrium point given the supply equation and the demand equation.
22. Determine the dimensions of a given matrix.
23. Write a zero matrix, given the dimensions.
24. Determine the conformability of two matrices for addition.
25. Add or subtract two (or more) conformable matrices.
26. Determine the conformability of two matrices to regular matrix multiplication.
27. Multiply two conformable matrices.
28. Find the dot product of two vector matrices.
29. Show, by example, that matrix multiplication is not commutative.
30. Solve a system of linear equations using the Gauss-Jordan Elimination Method.
31. Solve a system of linear equations that is dependent.
32. Identify a system of linear equations as having "no solution."
33. Give a geometric interpretation to the solution(s) of a system of linear equations.
34. Find the inverse of a given nonsingular matrix and use it to solve a system of linear equations.
35. Graph systems of linear inequalities.
36. Determine the values of  $x$  and  $y$  that maximize or minimize some linear function  $f(x,y)$  subject to a set of constraints.
37. Solve applied linear programming problems.
38. Compute simple interest.
39. Write a specified number of terms of a sequence.
40. Find certain specified terms of an arithmetic sequence.
41. Find sums of a specified number of terms of a given arithmetic sequence.
42. Compute the compound (future) amount and compound interest of money invested where interest is compounded at regular intervals.
43. Compute the compound (future) amount and interest on money where interest is compounded continuously.
44. Compute the effective annual interest rate of money invested at compound interest.
45. Find certain specified terms of a geometric series.
46. Find the sum of a specified number of terms of a given geometric sequence.
47. Compute the amount (future value) of an ordinary annuity.
48. Compute the present value of an ordinary annuity.
49. Compute the regular payments required to amortize a debt.
50. Compute the amount that must be invested periodically in a sinking fund to discharge a debt or other financial obligation at some specified time in the future.
51. Apply the multiplication rule to find the number of ways an event can happen.

52. Determine the number of permutations of  $n$  things taken  $r$  at a time (both with and without repetition),  $nPr$ .
53. Determine the number of permutations of  $n$  given objects when  $p$  of the  $n$  objects are alike and of one kind,  $q$  of the objects are alike of a second kind, ..., up to  $t$  others alike of still another kind.
54. Determine the number of circular permutations of  $n$  distinct objects.
55. Determine the number of combinations of  $n$  distinct objects taken  $r$  at a time,  $nCr$ .
56. **Optional: Use combinations to expand a binomial by the binomial theorem.**
57. **Optional: Find a specified term of a given binomial raised to a given power without expansion.**
58. Define the following terms: (i) sample space (ii) sample point (iii) event (iv) compound event
59. Given an experiment, describe a suitable sample space.
60. Define & compute the probability of an event,  $E$ , occurring.
61. Define mutually exclusive events.
62. Define the probability of the complement of the event  $E$ .
63. Define random selection and use it in finding the probability of an event,  $E$ , occurring.
64. Determine the hyper-geometric probability of an event occurring.
65. Define conditional probability and find  $P(B|A)$
66. Find  $P(A \text{ and } B)$  when  $P(A)$  and  $P(B|A)$  are available.
67. Find  $P(A \text{ or } B)$ .
68. Define independent events and apply this concept to finding probabilities in applied problems.

#### **Methods of Instruction/Course Format/Delivery:**

Methods of Instruction/Course Format/Delivery: Methods employed will include Lecture/demonstration, discussion, problem solving, analysis, and reading assignments. Homework will be assigned. Faculty may choose from, but are not limited to, the following methods of instruction:

1. Lecture
2. Discussion
3. Internet
4. Video
5. Television
6. Demonstrations
7. Field trips
8. Collaboration
9. Readings

#### **Major Assignments/Assessment:**

Faculty may assign both in- and out-of-class activities to evaluate students' knowledge and abilities. Faculty may choose from – but are not limited to -- the following methods attendance, class preparedness and participation. Collaborative learning projects, exams/tests/quizzes, homework, internet, library assignments, readings, research papers, scientific observations, student-teacher conferences, and written assignments.

The Mathematics department does not accept late work.

**Assessment(s):**

1. Exam per Chapter
2. Comprehensive Final Exam

**Course Grade:**

<b>Assignment Weights</b>	
Class Participation	10%
Homework/Quiz Average	15%
Exams	55%
Comprehensive Final Exam	20%

**Letter Grades for the Course will be assigned as follows:**

A: 90 < Average < 100

B: 80 < Average < 90

C: 70 < Average < 80

D: 60 < Average < 70

F: 00 < Average < 60

**Texts, Materials, and Supplies:**

- Textbook: Finite Mathematics with Calculus and Applications. 9<sup>th</sup> Edition. Lial, Greenwell and Ritchey ISBN 9780321749086
- MyMathLab Access
- Canvas Access
- Scientific Calculator

**Other:**

- For current texts and materials, use the following link to access bookstore listings: <http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to <http://www.panola.edu/student-success/disability-support-services/> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder*: <http://www.panola.edu/student-success/documents/pathfinder.pdf>

