Syllabus for
MAT 151—Mathematics and Society
3 Credit Hours
Spring 2011

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, finance and logic. (Does not count toward a major or minor in mathematics. Writing-intensive sections are available.)

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, insurance, annuities, loan payments, credit card interest, and mortgages.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

A. Unit Objectives

1. Unit 1— Problem Solving and Patterns
   Upon successful completion of this unit, the student will be able to do the following:
   a. Describe the difference between inductive and deductive reasoning.
   b. Identify different types of sequences and determine a general rule for some types of sequences.
   c. Use Polya's problem-solving framework to solve problems.
   d. Identify the Fibonacci sequence and discuss its relationship to objects in nature.
   e. Discuss applications of the golden ratio.

f. Discuss Pascal's triangle and its applications.
g. Describe fractals and their applications.
h. 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.

2. Unit 2—Logic and Critical Thinking

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

a. Identify and use the basics of mathematical logic.
b. Write a negation.
c. Construct truth tables.
d. Decide whether a statement is true or false.
e. Determine whether statements are equivalent.
f. Write the converse, inverse, and contrapositive of an "if then" statement.
g. Analyze arguments and identify fallacies.
h. Determine the validity and soundness of deductive arguments.

3. Unit 3— 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.

4. Unit 4— 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 estimation to solve problems and make projections.
d. Compute simple interest.
e. Compute compound amount and compound interest.
f. Find the effective annual interest rate of a given loan or investment.
g. Calculate the monthly payments for principal and interest for loans of various lengths at various interest rates.

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

B. Objectives for Students in Teacher Preparation Programs

The course goals for the Teacher Preparation Program now meet the "competency-based" requirements established by the Oklahoma Commission on Teacher Preparation. This course meets Subject Competencies 5,6,and 7.

SC5: Understands significant connections among mathematical ideas and the applications of these ideas to problem solving in mathematics, in other disciplines, and in the world outside of school.
SC6: Has experiences with practical applications of mathematical ideas and is able to incorporate these in curricular and instructional decisions.
SC7: Is proficient in, at least, the mathematics content needed to teach the mathematics skills described in Oklahoma's core curriculum, from multiple perspectives. This includes, but is not limited to, a concrete and abstract understanding of number systems and number theory, geometry and measurement, statistics and probability, functions, algebra, discrete mathematics, and calculus necessary to effectively teach the mathematics skills addressed in the first through eighth grade in the Oklahoma core curriculum.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

A. Required Materials
1. Textbooks
Miller, Charles D. *Mathematical Ideas*. Pearson Addison Wesley, 2008.
ISBN: 9780321526687 (Includes textbook, Student Solutions Manual, and MyMathLab access code)
2. Other
A MyMathLab packet (access code) should have been packaged with the textbook. If for some reason a student purchases a textbook without the MyMathLab access packet then the student will be required to purchase a separate MyMathLab packet in order to be able to complete the homework assignments. The MyMathLab packet includes an online version of the textbook.
ISBN: 9780321199911
3. A scientific calculator (a programmable calculator is not recommended)

B. Optional Materials
None

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. Students taking a late exam because of an unauthorized absence are charged a late exam fee.
3. 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, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:
    a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;
    b. Failing to meet group assignment or project requirements while claiming to have done so;
    c. Failing to cite sources used in a paper;
    d. Creating results for experiments, observations, interviews, or projects that were not done;
    e. Receiving or giving unauthorized help on assignments.

    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. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.
4. 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.
5. Students are to be in compliance with university, school, and departmental policies regarding Whole Person Assessment (WPA) requirements. Students should consult the WPA handbooks for requirements regarding general education and the students' majors.
    a. The penalty for not submitting electronically or for incorrectly submitting an 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. Student must receive permission of professor to take a late exam.
3. Any student whose unexcused absences total 33% or more of the total number of class sessions will receive an F for the course grade.

C. Course Policies and Procedures

1. Evaluation Procedures

a. Daily assignment scores are weighted to comprise 10 percent of the course grade. All daily assignments are facilitated through coursecompass.com. Students are required to purchase access to this program in order to complete the homework assignments for each section. If a student feels a need for additional practice after completing the MyMathLab homework assignment, then he or she can use additional problems from the text chapters and student study guide.

b. There are four unit projects, each scored on a 100-point scale. These points are weighted to comprise 40 percent of the course grade. The WPA artifact is a reflection paper that counts as 10 percent of the research project score from unit one – Problem Solving & Patterns, and therefore is 1 percent of your course grade.

c. There is one midterm exam on a 100-point scale. These points are weighted to comprise 20 percent of the course grade.

d. The final exam is weighted to make up 30 percent of the course grade.

e.

Daily Assignments	10% of course grade
Unit Projects (4 total)	40% of course grade
Midterm Examination	20% of course grade
Final Examination	30% 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. Whole Person Assessment Requirements

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

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

VI. COURSE CALENDAR

*All homework assignments should be completed through MyMathLab and the coursecompass.com website.

Lesson	Text	Topic	Assignment*
1	***1.1***	Solving Problems by Inductive Reasoning	*See details in CourseCompass
2	***1.2***	Number Patterns: Sequences	
3	***1.3***	Strategies for Problem Solving	
4	***5.4***	Fibonacci Sequence and Golden Ratio	
5	***11.4***	Pascal's Triangle	
6	***9.8***	Fractals	
7		Review	
8		***Project One***	
9		*Project Presentations*	
10		*Project Presentations*	
11		*Project Prsentations*	
12	***3.1***	Statements and Quantifiers	
13	***3.2***	Truth Tables	
14	***3.3***	The Conditional	
15	***3.4***	More on Conditional	
16	***3.5***	Analyzing Arguments (Euler Diagram)	
17	***3.5***	Analyzing Arguments (Euler Diagram)	
18	***3.6***	Analyzing Arguments (Truth tables)	
19	***3.6***	Analyzing Arguments (Truth tables)	
20		Review	
21		***Project Two***	
22		**Midterm Exam: UNIT 1 & 2**	

Lesson	Text	Topic	Assignment*
23	***14.1***	Time Value of Money	
24	***14.1***	Time Value of Money	
25	***14.2***	Installment Buying (Credit)	
26	***14.3***	Truth in Lending	
27	***14.4***	Mortgages and Home Ownership	
28	***14.4***	Mortgages and Home Ownership	
29	***14.5***	Financial Investments	
30	***14.5***	Financial Investments	
31		***Project Three***	
32	***13.1***	Visual Displays of Data	
33	***13.1***	Visual Displays of Data	
34	***13.2***	Measures of Central Tendency	
35	***13.3***	Measures of Dispersion	
36	***13.4***	Measures of Position	
37	***13.5***	Normal Distribution	
38	***13.5***	Normal Distribution	
39	***13.6***	Regression & Correlation	
40		Review	
41		***Project Four***	
42		Final Exam Review	
43		Final Exam Review	
		FINAL EXAM—COMPREHENSIVE	

Course Inventory for ORU's Student Learning Outcomes

MAT 151—Mathematics and Society
Spring 2011

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	