I. CATALOG INFORMATION
A. Discipline: MATHEMATICS
B. Subject Code and Number: MATH M07
C. Course Title: Precalculus and Trigonometry
D. Credit Course units:
   Units: 6
   Lecture Hours per week: 6
   Lab Hours per week: 0
   Variable Units: No
E. Student Learning Hours:
   Lecture Hours:
   Classroom hours: 105 - 105
   Laboratory/Activity Hours:
   Laboratory/Activity Hours 0 - 0
   Total Combined Hours in a 17.5 week term: 105 - 105
F. Non-Credit Course hours per week
G. May be taken a total of: X 1 □ 2 □ 3 □ 4 time(s) for credit
H. Is the course co-designated (same as) another course: No X Yes □
If YES, designate course Subject Code & Number: 
I. Course Description:
Integrates college algebra and trigonometry. Includes basic algebraic concepts, equations and inequalities of the first and second degree, systems of equations and inequalities, functions and graphs, linear and quadratic functions, polynomial functions of higher degree, rational functions, exponential and logarithmic functions, trigonometric functions, analytical trigonometry, and polar coordinates.
J. Entrance Skills
   *Prerequisite: No □ Yes X Course(s)
      MATH M03 or MATH M03B or High School Algebra II or placement as determined by the college's multiple measures assessment process.
   *Corequisite: No X Yes □ Course(s)
   Limitation on Enrollment: No X Yes □
   Recommended Preparation: No X Yes □ Course(s)
K. Other Catalog Information:

Recommended for students planning to enter the MATH M25A/B/C sequence.

Course Credit Limitation:

1. MC and CSU - completing MATH M07 is equivalent to completing both MATH M05 and MATH M06. Students completing MATH M05, M06, and M07 receive maximum credit of 6 units for MC and CSU.

2. UC - MATH M05 and MATH M06 combined: maximum credit one course, no more than 5 semester units or 7.5 quarter units.

3. UC - MATH M07: maximum credit one course, no more than 5 semester units or 7.5 quarter units.

C-ID: MATH 955

II. COURSE OBJECTIVES

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

<table>
<thead>
<tr>
<th></th>
<th>Methods of evaluation will be consistent with, but not limited by, the following types or examples.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>graph functions and relations in rectangular coordinates and polar coordinates.</td>
</tr>
<tr>
<td>2</td>
<td>analyze and identify the features of the graphs and/or the equations of functions and relations.</td>
</tr>
<tr>
<td>3</td>
<td>apply transformations to the graphs of functions and relations.</td>
</tr>
<tr>
<td>4</td>
<td>recognize the relationship between functions and their inverses graphically and algebraically.</td>
</tr>
<tr>
<td>5</td>
<td>solve and apply equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic, and solve linear, nonlinear, and absolute value inequalities.</td>
</tr>
<tr>
<td>6</td>
<td>solve systems of equations and inequalities.</td>
</tr>
<tr>
<td>7</td>
<td>apply functions to model real world applications.</td>
</tr>
<tr>
<td>8</td>
<td>prove trigonometric identities.</td>
</tr>
<tr>
<td>9</td>
<td>identify special triangles and their related angle and side measures.</td>
</tr>
<tr>
<td>10</td>
<td>evaluate the trigonometric function at an angle whose measure is given in degrees and radians.</td>
</tr>
<tr>
<td>----</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>manipulate and simplify a trigonometric expression.</td>
</tr>
<tr>
<td>12</td>
<td>solve trigonometric equations, triangles, and their related applications.</td>
</tr>
<tr>
<td>13</td>
<td>graph the basic trigonometric functions and apply changes in period, amplitude, phase shift and vertical shift to generate new graphs.</td>
</tr>
<tr>
<td>14</td>
<td>evaluate and graph inverse trigonometric functions.</td>
</tr>
<tr>
<td>15</td>
<td>convert between polar and rectangular coordinates.</td>
</tr>
<tr>
<td>16</td>
<td>calculate powers and roots of complex numbers using DeMoivre’s Theorem.</td>
</tr>
<tr>
<td>17</td>
<td>represent a vector (a quantity with magnitude and direction) in the form and ai+bj, compute the magnitude of a vector, and graph vectors on the xy-plane.</td>
</tr>
<tr>
<td>18</td>
<td>perform vector operations including addition, subtraction, scalar multiplication, and dot product. Determine the angle between two vectors and when vectors are parallel or perpendicular, and compute the projection vector.</td>
</tr>
<tr>
<td>19</td>
<td>write the standard form of a circle given the general equation.</td>
</tr>
<tr>
<td>20</td>
<td>graph plane curves described by parametric equations.</td>
</tr>
<tr>
<td>21</td>
<td>find parametric forms for functions in the plane and eliminate the parameter given curves in parametric form.</td>
</tr>
<tr>
<td>22</td>
<td>work with sequences and series or use the Binomial Theorem or determine the equations of the standard conics or perform partial fraction decomposition.</td>
</tr>
</tbody>
</table>

