Course ID: MATH R102
Curriculum Committee Approval Date: 10/10/2018
Catalog Start Date: Fall 2019

COURSE OUTLINE

OXNARD COLLEGE

I. Course Identification and Justification:
   A. Proposed course id: MATH R102
      Banner title: Math for Elem. School Teachers
      Full title: Mathematics for Elementary School Teachers

      Previous course id: MATH R102
      Banner title: Math for Elem. School Teachers
      Full title: Mathematics for Elementary School Teachers

   B. Reason(s) course is offered:
      This course is transferable to both the CSU and UC systems, fulfills area D2 of Oxnard College's general education pattern, area B4 of CSU GE-Breadth, Area 2 of IGETC, and is articulated with the lower-division math requirement in the Liberal Studies major at many CSUs for students, the major recommended for students planning to pursue a multiple-subject credential to teach elementary school.

   C. Reason(s) for current outline revision:
      Updating the prerequisites to reflect the new AB 705 placement guidelines.

   D. C-ID:
      1. C-ID Descriptor: MATH 120
      2. C-ID Status:

   E. Co-listed as:
      Current: None
      Previous:

II. Catalog Information:
   A. Units:
      Current: 4.00
      Previous: 4.00

   B. Course Hours:
      1. In-Class Contact Hours:
         Lecture: 52.5 Activity: 0 Lab: 52.5
      2. Total In-Class Contact Hours: 105
      3. Total Outside-of-Class Hours: 105
      4. Total Student Learning Hours: 210

   C. Prerequisites, Corequisites, Advisories, and Limitations on Enrollment:
      1. Prerequisites
         Current:
         MATH R005: Beginning and Intermediate Algebra for Statistics and Liberal Arts
         or
         MATH R015: Beginning and Intermediate Algebra or

MATH R032: Intermediate Algebra for Non-STEM Majors or
MATH R033: Pathway to STEM or
MATH R014: Intermediate Algebra or
MATH R014B: Intermediate Algebra II or
Placement as determined by the college's multiple measures assessment process.

Previous:
MATH R032: Intermediate Algebra for Non-STEM Majors or
MATH R014: Intermediate Algebra or
MATH R014B: Intermediate Algebra II

2. Corequisites
   Current:
   Previous:

3. Advisories:
   Current:
   Previous:

4. Limitations on Enrollment:
   Current:
   Previous:

D. Catalog description:
Current:
This course is designed for candidates pursuing an elementary teaching credential. It focuses on the development of quantitative reasoning skills through in-depth, integrated, hands-on explorations of topics in mathematics, including the real number system and subsystems, patterns and sequences, basic set theory, logic, and mathematical induction. Emphasis is on comprehension and analysis of mathematical concepts and applications of logical reasoning.

Previous, if different:

E. Fees:
Current: $ None
Previous, if different: $

F. Field trips:
Current:
Will be required: [ ]
May be required: [ ]
Will not be required: [X]

Previous, if different:
Will be required: [ ]
May be required: [ ]
Will not be required: [ ]

G. Repeatability:
Current:
A - Not designed as repeatable

Previous:
A - Not designed as repeatable

H. Credit basis:
Current:
Letter Graded Only [X]
Pass/No Pass [ ]
Student Option [ ]

Previous, if different:
Letter Graded Only [ ]
Pass/No Pass [ ]
Student Option [ ]

I. Credit by exam:
Current:
Petitions may be granted: [ ]
Petitions will not be granted: [X]

Previous, if different:
Petitions may be granted: [ ]
Petitions will not be granted: [ ]

III. Course Objectives:
Upon successful completion of this course, the student should be able to:

A. Compare numeration systems, including their calculations and historical development, with attention to base numeration systems, place values, exponents, and scientific notation.
B. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances.
C. Analyze algorithms from number theory to determine divisibility in a variety of settings, such as different base systems and modular arithmetic.
D. Analyze the structure of least common multiples and greatest common factor/divisors and their role in standard algorithms.
E. Explain the concepts of rational numbers, using both ratio and decimal representations; analyze the arithmetic algorithms for these two representations; and justify their equivalence.
F. Analyze the structure and properties of whole, rational, and real number systems; define the concept of rational and irrational numbers, including their decimal representation; and illustrate the use of a number line representation.
G. Construct conceptual understanding of mathematical topics through the use of patterns, problem solving, communication, connections, modeling, reasoning, and representation.
H. Enhance an activity to demonstrate an example from the curriculum standards.

IV. Student Learning Outcomes:

A. Student will compare numerations systems, including their historical development, with attention to base numeration systems, exponents, scientific notation, and place value.
B. Students will analyze the structure of least common multiple and greatest common factors/divisors and their role in standard algorithms.

