

MATH R102: MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS

Originator

ptrujillo

College

Oxnard College

Discipline (CB01A)

MATH - Mathematics

Course Number (CB01B)

R102

Course Title (CB02)

Mathematics for Elementary School Teachers

Banner/Short Title

Math for Elem. School Teachers

Credit Type

Credit

Start Term

Fall 2023

Catalog Course Description

This course is designed for candidates pursuing an elementary teaching credential. It focuses on the development of quantitative reasoning skills through in-depth, integrated 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.

Taxonomy of Programs (TOP) Code (CB03)

1701.00 - Mathematics, General

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

C - Satisfies AA/AS Analytical Thinking/Mathematics competency

Support Course Status (CB26)

N - Course is not a support course

Field trips

Will not be required

Grading method

(L) Letter Graded

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

52.5

Maximum Contact/In-Class Lecture Hours

52.5

Activity

Laboratory

Minimum Contact/In-Class Laboratory Hours

52.5

Maximum Contact/In-Class Laboratory Hours

52.5

Total in-Class

Total in-Class

Total Minimum Contact/In-Class Hours

105

Total Maximum Contact/In-Class Hours

105

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Minimum Outside-of-Class Hours

105

Maximum Outside-of-Class Hours

105

Total Student Learning

Total Student Learning

Total Minimum Student Learning Hours

210

Total Maximum Student Learning Hours

210

Minimum Units (CB07)

4

Maximum Units (CB06)

4

Prerequisites

Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process.

Entrance Skills

Entrance Skills

Algebraic fluency with expressions and equations. Understanding functions and graphs.

Requisite Justification

Requisite Type

Prerequisite

Requisite

Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process

Requisite Description

Course in a sequence

Level of Scrutiny/Justification

Content review

Student Learning Outcomes (CSLOs)

Upon satisfactory completion of the course, students will be able to:

- | | |
|---|--|
| 1 | Compare numerations systems, including their historical development, with attention to base numeration systems, exponents, scientific notation, and place value. |
|---|--|

- 2 Analyze the structure of least common multiple and greatest common factors/divisors and their role in standard algorithms.

Course Objectives

Upon satisfactory completion of the course, students will be able to:

- | | |
|---|--|
| 1 | Compare numeration systems, including their calculations and historical development, with attention to base numeration systems, place values, exponents, and scientific notation. |
| 2 | Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances. |
| 3 | Analyze algorithms from number theory to determine divisibility in a variety of settings, such as different base systems and modular arithmetic. |
| 4 | Analyze the structure of least common multiples and greatest common factor/divisors and their role in standard algorithms. |
| 5 | Explain the concepts of rational numbers, using both ratio and decimal representations; analyze the arithmetic algorithms for these two representations; and justify their equivalence. |
| 6 | 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. |
| 7 | Construct conceptual understanding of mathematical topics through the use of patterns, problem solving, communication, connections, modeling, reasoning, and representation. |
| 8 | Enhance an activity to demonstrate an example from the curriculum standards. |

Course Content

Lecture/Course Content

1. Numeration systems
 - a. Tally system
 - b. Egyptian numerals (additive principle)
 - c. Roman numerals (subtractive principle)
 - d. Chinese numerals (multiplicative principle)
 - e. Mayan numerals (place values)
 - f. Hindu-Arabic numerals (place values)
 - g. Place value systems with different bases
 - h. Computations with different base systems
2. Basic set theory and logic
 - a. Definition and concepts
 - b. Set operations
 - c. Venn diagrams
 - d. Relations and functions
 - e. DeMorgan's Laws
 - f. Truth tables
 - g. Equivalent statements
 - h. Deductive reasoning
 - i. Contradictions
 - j. Tautologies
3. Integers
 - a. Structure and basic properties
 - b. Computational algorithms
 - c. Algorithms for basic operations
 - i. "Standard" Algorithm
 - ii. Alternative Algorithm
4. Basic Number Theory
 - a. Divisibility
 - b. Prime and composite numbers
 - c. Prime factorization
 - d. Fundamental Theorem of Arithmetic
 - e. Least common multiple

- f. Greatest common factor/divisor
- g. Basic number theory applications on modular systems
- 5. Rational numbers
 - a. Structure and basic properties
 - b. Ratio and proportion
- 6. Real numbers
 - a. Structure and basic properties
 - b. Integer exponents and decimals
 - c. Arithmetic operations
 - d. Rational and irrational numbers
 - e. Decimal representation
 - f. Number line representation
 - g. Irrational numbers
- 7. Beyond procedure mathematics
 - a. Patterns and sequences
 - i. Arithmetic
 - ii. Geometric
 - iii. Mathematical induction
 - b. Problem solving
 - i. Proportional reasoning
 - ii. Rates and ratios
 - iii. Using proportions
 - iv. Using percent
 - v. Geometry
 - 1. Perimeter
 - 2. Area
 - 3. Pythagorean Theorem
- 8. Probability and Statistics
 - a. Concepts of probability
 - b. Representing data
 - c. Mean, Median, and Mode
 - d. Counting techniques
- 9. National and State Curriculum Standards for Elementary School Mathematics
 - a. California State Mathematics Framework
 - b. Common Core State Standards

Laboratory or Activity Content

Class demos on course content including:

