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Department of Mathematics

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Syllabus for **Math 2412-221CL (4784)**

Fall 2022 **Pre-Calculus (020)**

Professor: **Abbas Masum**

E-mail: [amasum@com.edu](mailto:amasum@com.edu)

Telephone: **(409) 933-8329**

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**LECTURE, HELP AND GUIDANCE MON & WED 05:30PM - 7:20PM STEAM BLDG # 22  
Room 119**

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**Communicating with your instructor:** ALL electronic communication with the instructor must be through your COM email. Due to FERPA restrictions, faculty cannot share any information about performance in the class through other electronic means. When sending an email, please be brief, mention your class name, date, and times. Please use the proper English and be sure to follow a professional writing. Spell check your statement before hitting SEND.

**Student hours:** MML and practicing the required concepts

**Office Hours:** Half hour before each class.

| Monday        | Wednesday    |
|---------------|--------------|
| 5:00PM-5:30PM | 5:00PM 530PM |

### 1. Required Textbook

The textbook used in this course is: **Precalculus, 11<sup>th</sup> Edition**, Michael Sullivan, published by Pearson Publishing Company.

### 2. Textbook Purchase

A student attending College of the Mainland is not under any obligation to purchase a textbook from the college-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

### 3. Course Description

In-depth combined study of algebra, trigonometry, and other topics for calculus readiness.

Prerequisites: MATH 1314 grade "C" or better or COM Math Placement Test.

### Topics

Algebra and Function Review

Linear and Quadratic Functions

Polynomial and Rational Functions

Exponential Functions

Logarithmic Functions

Trigonometric Functions

Graphs of Trigonometric Functions

Inverse Trigonometric Functions

Trigonometric Identities

Trigonometric Equations

Applications of Trigonometric Functions  
Polar Coordinates and Equations  
Complex numbers in Trigonometric Form  
Vectors  
Conic Sections  
Parametric Equations and Sequences

#### 4. **Technology**

A graphing calculator is needed for this course. A Texas Instruments TI 83 Plus or TI 84 Plus or Casio graphing calculator is recommended. A TI 89 or higher cannot be used in this course.

#### 5. **Course Requirements**

##### **Homework Assignments**

There is an assigned homework for each section to be completed online using MyMathLab.

The course ID: **masum88013**

##### **Quizzes and Exams**

There are some quizzes, four in class chapters exams and a comprehensive final exam. All of the quizzes are to be done online using MyMathlab. **There are no retakes on any of the exams.**

#### 6. **Determination of Course Grade**

**Grading Formula:** The course grade will be determined by the following formula:

$$\text{Final Average} = 64\% \text{Chapter Exam Average} + 16\% \text{Final Exam} \\ + 10\% \text{Homework Average} + 10\% \text{Quiz Average}$$

**The Final Exam score will replace the lowest Chapter Exam Score when it is larger.**

##### **Grading Scale:**

Grade A: Final Average in [89.5, 100]

Grade B: Final Average in [79.5, 89.5)

Grade C: Final Average in [69.5, 79.5)

Grade D: Final Average in [59.5, 69.5)

Grade F: Final Average in [0, 59.5)

#### 7. **Make-up policy**

There will be **no make-up or re-take of any exams**. If you are unable to make a scheduled exam within days specified in the course outline, **you will be allowed to make up the exam if you notify the instructor before the end of the scheduled exam period and have a legitimate reason for not being able to take the exam**. This policy is only good for ONE MISSED EXAM. Missing more than one exam will count as ZERO.

## 8. Course Outline

**Note:** The first three chapters of the text are from college algebra course. Please review them periodically to be prepared for topics that will be covered.