### III. COURSE CONTENT

<table>
<thead>
<tr>
<th>Estimated %</th>
<th>Topic</th>
<th>Learning Outcomes</th>
</tr>
</thead>
</table>
| 10.00%      | A. Functions  
1. Definitions, evaluation, domain and range of linear, polynomial, rational, radical, exponential, absolute value, logarithmic, trigonometric | 4, 7 |
<p>|             | 2. Inverses of functions |              |</p>
<table>
<thead>
<tr>
<th>Course Outline moorpark - MATH M07</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Algebra of functions</td>
</tr>
<tr>
<td>B. Graphs of Functions</td>
</tr>
<tr>
<td>1. Graphs of functions including asymptotic behavior, intercepts, and vertices</td>
</tr>
<tr>
<td>2. Transformations of quadratic, absolute value, radical, rational, exponential, trigonometric, logarithmic, and exponential functions</td>
</tr>
<tr>
<td>10.00%</td>
</tr>
<tr>
<td>C. Equations and Inequalities</td>
</tr>
<tr>
<td>1. Equations including rational, linear, radical, polynomial, exponential, trigonometric, logarithmic, and absolute value</td>
</tr>
<tr>
<td>2. Linear, nonlinear, and absolute value inequalities</td>
</tr>
<tr>
<td>3. Systems of equations and inequalities</td>
</tr>
<tr>
<td>4. Characterization of real and complex zeros of polynomials</td>
</tr>
<tr>
<td>15.00%</td>
</tr>
<tr>
<td>D. Trigonometric Functions</td>
</tr>
<tr>
<td>1. Rectangular coordinates, angles and circular/radian measure</td>
</tr>
<tr>
<td>2. Definitions of the six trigonometric functions according to the right triangle, the unit circle, and the rectangular coordinate system</td>
</tr>
<tr>
<td>3. Applications of the right triangle</td>
</tr>
<tr>
<td>4. Simplification of trigonometric expressions</td>
</tr>
<tr>
<td>15.00%</td>
</tr>
<tr>
<td>E. Graphs of the Trigonometric Functions</td>
</tr>
<tr>
<td>1. Graphs of trigonometric functions: period, amplitude, phase shift, and asymptotes</td>
</tr>
<tr>
<td>2. Graphs of inverse trigonometric functions</td>
</tr>
<tr>
<td>10.00%</td>
</tr>
<tr>
<td>F. Analytic Trigonometry</td>
</tr>
<tr>
<td>1. Proofs of trigonometric identities</td>
</tr>
<tr>
<td>2. Inverse trigonometric functions</td>
</tr>
<tr>
<td>10.00%</td>
</tr>
<tr>
<td>G. Applications of Trigonometry</td>
</tr>
<tr>
<td>1. Solving triangles: law of sines and law of cosines</td>
</tr>
<tr>
<td>2. Polar coordinates and equations</td>
</tr>
<tr>
<td>3. DeMoivre’s Theorem and applications</td>
</tr>
<tr>
<td>12.00%</td>
</tr>
<tr>
<td>H. Vectors</td>
</tr>
<tr>
<td>1. Introduction to vectors</td>
</tr>
<tr>
<td>2. Vector operations</td>
</tr>
<tr>
<td>5.00%</td>
</tr>
<tr>
<td>I. Additional College Algebra Topics</td>
</tr>
<tr>
<td>1. Equations and graphs of circles</td>
</tr>
<tr>
<td>2. Parametric equations</td>
</tr>
<tr>
<td>8.00%</td>
</tr>
<tr>
<td>J. Preparation for Calculus Topics - select one of the following topics:</td>
</tr>
<tr>
<td>1. Sequences and series</td>
</tr>
<tr>
<td>2. Binomial Theorem</td>
</tr>
<tr>
<td>3. Conic sections</td>
</tr>
<tr>
<td>4. Partial fraction decomposition</td>
</tr>
<tr>
<td>5.00%</td>
</tr>
</tbody>
</table>

### IV. TYPICAL ASSIGNMENTS

#### A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:

1. written explanation of the solutions, such as indicating all features and translations of the graph of a parabola or a square root function.

