Plane Trigonometry

Fall 2016

MTH 122 Section 104, CRN 2994

**T, R 12:30 – 1:45 T, R WAEC 3119**

**(Updated 8/21/2016)**

# Instructor: Dr. Bonita A. Lawrence

 Office and Lab - 614 Smith Hall

 696 – 3040 or 696-3854, lawrence@marshall.edu

Office Hours:  11:00 A.M. – 12:00 A.M M,W

 10:00 A.M. – 11:00 A.M. T,R

Or by appointment: If you are not able to come for office hours because you have other commitments, please let me know and we will find a good time that will work for both of us.

**General University**

**Policies:** By enrolling in this course, you agree to the University Policies presented below. You can read the full text of these important policies online using the following path: Marshall Home Page - Course Catalogs – Undergraduate Catalogs. At this point, choose the catalog you started under (or any catalog after that).

**University Attendance**

 **Policy**: The University Policy that describes excused absences can be found in the Marshall University 2015– 2016 Undergraduate Catalog on pages 85 – 86. Also, see attached document.

**Academic Dishonesty Policy:** I expect you to do your own work. You can certainly discuss the homework problems with your colleagues but what you present to me for any type of assessment must be your own. The University’s policy concerning academic dishonesty can be found in the Marshall University 2015 – 2016 Undergraduate Catalog on pages 71 - 73.

**Policy for Students with Disabilities:** Marshall University is committed to equal opportunity for all. Students with physical, learning or psychological disabilities should contact the Office of Disabled Students Services (DSS) in Prichard Hall Room 117, 304 696-2271 and provide documentation of their disability. After consultation the DSS coordinator will send a letter to the student’s instructors describing the accommodations the student will need. For more information, go to <http://www.marshall.edu/disabled> or call or visit the office in Prichard Hall.

**Affirmative Action Policy:** In the spirit of equal opportunity for all, Marshall University has an Affirmative Action Policy. This can be found in the Marshall University 2015 – 2016 Undergraduate Catalog on p. 68.

**Inclement Weather Policy:** In the event of bad weather that may prevent us from coming to school, Marshall has a policy that describes how things will be handled. (Prior to last year, during my time at Marshall, the University was only shut down for 1.5 days. However, last spring it was more than a week!) The policy can be found on pp. 69 -70 of the Marshall University 2015 – 2016 Undergraduate Catalog.

**Textbook:** Trigonometry, 4th Edition

Mark Dugopolski

 Pearson

**Course Prerequisites:** Math ACT 21 or MTH 127 or MTH 130 concurrent

**Course Objectives:** This course is designed to extend your study of the behavior and usefulness of functions to a collection of functions know as trigonometric functions. Each function in this interesting collection maps an angle measure to one of the six possible ratios of the sides of a right triangle. You may wonder why we are interested in such functions. They have lovely form and interesting properties, certainly. They also have an important role in modeling. They can be used to model physical systems characterized by functions whose values are cyclic in nature. We will use the unit circle to visualize how the change in angle affects the values of the foundational functions, sine and cosine. The other four can be created from these two building blocks. (Recall that a function is a relation that maps a value from the domain to a unique value in the range.)

 **Please review the preliminary chapter: Functions and their transformations and inverses.** We will begin our study with a discussion of various ways to measure angles and the intercepted arcs they create on a circle. We will define the trig functions and use a right triangle and a unit circle to calculate the values of the functions. Visualization of the curves that represent the functions will be important to your understanding. As with studies you have done of functions in the past, we will create graphs of all six functions as well as sums and differences of linear and trig functions, for example.

 With the goal of solving equations that include trig functions, we will start with some basic identities that can be used to simplify the solving process. The skills you honed solving linear and quadratic equations, for example, will be put to good use in the activities you will encounter. The important thing to remind yourself of often is that the trig function values repeat themselves in an amazingly regular pattern.

 From the simplicity of the right triangle and using the powerful properties of the trig functions, we can study other types of triangles. The use of all the information you learn in the course will come to you as an application of the theory. My goal is to teach how to recognize what concepts will help you solve the problem your boss has asked you to tackle. Drawing a sketch that represents the physical model is often invaluable. Such sketches may include Euclidean shapes that include triangles. You can determine lengths of the side of these triangles using trig functions (and perhaps get a nice raise!).

 If time permits, we will discuss the complex numbers and the complex plane. You will discover a link between the complex numbers and the foundational trig functions, sine and cosine.