### 1. Graphs

- 1.1 The Distance and Midpoint Formulas
- 1.2 Graphs of Equations in Two Variables; Intercepts; Symmetry
- 1.3 Lines
- 1.4 Circles

### 2. Functions and Their Graphs

- 2.1 Functions
- 2.2 The Graph of a Function
- 2.3 Properties of Functions
- 2.4 Library of Functions; Piecewise-defined Functions
- 2.5 Graphing Techniques: Transformations
- 2.6 Mathematical Models: Building Functions

### 3. Linear and Quadratic Functions

- 3.1 Properties of Linear Functions and Linear Models
- 3.2 Building Linear Models from Data
- 3.3 Quadratic Functions and Their Properties
- 3.4 Build Quadratic Models from Verbal Descriptions and from Data
- 3.5 Inequalities Involving Quadratic Functions

**The following sections are to be covered in class:**

|           |   |
|-----------|---|
| 8/22/2022 | <b>Course Orientation &amp; Review of Requirements</b>          |
| 8/24/2022 | 4. Polynomial and Rational Functions                            |
|           | 4.1 Polynomial Functions  |
|           | 4.2 Graphing Polynomial Functions; Models                       |
|           | 4.3 Properties of Rational Functions                            |
| 8/29/2022 | 4.4 The Graph of a Rational Function                            |
|           | 4.5 Polynomial and Rational Inequalities                        |
|           | 4.6 The Real Zeros of a Polynomial Function, 4.7- Complex Zeros |
| 8/31/2022 | <b>5. Exponential and Logarithmic Functions</b>                 |
|           | 5.1 Composite Functions   |
|           | 5.2 One-to-One Functions; Inverse Functions                     |
|           | 5.3 Exponential Functions                                       |
| 9/5/2022  | <b>No Class-Labor Day</b>                                       |

|            |   |
|------------|---|
| 9/7/2022   | 5.4 Logarithmic Functions   |
|            | 5.5 Properties of Logarithms  |
|            | 5.6 Logarithmic and Exponential Equations   |
| 9/12/2022  | 5.7 Financial Models  |
|            | 5.8 Exponential Growth and Decay Models; Newton's Law; Logistic Growth and Decay Models |
|            | 5.9 Building Exponential, Logarithmic, and Logistic Models from Data                    |
| 9/14/2022  | <b>Test 1 Review</b>  |
| 9/19/2022  | <b>Test 1</b>   |
| 9/21/2022  | <b>6. Trigonometric Functions</b>   |
|            | 6.1 Angles, Arc, Length, and Circular Motion  |
|            | 6.2 Trigonometric Functions: Unit Circle Approach                                       |
|            | 6.3 Properties of the Trigonometric Functions   |
| 9/26/2022  | 6.4 Graphs of the Sine and Cosine Functions   |
|            | 6.5 Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions                    |
|            | 6.6 Phase Shift; Sinusoidal Curve Fitting   |
| 9/28/2022  | <b>7. Analytic Trigonometry</b>   |
|            | 7.1 The Inverse Sine, Cosine, and Tangent Functions                                     |
|            | 7.2 The Inverse Trigonometric Functions (Continued)                                     |
|            | 7.3 Trigonometric Equations   |
| 10/3/2022  | 7.4 Trigonometric Identities  |
|            | 7.5 Sum and Difference Formulas   |
|            | 7.6 Double-angle and Half-angle Formulas  |
|            | 7.7 Product-to-Sum and Sum-to-Product Formulas  |
| 10/5/2022  | <b>Test 2 Review</b>  |
| 10/10/2022 | <b>Test 2</b>   |
| 10/12/2022 | <b>8. Applications of Trigonometric Functions</b>                                       |
|            | 8.1 Right Triangle Trigonometry; Applications   |
|            | 8.2 The Law of Sines  |
| 10/17/2022 | 8.3 The Law of Cosines  |
|            | 8.4 Area of a Triangle  |
|            | 8.5 Simple Harmonic Motion; Damped Motion; Combining Waves- <b>Optional</b>             |
| 10/19/2022 | <b>9. Polar Coordinates; Vectors</b>  |
|            | 9.1 Polar Coordinates   |
|            | 9.2 Polar Equations and Graphs  |
|            | 9.3 The Complex Plane; De Moivre's Theorem  |
| 10/24/2022 | 9.4 Vectors   |