2. graded assignments: in-class and/or homework assignments requiring complete solutions using both written English and symbolic mathematical language, such as indicating the sides of a general triangle, giving angle measures in both radians and degrees, and identifying sides with proper labels.
<table>
<thead>
<tr>
<th></th>
<th>short answer problems on exams, such as stating the results for an application problem indicating how much money is in an account after a certain period of time, or identifying how long it takes for some biological material to grow to a certain amount.</th>
</tr>
</thead>
</table>

**B. Appropriate outside assignments**

Appropriate outside assignments are required. Possible assignments may include, but are not limited to:

<table>
<thead>
<tr>
<th></th>
<th>assigned reading material from the college algebra and trigonometry textbook, such as viewing diagrams of the graphs of the various trigonometric functions.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>assigned homework problems selected from the textbook, such as practice sets on identifying all roots of a polynomial, or stating the domain of a rational function.</td>
</tr>
<tr>
<td></td>
<td>additional problem sets provided by the instructor, such as practice exercises on simplifying trigonometric expressions and proving identities.</td>
</tr>
<tr>
<td></td>
<td>graded problem solving assignments, such as review sheets or unit assignments on topics, which may include algebraic computations on polynomial and rational functions, or solving for solutions of trigonometric, exponential or logarithmic equations.</td>
</tr>
<tr>
<td></td>
<td>group or individual assignments, such as identifying and sketching graphs of polynomial, rational, exponential, logarithmic or trigonometric functions.</td>
</tr>
</tbody>
</table>

**C. Critical thinking assignments**

Critical thinking assignments are required. Possible assignments may include, but are not limited to:

<table>
<thead>
<tr>
<th></th>
<th>apply analytic techniques for solving higher degree polynomial equations, such as applying synthetic division and the Rational Root Theorem.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>compare and contrast methods of solution to mathematical problems, such as solving nonlinear inequalities by more than one method.</td>
</tr>
<tr>
<td></td>
<td>describe and apply the algorithmic steps for obtaining the solution to a mathematical problem, such as solving a trigonometric equation.</td>
</tr>
</tbody>
</table>

**V. METHODS OF INSTRUCTION**

Methods of instruction may include, but are not limited to:

- Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)
- Lecture/Discussion
- Laboratory/Activity
- Other (Specify)
Introductory lectures to new concepts; review material from previous topics as related to the current topic; provide detailed step-by-step examples; provide practice problems to develop proper mathematical skills and techniques; provide student interaction for questions and answers; use projects and/or group work to enhance student understanding of the concepts; and discuss application problems, such as using the principles of the law of sines and/or the law of cosines to structures that occur in engineering, architecture or nature.

Optional Field Trips

Required Field Trips

VI. METHODS OF EVALUATION

Methods of evaluation may include, but are not limited to:

- Essay Exam
- Problem Solving Exam
- Objective Exams
- Classroom Discussion
- Reports/Papers/Projects
- Participation
- Skill Demonstration
- Other (specify)

Quizzes and/or graded work will be used to evaluate students for the critical thinking skills needed to solve math problems. Problems must require students to demonstrate analytic skills and the step-by-step details required for the solution.

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS


VIII. STUDENT MATERIALS FEES

- No
- Yes

IX. PARALLEL COURSES

<table>
<thead>
<tr>
<th>College</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Santa Cruz</td>
<td>MATH 3</td>
<td>Precalculus</td>
<td>5</td>
</tr>
<tr>
<td>CSU Channel Islands</td>
<td>MATH 105</td>
<td>Precalculus</td>
<td>4</td>
</tr>
<tr>
<td>Ventura College</td>
<td>MATH V19</td>
<td>Precalculus &amp; Trigonometry</td>
<td>7</td>
</tr>
<tr>
<td>College of the Sequoias</td>
<td>MATH 070</td>
<td>Precalculus</td>
<td>5</td>
</tr>
<tr>
<td>CSU Fullerton</td>
<td>MATH 125</td>
<td>Precalculus</td>
<td>5</td>
</tr>
</tbody>
</table>

