Modesto Junior College
Course Outline of Record

MATH 101

I. OVERVIEW
The following information will appear in the 2009 - 2010 catalog

MATH-101 Mathematical Ideas and Applications 3 Units

Prerequisite: Satisfactory completion of MATH 90 or equivalent placement by MJC assessment process.

A general education course emphasizing the role of mathematics in civilization, the nature of mathematical thought, and applications of mathematics. Field trips are not required. Course is applicable to the associate degree. General Education:
CSU-GE - B4
IGETC Category: IGETC - 2M

II. LEARNING CONTEXT
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

   a. Mathematical reasoning and problem solving.

   b. The role of mathematics in civilization:
      i. Development of mathematical concepts
      ii. Significant questions leading to new mathematical developments
      iii. Contributions of various individuals and cultures to modern mathematics

   c. Mathematical content areas - at least four will be studied:
      i. Number concepts and numeration systems
      ii. Euclidean and non-Euclidean geometry
      iii. Number theory
      iv. Probability and statistics
      v. Linear programming and the Simplex Method
      vi. Group theory
      vii. Markov chains and Matrix Theory
      viii. Combinatorics
      ix. Graphs and networks
      x. Voting theory
xi. Cryptanalysis
xii. Mathematics of art and music
xiii. Analytic geometry and calculus
xiv. Mathematics of finance
xv. Set theory and Venn diagrams
xvi. Symbolic logic and truth tables
xvii. Other topics (with approval of the course supervisory committee)

B. ENROLLMENT RESTRICTIONS

1. Prerequisites
Satisfactory completion of MATH 90 or equivalent placement by MJC assessment process.

2. Requisite Skills
Before entering the course, the student will be able to:

a. Graph lines and find the equation of a line, given sufficient information.
b. Effectively use function notation to describe mathematical relationships.
c. Determine the domain and range of a given function.
d. Given a relation between two variables, determine if the relation is a function.
e. Graph linear, quadratic, absolute value, and simple cubic functions using transformations.
f. Solve systems of linear equations in two or three variables by choosing the most effective method for the given problem.
g. Solve linear, quadratic, absolute value, and rational inequalities.
h. Solve quadratic equations with real and complex solutions by completing the square and using the quadratic formula.
i. Graph quadratic functions by determining and using the vertex and stretching constant.
j. Add, subtract, multiply, and divide complex numbers.
k. Convert radicals to rational exponents and vice versa.
l. Add, subtract, multiply, divide, or compose two given functions.
m. Find the inverse of a given function.
n. Graph exponential and logarithmic functions using transformations.
o. Solve exponential and logarithmic equations.
p. Simplify expressions using the properties of logarithms.
q. Identify the equations for and sketch the graphs of conic sections.
r. List a requisite number of terms of a given arithmetic, geometric, or recursive sequence.

s. Determine the general term of a given arithmetic or geometric sequence.

t. Determine the sum of a fixed number of terms of an arithmetic or geometric series, and determine the sum of an infinite geometric series when it exists.

u. Solve problems involving permutations, combinations, and probability.

C. **HOURS AND UNITS**

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<thead>
<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lect</td>
<td>54.00</td>
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<tr>
<td>Lab</td>
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<td>0</td>
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<tr>
<td>Disc</td>
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3 Units

D. **METHODS OF INSTRUCTION (TYPICAL)**

Instructors of the course might conduct the course using the following method:

1. Lecture and discussion for presentation of material

2. Demonstrations of mathematical techniques, applications and problem solving strategies by both instructor and students

3. Application of material to specific problems in homework and/or in-class exercises

4. Homework assignments and in-class exercises require students to analyze problems and apply appropriate procedures to solve them.

E. **ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**
   
   Time spent on coursework in addition to hours of instruction (lecture hours)

   1. Daily homework assignments requiring at least two hours per class hour.

   2. Daily review of class notes and readings from the text.

   3. Review and preparation for examinations, including the final exam.

2. **EVIDENCE OF CRITICAL THINKING**

   Assignments require the appropriate level of critical thinking

   1. In a survey of 275 community college students 120 were females, 160 were transfer students, and 187 were under 25 years of age. Furthermore, 100 were female transfer students, 120 were transfer students under 25, and 70 were female transfer students who were under 25 years of age. How many students were male transfer students? How many were transfer students who were at least 25 year old? How many were male non-transfer students who are at least 25 years old? How many were females or transfer students?

   2. A stereo system contains 50 transistors. The probability that a given transistor will fail in 100,000 hours of use is 0.0005. Assume the failures of the various transistors are independent of one another. What is the probability that no transistors will fail in the first 100,000 hours of use?

F. **TEXTS AND OTHER READINGS (TYPICAL)**

III. **DESIRED LEARNING**

A. **COURSE GOAL**
   
   As a result of satisfactory completion of this course, the student should be prepared to:

   Solve applied problems, apply the principles of inductive and deductive logic, and analyze and evaluate mathematical systems.

B. **STUDENT LEARNING GOALS**

   Mastery of the following learning goals will enable the student to achieve the overall course goal.

   1. **Required Learning Goals**
      
      Upon satisfactory completion of this course, the student will be able to:

      a. apply algebraic techniques to solve problems in various mathematical disciplines.
      
      b. distinguish between inductive and deductive reasoning, describe the effectiveness and limitations of each, and apply each as necessary to the solution of problems.
      
      c. name famous mathematicians and list some of their important contributions.
      
      d. describe the development of mathematics from prehistory to the present, including the contributions of various cultures.
      
      e. for at least four mathematical content areas:
         1. Describe the relationship of the area to mathematics as a whole and to other disciplines as appropriate.
         2. List important problems, techniques, and individuals.
         3. Apply the techniques of the area to solve problems.
         4. Describe applications of the area to problems outside of mathematics.

IV. **METHODS OF ASSESSMENT (TYPICAL)**

A. **FORMATIVE ASSESSMENT**

   1. Tests and quizzes given at regular intervals.
   
   2. Daily homework assignments.
   
   3. Reports and projects (optional).

B. **SUMMATIVE ASSESSMENT**

   1. A two to three hour final exam, excluding group and multiple choice.