Success in the course will be measured by your success at meeting the following objectives.

The ability to:

1. Understand how angles are defined and measured and the relationship between the two standard angle measures.

Learning Outcome: Utilize the definition to create particular angles and to measure angles and arc lengths using standard measures. Apply the theory to problems in the physical world.

Skill Development: Small group and whole group discussions and analysis of the relationship between the two standard angle measures. Discussions about how to use the relationship between angle measure and arc length to solve problems in the physical world. Exercises assigned daily followed by timely feedback.

Assessment: Evaluation of written and oral presentations of using angle measure to solve problem in the physical world with an emphasis on proper use of definitions.

1. Use the definitions of the six trigonometric functions to define them relative to the right triangle and the unit circle

Learning Outcome: Utilizing a both a right triangle and a unit circle, choose the appropriate method and solve certain models that belong to particular classes of differential equations.

Skill Development: Small group and whole group discussions of methods for calculating the values of trig functions using a right triangle and the unit circle. Exercises assigned daily followed by timely feedback.

Assessment: Evaluation of written and oral presentations for of calculations with an emphasis on visualization of the concepts.

1. Visualize the six trig functions using graphical methods.

Learning Outcome: For a given function, construct the graph using the standard techniques for finding zeros and asymptotes and the inherent nature of the function. Excellent visualization is offered by the unit circle.

Skill Development: Small group and whole group discussions of graphical constructions for the trig functions with the unit circle in mind. Exercises assigned daily followed by timely feedback.

Assessment: Evaluation of written and oral presentations of graphical constructions accompanied by descriptions of the associated processes.

1. Understand how the presented techniques can be used to solve trigonometric equations can be used to solve them.

Learning Outcome: Choose the appropriate method and solve trigonometric equations.

Skill Development: Small group and whole group discussions of methods for determining the appropriate process for solving trigonometric equations. Exercises assigned daily followed by timely feedback.

Assessment: Evaluation of written and oral presentations for proper uses of presented techniques with an emphasis on creating a logical argument.

1. Recognize the relationships between physical systems and the trigonometric equations that are used to model them.

Learning Outcomes: Describe the connection between a physical system and a given model used to study it. Create a mathematical model from the description of the physical system.

Skill Development: Small group and whole group discussions of the qualitative nature of solutions. Exercises assigned daily followed by timely feedback.

Assessment: Evaluation of written and oral presentations of the construction of mathematical models from a given physical system.

1. Present all of your mathematical analyses clearly in both written and oral form. Organization and logical flow will be the secrets to success in meeting this objective.

Learning Outcome: Presentation of written or oral discussions in a valid and logical format.

Skill Development: Small group and whole group discussions of the organization of information when presenting the solution to exercises that involve modeling physical phenomena, solving the associate differential equation and analyzing the results.

Assessment: Evaluation of all written assignments and oral presentations at the board for validity and logical flow.

1. To recognize and appreciate various approaches to the same problem.

Learning Outcome: Construction of at least two different valid and logical approaches to a given problem.

Skill Development: Small group and whole group discussions with peers of various approaches to exercises.

Assessment: Evaluation of solutions of exercises that require the use of more than one approach to an exercise presented in both written and oral form.

**Grading Procedure:** You grade will be calculated using the following percentages:

 Challenge of the Week 15%

Boardwork 5 %

Lab 5%

 2 Chapter Exams 50 %

 Final Exam: 25%

There will be three exams during the semester, including the final exam (**Tuesday, December 13, 12:45 – 2:45).**  At the end of this document is a schedule with exam dates, lab dates, and topics of discussion for each week. In the event you are not able to take the exam on the scheduled date because of serious circumstances, (see General Undergraduate Catalog, p. 124, for the list of excused absences) please contact me before the scheduled exam time so that we can plan a time for you to take the exam early.

I will assign homework almost every class period. If you have questions about the homework, come and visit me during office hours. If you have a particular exercise that you still have questions about, ask at the beginning of class. I will ask to you present some of your fine works of art at the board for my enjoyment as well as that of your peers. This is what I call “Boardwork”. You must visit the board at least twice during the semester to get full credit for your boardwork. I will give you the opportunity to show me regularly how you are progressing with your homework through what I call the “Challenge of the Week”. This will be an in-class exercise with a couple of problems you do on your own.

Your final grade will be determined using the following scale:

90% - 100% A

80% - 89% B

70% - 79% C

60% - 69% D

0% - 59% F

My best advice (It’s free!) is for you to keep up with your reading and homework assignments.

**Attendance Policy:** I expect you to be in class every day you are physically able. It is your responsibility to determine what you missed in the event you are unable to attend class. Requesting notes from a colleague would be wise. I am happy to give you information about any assignments you missed. If you miss an exam or a deadline for an assignment and your absence is excused (See University Attendance Policy, page 1 of this document), you have one week after the date of the excused absence to make it up.

**Have a great semester and let me know if I can help you. If I can’t answer your question, I’ll find someone who can!**

**Cheers!**

**Dr. Lawrence**

**Tentative Program of Events for MTH 122**

**Class Days Topics and Events**

**Week 1 How are angles defined?**

**August 23, 25 Standard measures for angles.**

**Week 2 Linear and angular velocity**

**August 30, September 1 The trigonometric functions**

 **Boardwork**

**Week 3 Trig functions using a right triangle**

**September 6, 8 A powerful identity and reference**

 **angles**

**Week 4 Trig functions using the unit circle**

**September 13, 15 Understanding the sine and cosine**

 **functions using graphs**

 **Boardwork**

**Week 5 More graphing of trig functions**

**September 20, 22 Exam I**

**Week 6 Combining trig and algebraic**

**September 27, 29 functions**

 **Foundational identities**

 **Boardwork**

**Week 7 Understanding Identities**

**October 4, 6 Sum and difference identities**

 **Trip to the DA Lab**

**Week 8 Sum and differences identities**

**October 11, 13 continued…**

**Boardwork**

**Week 9 Double angle and half angle identities**

**October 18, 20 Product and sum identities**

**Week 10 Inverse trig functions**

**October 25, 27 Exam II**

**Week 11 Solving trigonometric equations**

**November 1, 3 Equations with compositions**

 **Boardwork**

**Week 12 Solving equations of the quadratic**

**November 8, 10 type**

 **Boardwork**

**Week 13 Applications using the Law of Sines**

**November 15, 17 Boardwork**

**Week 14 Take a Break and Recharge!**

**November 22, 24 Enjoy your family and friends and**

 **come back safely!**

**Week 15 Applications using the Law of November 29 Cosines**

**December 1 Areas of triangles**

**Week 15 Complex numbers and their**

**December 6, 8 trigonometric forms**

**Boardwork**

**Final Exam: Tuesday, December 13, 12:45 P.M. – 2:45 P.M.**

University Class Attendance Policy (Approved by the Faculty Senate, Spring 2015)

Students are expected to attend punctually all class meetings, laboratory sessions and field experiences and to participate in all class assignments and activities as described in the Course Syllabus. Absences are counted from the first class meeting after the student registers. Students registering late are expected to make up all missed assignments in a manner determined by the instructor. Students should be aware that excessive absences, whether excused or unexcused, may affect their ability to earn a passing grade. The instructor of each class shall establish a policy on class attendance and make-up work, and provide the policy to students in the Course Syllabus. This policy must not conflict with university policies, including this policy. Class attendance may be a criterion in determining a student’s final grade in the course if the instructor provides a statement to this effect in the course syllabus.

Students must promptly consult with their instructors about all class absences. Instructors will work with students to identify appropriate documentation and discuss any missed class time, tests, or assignments. A student may not be penalized for an excused absence, provided that the student, in a manner determined by the instructor, makes up the work that has been missed.

Instructors are required to honor University Excused Absences and to provide reasonable and equitable means for students to makeup work missed as a result of those absences. Academic obligations that cannot be made up should be addressed by the course instructor in consultation with the student to ensure that continued enrollment is feasible while there is still an opportunity to drop the course within the established withdrawal period.

This policy excludes academic endeavors that require the completion of a specific number of clock hours, such as clinical experiences, practica, and internships. For those courses, the department chair or program supervisor will determine the maximum number of absences. This policy does not supersede program accreditation requirements.

This policy also excludes laboratory courses that require significant preparation and monitoring. For such courses, departments will determine the minimum number of laboratories a student must complete to pass the course. If a student cannot complete this number of labs, the instructor may recommend that the student withdraw from the class.

If the instructor believes that the number of absences accrued under the terms of this policy (whether excused or unexcused) is such that a student cannot fulfill the learning experience and mastery that a course requires, the instructor may recommend that the student withdraw from the class.