X. MINIMUM QUALIFICATIONS

- Courses Requiring a Masters Degree:
  Master’s in mathematics or applied mathematics OR Bachelor’s in either of the above AND Master’s
XI. ARTICULATION INFORMATION

A. Title V Course Classification:
   1. This course is designed to be taken either:
      - Pass/No Pass only (no letter grade possible); or
      - Letter grade (P/NP possible at student option)

   2. Degree status:
      - Either Associate Degree Applicable; or Non-associate Degree Applicable

B. Moorpark College General Education:
   1. Do you recommend this course for inclusion on the Associate Degree General Education list?
      Yes: [X] No: [ ] If YES, what section(s)?
      - A1 - Natural Sciences - Biological Science
      - A2 - Natural Sciences - Physical Science
      - B1 - Social and Behavioral Sciences - American History/Institutions
      - B2 - Social and Behavioral Sciences - Other Social Behavioral Science
      - C1 - Humanities - Fine or Performing Arts
      - C2 - Humanities - Other Humanities
      - D1 - Language and Rationality - English Composition
      - D2 - Language and Rationality - Communication and Analytical Thinking
      - E1 - Health/Physical Education
      - E2 - PE or Dance
      - F - Ethnic/Gender Studies

C. California State University (CSU) Articulation:
   1. Do you recommend this course for transfer credit to CSU?  Yes: [X] No: [ ]

   2. If YES do you recommend this course for inclusion on the CSU General Education list?
      Yes: [X] No: [ ] If YES, which area(s)?
      - C1 [ ] C2 [ ] D1 [ ] D2 [ ] D3 [ ] D4 [ ] D5 [ ]
      - D6 [ ] D7 [ ] D8 [ ] D9 [ ] D10 [ ] E [ ]

D. University of California (UC) Articulation:
   1. Do you recommend this course for transfer to the UC?  Yes: [X] No: [ ]

   2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)?  Yes: [X] No: [ ]
IGETC Area 1: English Communication

- English Composition
- Critical Thinking-English Composition
- Oral Communication

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

- Mathematical Concepts

IGETC Area 3: Arts and Humanities

- Arts
- Humanities

IGETC Area 4: Social and Behavioral Sciences

- Anthropology and Archaeology
- Economics
- Ethnic Studies
- Gender Studies
- Geography
- History
- Interdisciplinary, Social & Behavioral Sciences
- Political Science, Government & Legal Institutions
- Psychology
- Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)

- Physical Science Lab or Physical Science Lab only (non-sequence)
- Physical Science Lecture only (non-sequence)
- Biological Science
- Physical Science Courses
- Physical Science Lab or Biological Science Lab Only (non-sequence)
- Biological Science Courses
- Biological Science Lab course
- First Science course in a Special sequence
- Second Science course in a Special Sequence
- Laboratory Activity
- Physical Sciences

IGETC Area 6: Language other than English

- Languages other than English (UC Requirement Only)
- U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)
XII. REVIEW OF LIBRARY RESOURCES

A. What planned assignment(s) will require library resources and use?

The following assignments require library resources:
Use textbooks on reserve. Use of the Library's reference materials, print and online, to assist with completion of various application problems, such as researching interest rates, or rates of growth and decay in biological situations.

B. Are the currently held library resources sufficient to support the course assignment?

YES: [X] NO: []

If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION

Requisite Justification for MATH M03

☐ A. Sequential course within a discipline.

☐ B. Standard Prerequisite or Corequisite required by universities.

UC Santa Cruz ; UC San Francisco ; CSU Sacramento

☐ C. Corequisite is linked to companion lecture course.

☐ D. Prerequisite or Corequisite is authorized by legal statute or regulation.

Code Section: _________

☐ E. Prerequisite or Corequisite is necessary to protect the students' health and safety.

☐ F. Computation or communication skill is needed.

☐ G. Performance courses: Audition, portfolio, tryouts, etc. needed.

or

Requisite Justification for MATH M03B

☐ A. Sequential course within a discipline.

☐ B. Standard Prerequisite or Corequisite required by universities.

UC Santa Cruz ; CSU Fullerton ; CSU Fresno
C. Corequisite is linked to companion lecture course.

