MATH 0585 - FOUNDATIONS OF MATHEMATICS

SECTION A

1. Division:	Sciences & Mathematics
2. Subject Code:	MATH
3. Course Number:	0585
4. Course Title:	FOUNDATIONS OF MATHEMATICS
5. Semester of First Offering:	FALL 2016

SECTION B General Course Information

1.Units: 6.0 **Variable Units:** N/A

2.This Course is: Nondegree-Applicable Credit - Basic Skills

3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		**5. Standard Term Total Semester Hours**	
Lecture/Discussion:	6	Lecture/Discussion:	108
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	6	**Total Hours :**	108

6. Minimum hours per week of independent work done outside the class: 12

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is REQUIRED to be completed previous to enrollment in this course.)

Placement by matriculation assessment process

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does not refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated only if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

- ☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.
- ☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.
- ☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Covers the topics of numeracy, algebraic reasoning and computation, proportional reasoning, critical thinking and problem solving through application, and math confidence. Explores student attitudes towards mathematics and develops student-specific study skills and learning strategies. Topics covered include: history of numbers, the real number system, mathematical operations, order of operations, linear equations, graphing, proportions, and applications.

Course Outline Information

10. Student Performance Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

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

Numeracy (History, Number Sense and Operation Sense)
1. Recognize and discuss the contributions of ancient civilizations to our present system of numbers.
2. Classify, locate, and compare real numbers.
3. Recognize equivalent quantities and perform conversions (between decimals, fractions, mixed numbers, percents).
4. Compute the sum, difference, product and quotient of real numbers.
5. Execute basic order of operations and demonstrate the effects of common operations, both in words and in symbols.

Algebraic Reasoning and Computation
6. Understand the use of variables to represent quantities in a variety of forms, including equations, formulas, and graphs.
7. Construct and solve equations representing relationships involving one or more unknown quantities.
8. Compute sums, differences, and products of polynomials and solve and interpret applications.
9. Understand the difference between an expression and an equation and demonstrate the appropriate mathematic process to follow based on this difference.
10. Convert mathematical representations, including linear and quadratic equations, into visual, graphical interpretations.

Proportional Reasoning
11. Recognize and compare proportional relationships presented in different ways.
12. Apply quantitative reasoning to solve applied problems with proportional relationships.

Critical Thinking and Problem Solving
13. Demonstrate an ability to perform higher level mathematics reasoning beyond computational skills.
14. Demonstrate critical thinking by analyzing ideas, patterns, and principles.
15. Construct equations to solve applied problems.
16. Demonstrate flexibility in examining multiple strategies to finding the solution.

Math Confidence
17. Demonstrate fluency with mathematical vocabulary, terminology, and notation through written and oral presentation.
18. Identify their attitude towards mathematics and their learning needs through self-reflection.
19. Implement student-specific learning strategies and study techniques.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

1. History of Numbers
a. Numeral Systems, including Babylonian, Greek, Egyptian, Roman, African, Mayan
b. Hindu-Arabic System
c. Place Value
d. Expanded Notation
e. Units of Measurement

2. The Real Number System
a. Classification
b. Location on a Number Line
c. Comparison, including using relational symbols
d. Conversions, including decimals, fractions, mixed numbers, percentages

3. Addition
a. Whole Numbers
b. Decimals
c. Fractions
d. Integers
e. Algebraic Expressions
f. Applications
g. Properties, including Identity, Commutative, Associative

4. Subtraction
a. Whole Numbers
b. Decimals
c. Fractions
d. Integers
e. Algebraic Expressions
f. Applications
g. Solving Linear Equations using the Addition Property

5. Multiplication
a. Whole Numbers
b. Decimals
c. Fractions
d. Integers
e. Algebraic Expressions, including exponents and exponent rules
f. Applications
g. Properties, including Identity, Commutative, Associative, Distributive

6. Division
a. Whole Numbers
b. Decimals
c. Fractions
d. Integers
e. Algebraic Expressions, including exponents and exponent rules
f. Applications
g. Solving Linear Equations using the Multiplication Property

7. Algebraic Combinations
a. Order of Operations
b. Simplify Expressions, including Algebraic Expressions
c. Solving Multi-Step Linear Equations

d. Applications

8. Graphing
a. Cartesian Coordinate System
b. Plotting Ordered Pairs
c. Graphing Linear and Quadratic Equations
d. Slope, and Slope-Intercept Form of Linear Equations
12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)
1. The Egyptians used symbols painted in their pottery, cut numbers in stone, and scrolled on papyrus to express counting. There is evidence that this numeration system dates back to 3400 B.C.. Find and read an article about the Egyptian numeration system and be prepared to discuss its contributions to our present number system.
2. Find and read an article about your identified learning style. Explore specific study strategies that would be effective for you.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

1. Consider the number 1,054. What does the 1 represent? What does the 0 represent? What does the 5 represent? What does the 4 represent? What do all the digits together represent? Now, compare and contrast the numbers 1,054 and 1,540. How are they the same? How are they different?

2. Using a nutrition label from a bag of chips, answer the following questions: What percent of calories in one serving size are from fat? What percent of calories in one serving size are from carbohydrates? What percent of a person’s daily allowance of carbohydrates will be consumed if the entire package is eaten? Describe in words the process and the proportion you would set up to find the number of calories per chip, and then determine this value.

c. Other (Term projects, research papers, porfolios, etc.)

In order to build your mathematical vocabulary and increase your mathematical fluency, this semester we are going to create a math dictionary as a visual reference for concepts and terminology.
In class, we will work together to identify words that are critical to the development of your deeper understanding of the concepts we are studying. For each term identified, you will us the Frayer Model to create an “entry” in your dictionary that includes:
1) A definition, including an interpretation in your own words,
2) Facts and characteristics,
3) Examples,
4) Non-examples.