|            |   |
|------------|---|
|            | 9.5 The Dot Product   |
|            | 9.6 Vectors in Space  |
|            | 9.7 The Cross Product   |
| 10/26/2022 | <b>Test 3 Review</b>  |
| 10/31/2022 | <b>Test 3</b>   |
| 11/2/2022  | <b>10. Analytic Geometry</b>  |
|            | 10.1 Conics   |
|            | 10.2 The Parabola   |
|            | 10.3 The Ellipse  |
|            | 10.4 The Hyperbola  |
| 11/7/2022  | 10.6 Polar Equations of Conics  |
|            | 10.7 Plane Curves and Parametric Equations  |
|            | <b>11. Systems of Equations and Inequalities</b>                                    |
|            | 11.1 Systems of Linear Equations: Substitution and Elimination                      |
|            | 11.2 Systems of Linear Equations: Matrices  |
| 11/9/2022  | 11.3 Systems of Linear Equations: Determinants                                      |
|            | 11.4 Matrix Algebra   |
|            | 11.5 Partial Fraction Decomposition   |
|            | 11.6 Systems of Nonlinear Equations   |
|            | 11.7 Systems of Inequalities  |
|            | 11.8 Linear Programming   |
| 11/14/2022 | <b>Test 4 Review</b>  |
| 11/16/2022 | <b>Test 4</b>   |
| 11/21/2022 | <b>14. A Preview of Calculus: The Limit, Derivative, and Integral of a Function</b> |
| 11/23/2022 | <b>Thanksgiving Holiday-No Class</b>  |
| 11/28/2022 | 14.1 Finding Limits Using Tables and Graphs   |
|            | 14.2 Algebra Techniques for Finding Limits  |
| 11/30/2022 | <b>Final Exam Review</b>  |
| 12/5/2022  | <b>Final Exam Week</b>  |

### 9. Attendance Policy

**You must log in and be active in MyMathLab at least four times each week.** In addition to time spent in doing homework, taking quizzes and exams it will be necessary to study, using the course materials, at least 4 hours per week to be successful in the class.

### 10. Withdrawal Policy

Students may withdraw from this course for any reason prior to the last eligible day for a “W” grade. Before withdrawing students should speak with the instructor and consult an advisor.

Students are permitted to withdraw only six times during their college career by state law. The last date to withdraw 11/18/2022 (please verify).

### 11. Early Alert Program

The Student Success Center at College of the Mainland has implemented an Early Alert Program because student success and retention are very important to us. I have been asked to refer students to the program throughout the semester if they are having difficulty completing assignments or have poor attendance. If you are referred to the Early Alert Program you will be contacted by someone in the Student Success Center who will schedule a meeting with you to see what assistance they can offer in order for you to meet your academic goals.

### 12. Academic Dishonesty

College of the Mainland is committed to a high standard of academic integrity. All students are responsible for honesty and independent effort. Incidents of academic and scholastic dishonesty (including cheating, plagiarism, and collusion) will be dealt with in a manner that is consistent with College Policy and the Student Handbook. Any student found to have been academically dishonest on an assignment, quiz or exam will receive a zero for that assignment, quiz or exam and he or she will be referred to the Office of Student Conduct for further disciplinary action. Please read the sections on Standards of Student Conduct and Discipline and Penalties in the on-line Student Handbook.

### 13. Concerns about the Instructor

If you have any concerns or issues with the instructor, you should first attempt to resolve the issue with the instructor. If you are unable to resolve the issue with the instructor, you should then contact then Mathematics Department Chair, Mr. Leslie Richardson at (409) 933-8329, lrichardson@com.edu.

### 14. Table Mapping SLO's and Core Objectives

| Student Learner Outcomes   | Maps to Core Objective                  | Assessed via this assignment |
|--|---|------------------------------|
| 1. Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, and inverses. | Critical Thinking Skills (CT)           | Exam                         |
| 2. Recognize and apply polynomial, rational, exponential, and logarithmic functions and solve related equations.                   | Critical Thinking Skills (CT)           | Exam                         |
| 3. Apply graphing techniques.  | Visual Communication Skills (CS)        | Quiz                         |
| 4. Evaluate all roots (zeros) of higher degree polynomials and rational functions.   | Critical Thinking Skills (CT)           | Quiz                         |
| 5. Recognize, solve and apply systems of linear equations using matrices.  | Empirical and quantitative Skills (EQS) | Exam                         |

