Syllabus for
MAT 151—Mathematics and Society
3 Credit Hours
Spring 2006

I. COURSE DESCRIPTION

A study of the pattern and order in the universe, including creative thought in making conjectures based on inductive reasoning and application in problem-solving using deductive reasoning. Covers problem-solving, statistics, geometry, finance, and logic. (Does not count toward a major or minor in mathematics. Writing-intensive sections are available.)
Academic technology fee: $45.

II. COURSE GOALS

The purpose of this course is to enable the student to do the following:

A. Recognize God's pattern and order in the universe.
B. Become mathematically literate.
C. Engage in proportional, hypothetical, logical, and indirect reasoning.
D. Construct inductive and deductive arguments.
E. Develop the ability to use numbers to describe and model natural phenomena in daily life in order to better understand the world around them and solve real-world problems.
F. Develop the ability to use inductive and deductive reasoning to recognize, extend, and generalize patterns and arguments.
G. Learn George Polya's four-step problem-solving framework and apply it in a variety of problem-solving experiences.
H. Learn to use statistics to evaluate and interpret the vast amount of information that is presented in the media today.
I. Make wise financial decisions in the areas of sales, annuities, loan payments, credit card interest, and mortgages.
J. Recognize the world to be composed of planes, angles, straight lines, and smooth curves based on Euclidean geometry.
K. Determine how to apply the properties and theorems of Euclidean geometry to problems of length, area, and volume.
L. Study the relationship between the English system of measurements widely used in the United States and the Metric system of measurements used the world-over.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

A. Unit Objectives

1. Unit 1—Finance

Upon successful completion of this unit, the student will be able to do the following:

a. Convert a percent to a decimal or fraction and convert decimals and fractions to percents.
b. Discuss the uses and abuses of percentages.
c. Use scientific notation.
d. Use estimation to solve problems and make projections.
e. Compute simple interest.
f. Compute compound amount and compound interest.
g. Find the effective annual interest rate of a given loan or investment.
h. Calculate the monthly payments for principal and interest for loans of various lengths at various interest rates.

i. Demonstrate sound reasoning in making financial decisions by working with a team and completing a project written report.
j. Calculate interest and new balance for credit cards.
k. Calculate the annuity necessary to save a given amount of money for retirement.
l. Calculate the amount in a saving plan after depositing a given annuity at certain intervals into a savings plan.

2. Unit 2—Principles of Reasoning and Critical Thinking Skills

Upon successful completion of this unit, the student will be able to do the following:

a. Identify common fallacies.
b. Identify and use the basics of mathematical logic.
c. Construct truth tables.
d. Describe the difference between inductive and deductive reasoning.
e. Determine the validity and soundness of deductive arguments.
f. Identify different types of sequences and determine a general rule for some types of sequences.

3. Unit 3—Geometry and Problem Solving

Upon successful completion of this unit, the student will be able to do the following:

a. Identify the major techniques for problem solving.
b. Identify and find the measure of the following types of angles:
   (1.) Acute
   (2.) Obtuse
   (3.) Right
   (4.) Straight
   (5.) Vertical
c. Use the Pythagorean Theorem to find the length of a side of a right triangle given the measures of the other two sides.
d. Identify and find the values of certain parts or the following types of triangles:
   (1.) Equilateral
   (2.) Isosceles
   (3.) Right
   (4.) Acute
   (5.) Obtuse
   (6.) Equiangular
e. Identify the following types of polygons:
   (1.) Trapezoids
   (2.) Parallelograms
   (3.) Rhombuses
   (4.) Rectangles
   (5.) Squares
f. Find the perimeter of a given polygon.
g. Find the circumference of a given circle.
h. Find the area of the following types of figures:
   (1.) Rectangles
   (2.) Squares
   (3.) Parallelograms
   (4.) Triangles
   (5.) Trapezoids
   (6.) Circles
i. Find the surface area of the following types of solids:
   (1.) Rectangular solids
   (2.) Right circular solids

(3.) Spheres

j. Find the volume of the following types of solids:
   (1.) Rectangular solids
   (2.) Right circular cylinders
   (3.) Spheres

k. Identify and use the following prefixes in the metric system:
   (1.) Kilo-
   (2.) Hecto-
   (3.) Deka-
   (4.) Deci-
   (5.) Centi-
   (6.) Milli-

l. Use unit analysis to solve problems.

m. Name the basic unit of length in the metric system.

n. Convert between the various metric units for measuring length, and use conversion tables to convert our customary units of length to metric units and vice versa.

o. Name the basic unit of weight in the metric system and describe the relationship between this unit and the basic unit of volume.

p. Convert between the various metric units for measuring weight and use conversion tables to convert our customary units of weight to metric units and vice versa.

q. Describe the Celsius thermometer and convert Fahrenheit degree readings to Celsius and vice versa.

r. State and explain Polya's four-step process for problem solving.

s. Use Polya's problem-solving framework to solve problems.

t. Research and report as part of a team of students on a topic relating mathematics to other areas of life, such as nature, history, fine arts, etc.