1. Integers and Number Theory
2. Prime factorizations
3. Fundamental Theorem of Arithmetic
4. Least Common Multiple
5. Greatest Common Factor or Divisor
6. Basic number theory applications on modular systems
7. Number line representation
8. Perimeter
9. Area
10. Concepts of probability
11. Representing data
12. Mean, Median, Mode
13. Counting techniques

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

- Written expression
- Problem solving exercises

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
 Essay exams
 Laboratory activities
 Laboratory reports
 Objective exams
 Oral analysis/critiques
 Problem-solving exams
 Quizzes
 Essays
 Problem-Solving Assignments

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
 Class activities
 Class discussions
 Collaborative group work
 Computer-aided presentations
 Demonstrations
 Distance Education
 Group discussions
 Guest speakers
 Instructor-guided interpretation and analysis
 Instructor-guided use of technology
 Internet research
 Laboratory activities
 Lecture
 Small group activities

Describe specific examples of the methods the instructor will use:

Methods may be, but not limited to:

1. Lectures and demonstrations of concepts (e.g. class discussion of addition of Natural Numbers using numerous teaching methods)
2. Lab Work consisting of completing lab exercises from the textbook (e.g. manipulating multi-base blocks and Cuisenaire Rods to demonstrate fractional operations)
3. Use of manipulative tools, both in lecture and lab, to give alternative explanations and in support of key concepts (e.g. finding a Least Common Multiple)
4. Small Group Work to practice mathematical skills and problem-solving technique (e.g. developing an algorithm or mathematical model)

Students may present results of special research of journal or web sites for samples of lessons pertaining to material presented as part of the course topics. Examples of some topics include set theory, number systems, algorithms for basic operations, geometry, probability, and statistics.

Representative Course Assignments

Writing Assignments

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.

Critical Thinking Assignments

Students will analyze data or elementary school student work and determine outcomes and conclusions. For example, use Venn Diagrams to represent the data; using the diagrams, the students will present their findings and outcomes about the situation.

Reading Assignments

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.

Problem-Solving and Other Assignments (if applicable)

1. 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.

Outside Assignments**Representative Outside Assignments**

1. Students will be required to complete textbook problem sets. Homework assignments may require written responses.
2. Students will analyze data or elementary school student work and determine outcomes and conclusions.
3. Students will be required to read textbook material on topics covered in class.
4. Students may do literature searches of journals or web sites for examples of lessons pertaining to material presented in the course topics.
5. Students will practice the use of mathematical teaching manipulatives learned in class.

Articulation**C-ID Descriptor Number**

MATH 120

Status

Approved

Comparable Courses within the VCCCD

MATH M10 - Mathematics for Elementary Teachers

MATH V38 - Mathematics for Elementary School Teachers

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type

Textbook

Description

Julian Weissglass (1990). *Exploring Elementary Mathematics: A Small-Group Approach for Teaching* (Latest edition). Kendall-Hunt Publishing.

Resource Type

Textbook

Description

Musser, G.L., Burger, W.F., Peterson, B.E. (2011). *Mathematics for Elementary Teachers* (9th). John Wiley Sons, Inc..

Resource Type

Other Instructional Materials

Description

Various manipulative tools, designed for hands-on learning in lab settings.

Resource Type

Other Instructional Materials

Description

Calculators.

Resource Type

Textbook

Classic Textbook

Yes

Description

A Problem Solving Approach to Mathematics for Elementary School Teachers (13th Edition), Billstein, Libeskind, Sholmo, Lott, Johnny, Boschmans, Barbara, Pearson (2020).

Distance Education Addendum

Definitions

Distance Education Modalities

- Hybrid (1%–50% online)
- Hybrid (51%–99% online)
- 100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post to a Discussion Board their problem and offer detailed solutions to another student's problem.
Synchronous Dialog (e.g., online chat)	Students will prepare a problem, discuss their possible solutions in a Small Discussion Group, and determine the "best" solution.
Other DE (e.g., recorded lectures)	Students will view instructor-prepared or outside-sourced videos.
Video Conferencing	Students will attend Zoom class sessions or presentations.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post to a Discussion Board their problem and offer detailed solutions to another student's problem.
Synchronous Dialog (e.g., online chat)	Students will prepare a problem, discuss their possible solutions in a Small Discussion Group, and determine the "best" solution.
Other DE (e.g., recorded lectures)	Students will view instructor-prepared or outside-sourced videos.
Video Conferencing	Students will attend Zoom class sessions or presentations.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post to a Discussion Board their problem and offer detailed solutions to another student's problem.
Synchronous Dialog (e.g., online chat)	Students will prepare a problem, discuss their possible solutions in a Small Discussion Group, and determine the "best" solution.
Other DE (e.g., recorded lectures)	Students will view instructor-prepared or outside-sourced videos.
Video Conferencing	Students will attend Zoom class sessions or presentations.

Examinations**Hybrid (1%–50% online) Modality**

On campus
Online

Hybrid (51%–99% online) Modality

On campus
Online

Primary Minimum Qualification

MATHEMATICS

Review and Approval Dates**Department Chair**

05/09/2023

Dean

05/09/2023

Technical Review

05/10/2023

Curriculum Committee

05/10/2023

DTRW-I

MM/DD/YYYY

Curriculum Committee

MM/DD/YYYY

Board

MM/DD/YYYY

CCCCO

MM/DD/YYYY

Control Number

CCC000323813

DOE/accreditation approval date

MM/DD/YYYY