College of San Mateo
Course Outline

☐ New Course
☒ Update/No change
☐ Course Revision (Minor)
☐ Course Revision (Major) Date: 14 February 2011

Department: Mathematics **Number: MATH 145**

Course Title: Liberal Arts Mathematics **Units: 3**

Total Semester Hours **Lecture: 48** **Lab: 0** **Homework: 80** **By Arrangement: 16**

Length of Course
- ☒ Semester-long
- ☐ Short course (Number of weeks___)
- ☐ Open entry/Open exit

Grading
- ☒ Letter
- ☐ Pass/No Pass
- ☐ Grade Option (letter or Pass/No Pass)

Faculty Load Credit (To be completed by Division Office; show calculations.)**: 48/16 = 3 FLCs**

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

MATH 120 or MATH 123 or appropriate score on the College Placement Test and other measures as appropriate.

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

None

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

READ 400 or an equivalent level of reading proficiency.

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)

Minimum of 48 lecture hours plus 16 hours by arrangement. *Prerequisite:* MATH 120 or MATH 123 *or* appropriate score on the College Placement Test and other measures as appropriate. *Recommended preparation:* READ 400 or an equivalent level of reading proficiency. An examination of important concepts of mathematics and of mathematics as a tool for decision making. Topics and applications may include aspects of the history of mathematics, problem solving, counting methods, elementary number theory, sets, Euclidean and non-Euclidean geometry, Platonic solids, topology and logic. (AA, Area C1/Area E2c; CSU Area B4; UC: Area 2A*)

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)

An examination of important concepts of mathematics and of mathematics as a tool for decision making. Topics and applications may include aspects of the history of mathematics, problem solving, counting methods, elementary number theory, sets, Euclidean and non-Euclidean geometry, Platonic solids, topology and logic. Plus 16 hours by arrangement. Extra supplies may be required as well. *Prerequisite:* MATH 120 or MATH 123 *or* appropriate score on the College Placement Test

and other measures as appropriate. *Recommended preparation:* READ 400 or an equivalent level of reading proficiency. (AA, Area C1/Area E2c)

6. Student Learning Outcomes (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

1. **Clearly describe the application of and model a variety of modes of thinking to deduce and to solve mathematical problems including:**
   a. **Numerical estimation**
   b. **Proof by contradiction, and other methods of proof**
   c. **Identification of mathematical patterns**
   d. **Using analogy (a simpler version of a complex mathematical idea)**
   e. **Examination of familiar mathematics from a fresh perspective**
   f. **Using recursive (or iterative) processes**
   g. **Employing reflective trial and error in mathematical problems**

2. **Examine the same mathematics from various points of view, and describe or explain what is common to the points of view and what is specific.**

7. Course Objectives (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. In this case, "Same as Student Learning Outcomes" is appropriate here.)*

Course Objectives are the same as the Student Learning Outcomes.

8. Course Content (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, a sample course syllabus with timeline may be attached.)

1. **Problem Solving using mathematical puzzles to see patterns and develop strategies.**
2. **Number Theory**
   a. **Natural numbers, prime numbers and patterns**
   b. **Rational and irrational numbers**
   c. **Fibonacci and other sequences**
3. **Finite and infinite sets**
   a. **Basic notions of set theory**
   b. **Cardinality, and determining whether two infinite sets area of equal cardinality**
   c. **Cantor sets**
4. **Geometry**
   a. **Euclidean geometry (including Platonic solids, the Golden ratio, and proofs of the Pythagorean Theorem)**
   b. **Non-Euclidean Geometry**
5. **Other topics**
   a. **Complex Numbers**
   b. **Fractals and chaos**
   c. **Probability and Statistics**
   d. **Voting systems and fair division of resources**

6. **History of mathematics (Typically, the history of the development of the various topics is treated as the topics are treated)**

9. Representative Instructional Methods (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Describe out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills. **If hours by arrangement are required, please indicate the additional instructional activity which will be provided during these hours, where the activity will take place, and how the activity will be supervised.**)

A. **Instructor prepares and chooses out-of-class assignments (exercises and readings) to be completed by students either online or in written form.**

B. **Guided discussion of topics either in class or online, and lectures and explanations to clarify hard-to-grasp concepts.**

C. **Written essay assignments incorporating mathematical modeling or exposition of applications of mathematics. Typically, students are asked to write up several (often three) short essays on set questions that the instructor determines are doable and to put together a larger project that may be presented to the class as a whole.**

D. **Critical thinking: Small group problem solving proposed solutions are evaluated in light of constraints of the problem.**

E. **Resources available on CD and the Internet may be used to supplement the text.**

F. **Hours by arrangement are completed by working on assignments in the Math Resource Center under the supervision of mathematics instructors working there.**

10. Representative Methods of Evaluation (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

A. **Completed individual assignments and/or journal either in paper form or written online: to demonstrate individual student progress toward objectives.**

B. **Small group presentations: to reflect student participation in problem solving process.**

C. **Written exams/quizzes: to demonstrate student knowledge of vocabulary, concepts, and application of concepts to problem solving as presented in lectures and discussion, small group sessions, and text readings.**

D. **A Final Examination or Final project: to demonstrate student knowledge of vocabulary, concepts, and applications of concepts to problem solving as presented in classwork for the entire course, or to demonstrate the ability to apply what has been learnt to a topic "not covered" in the normal class work. The instructor may determine a number of feasible projects from which students or groups of students choose to develop a Final Project.**

E. **Participation: to reflect student involvement in class discussions, in small group sessions and in presentations.**

11. Representative Text Materials (With few exceptions, texts need to be current. Include publication dates.)

Texts: Burger, Edward B and Michael Starbird, ***The Heart of Mathematics: An Invitation to Effective Thinking.*** 2010, Hoboken, NJ: John Wiley & Sons. ISBN: 9780470424766.

Tannenbaum, Peter, ***Excursions in Modern Mathematics 7e.*** 2010, Upper Saddle River, NJ: Pearson. ISBN: 9780321568038.

Lippman, David ***Math in Society*** downloadable free at http://dlippman.imathas.com/mathinsociety/ or in paper form from www.lulu.com/product/paperback/math-in-society/13504964

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Submission Date: _____