4. Unit 4—Statistics

Upon successful completion of this unit, the student will be able to do the following:

a. Determine the believability of a statistical study.

b. Construct the following types of graphs from a given set of data.
   (1.) Vertical bar graph
   (2.) Horizontal bar graph
   (3.) Comparative bar graph
   (4.) Pictogram
   (5.) Circle graph
   (6.) Frequency distribution table
   (7.) Histogram
   (8.) Frequency polygon

c. State four measures of central tendency and distinguish among them.

d. Compute the mean, median, mode, and midrange for a given set of data.

e. Determine the shape of a given distribution.

f. Find the five number summary of a set of data.

g. State two measures of dispersion and distinguish between them.

h. Compute the range, variance, and standard deviation for a given set of data.

i. Calculate what percentage of normally distributed data is within a given number of standard deviations from the mean.

j. Determine the margin of error of a given set of data.

k. Discuss the possible validity of a statistical study.

IV. TEXTBOOKS

A. Required Textbooks

Bennett, J. O. and Briggs, W. L., et. al. (2005). *Math and Society, Custom Edition for Oral Roberts University with materials by Susan R. Carr and Dr. Vincent Dimiceli*. Reading, Mass.: Addison-Wesley.

B. Required Materials

A scientific calculator (a programmable calculator is not recommended)

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.
2. Double cuts are assessed for absences immediately preceding or following holidays.
3. Students taking a late exam because of an unauthorized absence are charged a late exam fee.
4. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software. By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means.
5. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.
6. Students are to be in compliance with University, school, and departmental policies regarding ePortfolio requirements. Students should consult the ePortfolio handbooks for requirements regarding general education and the students' majors.
    a. The penalty for not submitting electronically or for incorrectly submitting an ePortfolio artifact is a zero for that assignment.
    b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.

B. Department Policies and Procedures

1. Each Student who uses the computer is given access to the appropriate computer resources. These limited resources and privileges are given to allow students to perform course assignments. Abuse of these privileges will result in their curtailment. Students should note that the contents of computer directories are subject to review by instructors and the computer administrative staff.
2. A fee of $15.00 will be assessed for all late exams. This policy applies to all exams taken without notifying the professor prior to the regularly scheduled exam time, and to all exams taken late without an administrative excuse.

C. Course Policies and Procedures

1. Evaluation Procedures
    a. Daily assignment scores are weighted to comprise 20 percent of the course grade.
    b. There are four one-hour examinations, each scored on a 100-point scale. These points are weighted to comprise 40 percent of the course grade.
    c. There are two projects, each scored on a 100-point scale. These points are

weighted to comprise 20 percent of the course grade. The ePortfolio artifact is a reflection paper that counts as 10 percent of the group research project score and therefore is 1 percent of your course grade.

d. The final exam is weighted to make up 20 percent of the course grade.

e.

Daily Assignments	20% of course grade
Hour Examinations	40% of course grade
Projects	20% of course grade
Final Examination	20% of course grade

f. Grades will be assigned as follows:

Percentage		**Grade**
90 - 100	-	**A**
80 - 89	-	**B**
70 - 79	-	**C**
60 - 69	-	**D**
0 - 59	-	**F**

2. ePortfolio Requirements

a. An ePortfolio artifact is required for this course. The ePortfolio artifact for this course is a 200-250 word reflection paper that summarizes ideas discovered in the group research project. For specific assignment requirements and to view the rubric that will be used to assess the assignment for ePortfolio, check the General education ePortfolio handbook at http://eportfolio.oru.edu/servlet/page?_pageid=1883&_dad=portal30&_schema=PORTAL30&p_page=GEH and click on the "General Education ePortfolio Handbook Fall 2005" link.

b. Artifacts not submitted electronically or incorrectly submitted receive a zero for that assignment.