For each definition you create, be prepared to work in groups to:
1) Compare attributes and examples,
2) Find relationships between concepts,
3) Create visual connections and personal associations.

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

☑ Yes
☐ No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

__Book 1:__

Author:	Lontz, Barbara
Title:	Concepts of Numbers for Arithmetic and PreAlgebra
Publisher:	Pearson
Date of Publication:	2015
Edition:	5th

c. Other materials and/or supplies required of students:

14.Check all Instructional methods used to present course content:

☑ Lecture
☐ Discussion Semminar
☑ Lab
☐ Directed Study
☐ Activity
☐ Distance Education (requires supplemental form)
☐ Work Experience
☐ Tutoring

Other:

Give detailed examples of teaching methodology that relate to the course performance objectives:

1. Lecture: An interactive lecture format will be used to explore the history of our present system of numbers, the Hindu-Arabic number system. Through lecture, discussion, and demonstration the class, guided by the instructor, will explore place value and how to read and write whole numbers and decimals.

Course Objectives Addressed: 1) Recognize and discuss the contributions of ancient civilizations to our present system of numbers; 16) Demonstrate fluency with mathematical vocabulary, terminology, and notation through written and oral presentation.

2. Discussion: In small groups, students will be given deck of Krypto cards. The dealer should deal five playing cards, number side up. Then turn over a sixth card which is the Target Card. Each player in the group will add, subtract, multiply, or divide using each of the numbers on the five playing cards. Each card must be used once and only once to obtain a final solution equal to the number on the Target Card. Students will take turns verbally explaining their solutions to their group, and then they will work together to translate their solutions into written mathematical statements that use grouping symbols and adhere to the order of operations. As the groups are working, the instructor will circulate around the classroom facilitating discussion, addressing questions and concerns, and assessing solutions.

Course Objectives Addressed: 5) Execute basic order of operations and demonstrate the effects of common operations, both in words and in symbols; 16) Demonstrate fluency with mathematical vocabulary, terminology, and notation through written and oral presentation; 14) Demonstrate critical thinking by analyzing ideas, patterns, and principles; 15) Demonstrate flexibility in examining multiple strategies to finding the solution.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

- ☐ Essay Exam
- ☑ Objective Exam
- ☑ Projects
- ☑ Class Discussion
- ☐ Reports
- ☑ Problem Solving Exam
- ☐ Skill Demonstration
- ☐ Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

1. Objective/Problem Solving Examinations: The following is an example of a problem from an exam which would entail problem solving, written explanations, and objective solutions. Student performance would be evaluated based on the correctness of the solutions and on the depth of understanding displayed in written explanations to the question asked in the problem.

Given a list that contains 3 expressions and 3 equations:
a. Identify which are the expressions.
b. What is an expression?
c. What does it mean to simplify an expression?
d. Simplify each of the expressions that you identified in part a).
e. Identify which are the equations.
f. What is an equation?
g. What does it mean to solve an equation?
h. Solve the equations that you identified in part e).
i. Summarize the difference between an expression and equation, and describe how the mathematical process you utilize is different for each.

2. Classroom Discussion/Project: The following is an example of a classroom discussion that would lead into a group project that is started in class and finished for homework. The final product would be a group report turned in at the completion of the project. Student performance would be evaluated based on the detail provided about the students' specific project, each student's contribution to the group and the correctness of the solutions given.

As a class, the instructor will facilitate a discussion about equivalent fractions, how understanding equivalent fractions is important for simplifying fractions, and how the number sense of recognizing equivalent fractions is useful when studying proportions. The instructor will demonstrate an activity that the students will then do on their own: Given a cup that is filled with 45 beans, 30 marked and 15 unmarked, randomly select 30 beans. How many of those beans do we expect to be marked? Why? How many of those beans were actually marked? Now, suppose only 12 beans were randomly selected. How many of those beans do we expect to be marked? Why? How many of those beans were actually marked? The instructor will lead a discussion on experimental values versus expected values. Once the students understand the methodology of the experiment, they will be divided into small groups.
In their groups, students will complete 10 trials of the experiment. The groups will use this data collection to complete an in class worksheet. At the end of class each small group will be given the following questions to address:
a. Given a pair of ratios, how can you tell if they are equivalent?
b. How can you use this concept of equivalent ratios to determine how many beans are in a cup if you don't know how many are given at first?
c. Using what you learned in this activity, solve the following problem: A factory puts 150 raisins and 100 peanuts in each package of peanuts and raisins. In a sample with 75 pieces, how many pieces do your expect to be raisins? How is this question different from the other questions we have explored in this project?
d. Write a conclusion paragraph about this project. Include your contribution to the group data collection and class worksheet, and include any difficulties that your group encountered.

SECTION C

1. Program Information:

- ☐ In an approved program
- ☐ Part of a new program
- ☑ Not part of an approved program

2. TOP Code Information

Program Title: Mathematics, General 170100

3. Course SAM Code:

- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Minimum Qualifications/Degrees:

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:

2. CSU GE Applicability:

3. IGETC Applicability:

4. CAN :

5. LDTP:

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

- ☐ CSU Transferable
- ☐ UC Transferable
- ☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

Math 585 will provide basic skills students an accelerated pathway through developmental math. Successful completion of Math 585 will gain students access to Math A or Math E.

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationship

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

All math faculty members meet the minimum qualifications to teach this course. No special training is required. No additional resources are needed since we have the classroom space and technology already available.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

SECTION G

1. Maximum Class Size (recommended): 30

2. If recommended class size is not standard, then provide rationale: