American Public University System

The Ultimate Advantage is an Educated Mind

School:	Science, Technology, Engineering and Math
Course Number:	MATH112
Course Name:	Pre-Calculus
Credit Hours:	3 Credit Hours
Length of Course:	8 Weeks
Prerequisite:	MATH110 College Algebra or an equivalent course.

Table of Contents

Course Description

This is a course to prepare students for Calculus. It synthesizes topics from college algebra and trigonometry (courses such as MATH110 College Algebra and MATH111 Trigonometry). It also goes into greater depth with concepts that will be crucial when taking Calculus. These mathematical concepts and techniques are important to those continuing into more advanced math and math-related classes. Practical applications are provided throughout the course.

The course assumes the student is completely comfortable with the language of algebra, equations and inequalities, polynomials, factoring, and rational expressions. If a lower-level math course has not been completed recently, we recommend that students take MATH100 Pre-Algebra or MATH101 Introduction to College Algebra.

Table of Contents

Course Scope

This course is presented online through the APUS website. It uses a specially developed online program which utilizes video lectures, and practice assignments covering each of the key mathematical skills needed to succeed in the course. The course includes the study of algebraic functions as well as trigonometric functions and their graphs, trigonometric identities, the applications of trigonometry, polar coordinates, and parametric equations.

Course Objectives

After completing the course, the student should be able to accomplish these Course Learning Outcomes (CO):

CO1: Identify a variety of algebraic and trigonometric functions.
CO2: Solve problems using graphs, equations, and vectors.
CO3: Apply the rectangular coordinate system to describe a variety of algebraic and trigonometric functions and their characteristics.
CO4: Discuss algebraic and trigonometric concepts and their characteristics, and how they apply to situations in everyday life.
CO5: Construct mathematical models to solve application problems.
CO6: Demonstrate mathematics to make informed decisions.
CO7: Apply algebraic and trigonometric concepts to situations in everyday life.

Course Delivery Method

This mathematics course delivered via distance learning. will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. Assigned faculty will support the students throughout this learning experience. The key to success in this course as in all online/distance learning courses is communication. If something is going on that prevents you from completing an assignment or exam you need to let your instructor know as soon as possible. The same is true with questions about the material. The instructor cannot help you if you do not let them know the problem.

The nature of an online course requires a significant amount of independent work. The student will be provided with structure, resources, guidance, and instructor experience for learning the course material. The student, however, is responsible for managing time, completing assignments on time, watching the videos, and making inquiries as needed to complete the course effectively.

It is important for the student to check email and Announcements for each week's work. Assignment due dates will be posted with assignment directions. All assignments will have due dates of a week or more, therefore, no extensions or last-minute exceptions are anticipated. The student is expected to complete all work on time. Online assignments are due by 11:55 p.m. ET on the due date for the assignment. This includes Discussion questions and activities, examinations, and individual assignments.

The University requires that each student contact their instructor at least weekly during the semester, which in this course will be necessary to complete all assignments. Due to the busy student schedules, all work and discussions are asynchronous, meaning students are not required to be online at a specific time with the instructor or other students. Instead, students may post comments or questions on the Discussions as they are available each week. Students may, of course, interact with the professor or other students via the Discussions or Messages room at any time or with the professor during office hours or by appointment.

Each student is responsible for the following:

- Completely reading the syllabus. Should questions arise about the syllabus or the course that are not covered or should the student need clarification, the instructor may be contacted via email or in the Discussions.

- Reading email for important updates and course information each week.

- Reading the assignments in a timely manner to ensure all questions concerning all assignments and the Final Exam are specifically addressed.

- Submitting all assignments, completing the Discussion activities, and submitting the final exam on time. These are the graded submissions. Students should complete these during the time periods assigned for each of them. These should be submitted by 11:55 p.m. ET on the due date announced by the professor.

Course Resources

Video lessons are presented by LimeSpring – access to which is provided within the classroom. LimeSpring also provides the homework and weekly tests as well as a workbook designed to give students the necessary practice to be successful with the material.

Students will need a calculator to successfully complete this course. The calculator should include a memory and square root function. At the

student's discretion, a scientific calculator capable of performing statistical functions or a computer spreadsheet program like Microsoft Excel may be used. Students may also take advantage of the excellent scientific and graphing calculators available at desmos.com. These tools may be used for all graded assignments during the course.

Supplementary Materials

The lessons contain links to online supplementary materials for this class. You may click on the links in the lessons directly to view them. In addition to these, the following public domain web sites are useful. Please abide by the university's academic honesty policy when using Internet sources as well. Note web site addresses are subject to change.

Evaluation Procedures

Discussion Assignments: The University requires weekly contact from each student. This requirement can be met by taking the Unit Tests and by participating in the Discussions. Discussion postings are expected to be written in complete sentences using correct grammar and spelling. Any posting which requires research must be accompanied by a citation of the references used. Discussions contribute 16% of the final grade and are relatively easy points to earn – don't skip them!

Homework: Practice problems are assigned at the end of each of LimeSpring's videos. Don't skip around. Be sure to watch each of the videos to learn the material covered in these practice problems. Grades on these problems are compiled weekly and make up the homework grade.

These homework problems are only 28% of your final grade but they are an important factor in your success at mastering the subject. Math is not a spectator sport - one learns math by putting the pencil to the paper!

Workbooks: Each week's material includes a workbook of problems related to that week's lecture. Workbook grades are not used in the calculation of the course grade; however, completion of the workbook assignment is necessary for the student to access the weekly exam. It is also possible to return to the workbook for additional practice on the material.

Weekly Tests: There will be a graded test during each week of the course. Each will be a 25 question online, open-book, open-note exam. You may not consult with any other person while taking the exam. A total of 35% of the final course grade comes from these tests. These assignments will follow each week of the course and will be problems or questions like those in the lecture and workbook. They are selected to provide the student with hands on experience in applying the techniques and models being discussed. You may only take the weekly test one time, so be sure that you are well-

prepared before you attempt it!

Final Exam: The final exam will count as 21% of the final grade. It will also be a 25 question online, open-book, open-note exam. You may not consult with any other person while taking the exam. This examination will be based on all material covered during the semester. The questions will require computations and application of the material covered during the semester.

Please coordinate with the professor for any special arrangements. Unless the professor approves alternate arrangements, students should plan to take the final examination during the last week of the course. You will **not** need a proctor to take this exam.

TASK	% OF FINAL GRADE
Discussions	16%
Homework	28%
Weekly Tests	35%
Final Examination	21%
Total	100%

LimeSpring Weekly Course Outline

Course Outline

Optional Review – CO2 – CO3 – CO6
        Factoring Polynomials
        Graphing Linear Equations
        Graphing Equations Using Slope & Intercept
        Circles
        Right Triangles

Week 1 Introduction to Functions – CO1 - CO2
        Fundamentals of Functions
        Graphing Functions
        Attributes of Functions
        Transformations of Functions
        Operations on Functions
        Piecewise Functions
        The Difference Quotient

        Workbook & Book Exam
        Discussion Week 1

Week 2 - Introduction to Functions Part 2: - CO1 - CO2 – CO3 – CO4 – CO7
        Composite Functions
        Composite Functions: Part 2
        Inverse Functions
        Graphing Non-Linear Equations
        Graphing Polynomials

Rational Functions
Complex Numbers

Workbook & Book Exam
Discussion Week 2

Week 3 Power Functions, Exponential Functions & Logarithms - CO2 – CO3 – CO4 – CO5 – CO6 – CO7
Power & Exponential Functions
Graphing Power & Exponential Functions
Introduction to Logarithms
Graphing Logarithms
Properties of Logarithms

Workbook & Book Exam
Discussion Week 3

Week 4 Introduction to Trigonometry - CO1 - CO2 – CO3 – CO4 – CO6 - CO7
Angles in Trigonometry
Radians
Introduction to Sine, Cosine & Tangent
Trigonometric Functions: Part 1
Trigonometric Functions: Part 2

Workbook & Book Exam
Discussion Week 4

Week 5 The Unit Circle & Inverse Trig Functions - CO1 - CO4 – CO5 - CO7
Special Triangles
The Unit Circle: Part 1
The Unit Circle: Part 2
The Unit Circle: Part 3
Inverse Trigonometric Functions

Workbook & Book Exam
Discussion Week 5

Week 6 Graphing Trig Functions & Other Core Concepts - CO2 – CO3 – CO5
Graphing Trigonometric Functions
Transforming Trigonometric Functions
Reciprocal Trigonometric Functions
Using a Calculator to Evaluate Functions
Modeling with Trigonometric Equations
Trigonometric Identities

Workbook & Book Exam
Discussion Week 6

Week 7 Vectors – CO2 – CO6
Introduction to Vectors
Multiplying Vectors by Scalars
The Dot Product
Finding the Angle Between Vectors

Workbook & Book Exam
Discussion Week 7

Week 8 Final
Course Wrap-up
Final Exam
Week 8 Discussion

MATH112 Pre-Calculus Course Outcomes
CO1: Identify a variety of algebraic and trigonometric functions.
CO2: Solve problems using graphs, equations, and vectors.
CO3: Apply the rectangular coordinate system to describe a variety of algebraic and trigonometric functions and their characteristics.
CO4: Discuss algebraic and trigonometric concepts and their characteristics, and how they apply to situations in everyday life.
CO5: Construct mathematical models to solve application problems.
CO6: Demonstrate mathematics to make informed decisions.
CO7: Apply algebraic and trigonometric concepts to situations in everyday life.

Weekly Discussions
Week 1: Working Together Study Group – Ungraded
Week 1: Welcome and Introductions - Graded
Week 2: Searching for Solutions - Graded
Week 3: Logarithmic and Exponential Functions in the Real World - Graded
Week 4: How is Pre-Calculus used in the Real World? - Graded
Week 5: Midterm Reflection - Graded
Week 6: Trigonometry in the Real World - Graded
Week 7: Vectors: What's the Point? - Graded
Week 8: Final Debriefing - Graded

Please see the Student Handbook to reference the University grading scale.

Course Guidance

Please see the Student Handbook to reference all University policies. Quick links to frequently asked question about policies are listed below.

University Policies

Student Handbook

- Drop/Withdrawal policy

- Extension Requests

- Academic Probation

- [Appeals](#)

- [Disability Accommodations](#)

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- Tutor.com offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources,worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

The University encourages all work to be completed according to the course schedule. The University Late Work Policy can be found in the Student Handbook [here](#).

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases, professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placedon such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Communicating on the Discussion

- Discussions are the heart of the interaction in this course. The more engaged and livelier the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the Discussion. The purpose of the Discussions is to actively participate in an on-going discussion about the assigned content.
- "Substantive" means comments that contribute something new and hopefully important to the discussion. A message that simply says "I agree" is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting viewpoints, we must respect everyone's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

Online Library

The Online Library is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Online Library provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to **librarian@apus.edu**.

- *Charles Town Library and Inter Library Loan:* The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.
- *Electronic Books:* You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- *Electronic Journals:* The University provides access to over 12,000journals, which are available in electronic form and only through limited subscription services.
- *Tutor.com*: AMU and APU Civilian & Coast Guard students are eligiblefor 10 free hours of tutoring provided by APUS. Tutor.com connects you with a professional tutor online 24/7 to provide help with assignments, studying, test prep, resume writing, and more. Tutor.com

is tutoring the way it was meant to be. You get expert tutoring whenever you need help, and you work one-to-one with your tutor in your online classroom on your specific problem until it is done.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.