VI. COURSE CALENDAR

Lesson	Text	Topic	#	Assignment
1	***Prologue***	Literacy for the Modern World	***1***	5, 7
2	***App. A***	Arithmetic & Geometric Sequences	***2***	8, 12, 14, 18, 22, 26, 30, 40, 44, 48, 50, 52, 56, 60, 62
3	***3A***	**Finance**: Uses and Abuses of Percentages	***3***	8, 12, 20, 26, 30, 34, 44, 48, 56, 62, 64, 66, 70, 74, 76
4	***4A***	**Finance**: The Power of Compounding	***4***	10, 14, 16, 18, 26, 32, 36, 40, 46, 48
5	***4A***	Annual Percentage Yield	***5***	52, 54, 62, 66, 72, 74
6	***4C***	Loan Payments & Mortgages	***6***	8, 14, 18, 24, 26, 30, 38, 46, 50
7	***App. C***	Mortgages	***7***	Payment Necessary: 1-6
8	***App. D***	Credit Cards	***8***	Credit Card: 1-3
9	***4B***	Savings Plans	***9***	10, 18, 24, 28, 32, 36, 40, 46, 48
10		Review		
11		**EXAM I: UNIT 1**		
12	***1A***	**Thinking Critically**: Rec. Fallacies	***10***	6, 10, 14, 18, 24, 30, 32, 34
13	***1B***	Propositions and Truth Values	***11***	12, 18, 20, 24, 26, 32, 36, 40, 44, 54
14	***1B***	Propositions and Truth Values	***12***	60, 64, 66, 68, 72, 76, 78, 82, 94, 96
15	***1C***	Sets and Venn Diagrams	***13***	14, 16, 20, 22, 32, 34, 40, 46, 50, 54
16	***1C***	Sets and Venn Diagrams	***14***	60, 64, 66, 68, 70
17	***1D***	Analyzing Arguments	***15***	16, 18, 22, 30-36 evens
18	***1D***	Analyzing Arguments	***16***	40-48 evens, 54-60 evens
19		Review		
20		**EXAM II: UNIT 2**		
21	***2A***	The Problem Solving Power of Units	***17***	8, 10, 22, 28, 30, 34, 38, 40, 48, 58, 66, 78
22	***2B***	Standardized Units	***18***	8, 14, 16, 20, 24, 28, 38, 42, 50, 56, 60
23	***2C***	Problem Solving	***19***	10, 12, 16, 18, 26
24	***10A***	Fundamentals of Geom.: Plane Geom.	***20***	12, 16, 18, 22, 26,30
25	***10A***	Fund. of Geom.: Perimeter & Area	***21***	32, 36, 40, 42, 44, 48, 52, 84
26	***10A***	Fundamentals of Geom.: Surface Area, Volume & Surface Area to Vol. Ratio	***22***	54, 56, 58, 60, 76-80, 86

Lesson	Text	Topic	#	Assignment
27	***10A***	Fundamentals of Geom.: Scaling Laws & Pythagorean Theorem	***23***	62-70 evens 10B: 52, 54, 84, 86
28		Review		
29		**EXAM III: UNIT 3**		
30	***5A***	**Statistics**: Fundamental of Statistics	***24***	18, 26, 28, 32, 34, 36, 40, 44, 48, 52, 58
31	***5B***	Should You Believe a Stat. Study?	***25***	6, 10, 16, 20, 22, 26, 30, 34, 38, 43
32	***5C***	Statistical Tables and Graphs	***26***	8, 14, 16, 20, 24, 26, 30, 36, 38, 42
33	***6A***	Characterizing a Data Distribution	***27***	8, 12, 14, 16, 20, 22, 26, 34, 36, 38
34	***6B***	Measures of Variation	***28***	8-24 evens
35	***6C***	The Normal Distribution	***29***	6, 10-28 evens
36	***6C***	The Normal Distribution	***30***	30-42 evens
37	***6D***	Statistical Inference (If time permits.)	***31***	16-32 evens
38		Review		
39		**EXAM IV: UNIT 4**		
40		Project Presentations		
41		Project Presentations		
44		Final Exam Review		
		FINAL EXAM—COMPREHENSIVE		

Course Inventory for ORU's Student Learning Outcomes

MAT 151 Mathematics and Society
Spring 2006

This course contributes to the ORU student learning outcomes as indicated below:
Significant Contribution – Addresses the outcome directly and includes targeted assessment.
Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment.
Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment.
No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

OUTCOMES & Proficiencies/Capacities	Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1	**Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A	Biblical knowledge			X	
1B	Sensitivity to the Holy Spirit			X	
1C	Evangelistic capability			X	
1D	Ethical behavior		X		
2	**Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A	Critical thinking	X			
2B	Information literacy		X		
2C	Global & historical perspectives			X	
2D	Aesthetic appreciation			X	
2E	Intellectual creativity		X		
3	**Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A	Healthy lifestyle				X
3B	Physically disciplined lifestyle				X
4	**Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A	Communication skills		X		
4B	Interpersonal skills		X		
4C	Appreciation of cultural & linguistic differences			X	
4D	Responsible citizenship		X		
4E	Leadership capacity			X	