D. Prerequisite or Corequisite is authorized by legal statute or regulation.
   Code Section: _________

E. Prerequisite or Corequisite is necessary to protect the students' health
   and safety.

F. Computation or communication skill is needed.

G. Performance courses: Audition, portfolio, tryouts, etc. needed.

or

Requisite Justification for High School Algebra II

A. Sequential course within a discipline.

B. Standard Prerequisite or Corequisite required by universities.

C. Corequisite is linked to companion lecture course.

D. Prerequisite or Corequisite is authorized by legal statute or regulation.
   Code Section: _________

E. Prerequisite or Corequisite is necessary to protect the students' health
   and safety.

F. Computation or communication skill is needed.

G. Performance courses: Audition, portfolio, tryouts, etc. needed.

or

Requisite Justification for placement as determined by the college's multiple measures
assessment process.

A. Sequential course within a discipline.

B. Standard Prerequisite or Corequisite required by universities.

C. Corequisite is linked to companion lecture course.
D. Prerequisite or Corequisite is authorized by legal statute or regulation. 
Code Section: ________

E. Prerequisite or Corequisite is necessary to protect the students' health and safety.

F. Computation or communication skill is needed.

G. Performance courses: Audition, portfolio, tryouts, etc. needed.

XIV. WORKPLACE PREPARATION
MATH M07: Not Applicable

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

1. Mode of Delivery

Online (course will be delivered 100% online)

Online with onsite examinations (100% of the instruction will occur online, but examinations and an orientation will be scheduled onsite)

Online/Hybrid (a percentage of instruction will be held online and the remaining percentage of instruction will be held onsite)

Lab activities will be conducted onsite

Televideo (Examinations and an orientation will be held onsite)

Teleconference

Other

2. Need/Justification

Improve General Student Access

3. Describe how instructors teaching this course will ensure regular, effective contact with and among students.

Using the Course Management System (CMS) adopted by VCCCD, instructors may engage students using the following communication activities:

Provide students with an opportunity to ask questions of fellow students and the instructor using the "discussion forum" tool provided by the CMS.

Contact students via email within the CMS, by campus email, and/or MyVCCCD.

Meet with students for study sessions and online office hours using an online communication tool like CCCConfer utilizing Blackboard, where instructors and students may speak with one another using VoIP or phone, and instructors may write the problems for all to see using an online whiteboard. These sessions may be archived so that students...
who were not able to attend may watch the session at a later time.

Provide students with an online schedule of class events using the "calendar" tool in the online CMS.

Use the "announcement" tool to remind students of important assignments and due dates.

4. Describe how instructors teaching this course will involve students in active learning.

Instructors may involve students in active learning in the following activities:

- Students may view video lessons and/or text-based lessons for each learning objective (created by an instructor or by a publishing company).
- Students may complete homework on paper and/or using an interactive online homework system provided by a publishing company.
- Students may test their knowledge with interactive online quizzes provided by a publishing company.
- Students may interact with the instructor and classmates using an online discussion forum to ask questions.
- Students may attend online study sessions using a communication tool through CCCConfer.
- Students may submit questions to the instructor by email.
- Instructor may create student groups or group activities using the CMS.

5. Explain how instructors teaching this course will provide multiple methods of content representation.

The following represent the methods by which content may be provided for learning:

- Live tutorials using a communication tool like CCCConfer.
- Instructional Videos
- Textbook
- Links to online resources that may include video, quizzes, interactive math games, text explanations, and more.

6. Describe how instructors teaching this course will evaluate student performance.

Students will take problem solving exams in a proctored on-ground environment.

Students may be required to do the following assignments:

- Complete practice problems on paper and/or in an online interactive homework system
- Complete regular online quizzes
- Participate in online discussion forums.

XVI. GENERAL EDUCATION COURSE OUTLINE ADDENDUM

General Education Division of Learning [check all applicable boxes]:

□
Check either Option 1 or Option 2

☐ OPTION #1: Moorpark College has already received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. Note: This option applies only to technical revisions and updated courses.

☒ OPTION #2: Moorpark College has not received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. This option applies to all new and substantively revised courses.

XVII. STUDENT MATERIALS FEE ADDENDUM
MATH M07: Not Applicable

XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041
MATH M07: Not Applicable

XIX. CURRICULUM APPROVAL
Course Information:
   Discipline: MATHEMATICS
   Discipline Code and Number: MATH M07
   Course Revision Category: Outline Update

   Course Proposed By:
   Originating Faculty Tom Ogimachi 10/11/2017
   Faculty Peer: Brendan Purdy 10/17/2017
   Curriculum Rep: Daniel Rubinstein 10/18/2017