### 15. Grade Appeal Process:

Concerns about the accuracy of grades should first be discussed with the instructor. A request for a change of grade is a formal request and must be made within six months of the grade assignment. Directions for filing an appeal can be found in the student handbook. <[https://build.com.edu/uploads/sitecontent/files/student-services/Student\\_Handbook\\_2019-2020v5.pdf](https://build.com.edu/uploads/sitecontent/files/student-services/Student_Handbook_2019-2020v5.pdf). *An appeal will not be considered because of general dissatisfaction with a grade, penalty, or outcome of a course. Disagreement with the instructor's professional judgment of the quality of the student's work and performance is also not an admissible basis for a grade appeal.* [https://build.com.edu/uploads/sitecontent/files/student-services/Student\\_Handbook\\_2019-2020v5.pdf](https://build.com.edu/uploads/sitecontent/files/student-services/Student_Handbook_2019-2020v5.pdf)

### 16. Academic Success & Support Services

College of the Mainland is committed to providing students the necessary support and tools for success in their college career. Support is offered through our Tutoring Services, Library, Counseling, and through Student Services. Please discuss any concerns with your faculty or an advisor.

### 17. ADA Statement

Any student with a documented disability needing academic accommodations is requested to contact Holly Bankston at 409-933-8520 or [hbankston@com.edu](mailto:hbankston@com.edu). The Office of Services for Students with Disabilities is located in the Student Success Center.

### 18. Counseling Statement:

Any student that is needing counseling services is requested to please contact Holly Bankston in the student success center at 409-933-8520 or [hbankston@com.edu](mailto:hbankston@com.edu). Counseling services are available on campus in the student center for free and students can also email [counseling@com.edu](mailto:counseling@com.edu) to setup their appointment. Appointments are strongly encouraged; however, some concerns may be addressed on a walk-in basis.

#### **Please Note:**

Computer access and printing will be available on the following days and times in either Innovations or the Library Lab.

|            |            |           |           |
|------------|------------|-----------|-----------|
| Monday:    | 7am – 6pm  | Tuesday:  | 7am – 6pm |
| Wednesday: | 8am – 6pm  | Thursday: | 7am – 6pm |
| Friday:    | 8am – 12pm | Saturday: | 9am – 1pm |

Here are the links for each of the labs. The hours are updated online.

<https://www.com.edu/computer-labs/library-computer-lab>

<https://www.com.edu/computer-labs/innovations>

## Institutional Policies and Guidelines

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**Textbook Purchasing Statement:** A student attending College of the Mainland is not under any obligation to purchase a textbook from the college-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

**Withdrawal Policy:** Students may withdraw from this course for any reason prior to the last eligible day for a "W" grade. Before withdrawing students should speak with the instructor and consult an advisor. Students are permitted to withdraw only six times during their college career by state law.

**F<sub>N</sub> Grading:** The F<sub>N</sub> grade is issued in cases of *failure due to a lack of attendance*, as determined by the instructor. The F<sub>N</sub> grade may be issued for cases in which the student ceases or fails to attend class, submit assignments, or participate in required capacities, and for which the student has failed to withdraw. The issuing of the F<sub>N</sub> grade is at the discretion of the instructor. The last date of attendance should be documented for submission of an F<sub>N</sub> grade.

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asked to refer students to the program throughout the semester if they are having difficulty completing assignments or have poor attendance. If you are referred to the Early Alert Program you will be contacted by someone in the Student Success Center who will schedule a meeting with you to see what assistance they can offer in order for you to meet your academic goals.

### **Resources to Help with Stress:**

If you are experiencing stress or anxiety about your daily living needs including food, housing or just feel you could benefit from free resources to help you through a difficult time, please click here <https://www.com.edu/community-resource-center/>. College of the Mainland has partnered with free community resources to help you stay on track with your schoolwork, by addressing life issues that get in the way of doing your best in school. All services are private and confidential. You may also contact the Dean of Students office at [deanofstudents@com.edu](mailto:deanofstudents@com.edu) or [communityresources@com.edu](mailto:communityresources@com.edu)

**COVID-19 Statement:** All students, faculty, and staff are expected to familiarize themselves with materials and information contained on the College of the Mainland's Coronavirus Information site at [www.com.edu/coronavirus](http://www.com.edu/coronavirus). In compliance with Governor Abbott's May 18 Executive Order, face coverings/masks will no longer be required on COM campus. Protocols and college signage are being updated. We will no longer enforce any COM protocol that requires face coverings. We continue to encourage all members of the COM community to distance, when possible, use hygiene measures, and get vaccinated to protect against COVID-19. Please visit [com.edu/coronavirus](http://com.edu/coronavirus) for future updates.