V. Course Content:

Topics to be covered include, but are not limited to:

A. Numeration systems
   1. Tally system
   2. Egyptian numerals (additive principle)
   3. Roman numerals (subtractive principle)
   4. Chinese numerals (multiplicative principle)
   5. Mayan numerals (place values)
   6. Hindu-Arabic numerals (place values)
   7. Place value systems with different bases
   8. Computations with different base systems

B. Basic set theory and logic
   1. Definition and concepts
   2. Set operations
   3. Venn diagrams
   4. Relations and functions
   5. DeMorgan's Laws
   6. Truth tables
   7. Equivalent statements
   8. Deductive reasoning
   9. Contradictions
   10. Tautologies

C. Integers
   1. Structure and basic properties
   2. Computational algorithms
   3. Algorithms for basic operations
      a. "standard" algorithm
      b. alternative algorithm

D. Basic number theory
   1. Divisibility
   2. Prime and composite numbers
   3. Prime factorization
   4. Fundamental Theorem of Arithmetic
   5. Least common multiple
   6. Greatest common factor/divisor
   7. Basic number theory applications on modular systems

E. Rational numbers
   1. Structure and basic properties
   2. Ratio and proportion

F. Real numbers
   1. Structure and basic properties
   2. Integer exponents and decimals
   3. Arithmetic operations
   4. Rational and irrational numbers
   5. Decimal representation
   6. Number line representation
   7. Irrational numbers

G. Beyond procedure mathematics
   1. Patterns and sequences
      a. Arithmetic
      b. Geometric
      c. Mathematical induction
   2. Problem solving
      a. Proportional reasoning
      b. Rates and ratios
      c. Using proportions

d. Using percent
e. Geometry
i. Perimeter
ii. Area
iii. Pythagorean Theorem

H. Probability and statistics
1. Concepts of probability
2. Representing data
3. Mean, median, and mode
4. Counting techniques

I. National and state curriculum standards for elementary school mathematics
1. California State Mathematics Framework
2. Common Core State Standards

VI. Lab Content:
Class demos on course content including:
A. Integers and number theory
B. Prime factorizations
C. Fundamental Theorem of Arithmetic
D. Least common multiple
E. Greatest common factor/divisor
F. Basic number theory applications on modular systems
G. Number line representation
H. Perimeter
I. Area
J. Concepts of probability
K. Representing data
L. Mean, median, mode
M. Counting techniques

VII. Methods of Instruction:
Methods may include, but are not limited to:
A. Lecturing and demonstrating examples of concepts, for example, class discussion of addition of natural numbers using numerous methods
B. Lab work, consisting of completing lab exercises in text, such as manipulating multi-base blocks and Cuisenaire rods to demonstrate fractional operations
C. Use of manipulative tools, both in lecture and lab, to give alternative explanation and support of key concepts, such as finding a Least Common Multiple (LCM)
D. Small group work to practice mathematical skills and problem-solving techniques, such as to develop an algorithm or mathematical model
E. Students may present results of special research of journals or web sites for samples of lessons pertaining to material presented in the course topics. Topics include set theory, number systems, algorithms for basic operations, geometry, probability and statistics.

VIII. Methods of Evaluation and Assignments:
A. Methods of evaluation for degree-applicable courses:
Essays [X]
Problem-Solving Assignments (Examples: Math-like problems, diagnosis & repair) [X]
Physical Skills Demonstrations (Examples: Performing arts, equipment operation) [ ]

For any course, if "Essays" above is not checked, explain why.

B. Typical graded assignments (methods of evaluation):
1. Students work in small groups to practice and to share multiple approaches to solving problems. With this background, students will answer related homework problems sets. These are graded by the instructor, returned to the students, and

discussed. For example, students will analyze data using Venn Diagrams, demonstrate the use of manipulative blocks, C-Rods, in explaining mathematical operations and processes, or justify their C-Rods towers representation for their choice of least common multiple or greatest common factor.

2. Midterm examinations will include questions addressing objectives covered at that point in the course. Students will demonstrate their analysis of the situation, create a solution and justify their choice. For example, students will explain to a third-grader the meaning of "4 times 5." The students will determine an appropriate approach, will describe the process, and will explain the advantages and disadvantages of their choice of algorithm.

C. Typical outside of classroom assignments:
   1. Reading
      a. Students will be required to read textbook material on topics covered in class. This includes set theory, number systems, algorithms for basic operations, geometry, probability and statistics
   2. Writing
      a. Students will be required to complete textbook problem sets. Homework assignments may require written responses. One example may require an explanation of process or an anecdotal situation in problems involving probability and statistics
   3. Other
      a. Students may do a literature search of journals or web sites for samples of lessons pertaining to material presented in the course topics. Topics include set theory, number systems, algorithms for basic operations, geometry, probability and statistics

IX. Textbooks and Instructional Materials:
   A. Textbooks/Resources:
      1. Julian Weissglass (1990). *Exploring Elementary Mathematics: A Small-Group Approach for Teaching* (Latest edition /e). Kendall-Hunt Publishing.
      2. Musser, G.L., Burger, W.F., & Peterson, B.E. (2011). *Mathematics for Elementary Teachers* (9th/e). John Wiley & Sons, Inc..
   B. Other instructional materials:
      1. Various manipulative tools, designed for hands-on learning in lab settings
      2. Calculators

X. Minimum Qualifications and Additional Certifications:
   A. Minimum qualifications:
      1. Mathematics (Masters Required)
   B. Additional certifications:
      1. Description of certification requirement:
      2. Name of statute, regulation, or licensing/certification organization requiring this certification:

XI. Approval Dates
Curriculum Committee Approval Date: 10/10/2018
Board of Trustees Approval Date: 10/10/2018
State Approval Date:
Catalog Start Date: Fall 2019