**MATH 1120: College Trigonometry**

**Department of Mathematical and Statistical Sciences**

**College of Liberal Arts and Sciences, University of Colorado Denver**

**COURSE SYLLABUS**

Instructor: Heather Killeen

Term: Spring 2019

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Class Meeting Days: Mondays, Tuesdays, Wednesdays, Fridays

Class Meeting Times: 3rd or 5th period

Location: N-208

Office Hours: T/R Access or any 7th period

COURSE OVERVIEW

**I. Description**

Topics in trigonometry, analytic geometry, and elementary functions designed for students who intend to take the calculus sequence. Angles and trigonometry functions of acute angles, analytic trigonometry, fundamental trigonometric functions and identities including hyperbolic trigonometry, parametric equations, and polar coordinate system. Graphic calculators and/or computer algebra systems are used extensively. Applications are emphasized

*Note: No co-credit with MATH 1130* **Semester Hours:** 3

**II. Course Prerequisites**

A good understanding of advanced algebra, including the characteristics of the elementary functions and the solutions to equations, is required to successfully complete a college trigonometry course. Exposure to a graphing calculator will be assumed.

**III. Required Texts and Materials**

Ron Larson*, Precalculus with Limits a Graphing Approach;* 6th edition, Pennsylvania State Univ. Brooks/Cole Cengage Learning. TI-83 or higher

**IV. Colorado Commission on Higher Education Learning Objectives** The Colorado Commission on Higher Education has approved MATH 1120 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-MA1 category. For transferring students, successful completion with a minimum grade of C- grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to <http://highered.colorado.gov/academics/transfers/gtpathways/curriculum/html>.

**GT Pathways Mathematics (GT-MA1) Content Criteria:**

a) Demonstrate good problem-solving habits, including:

• Estimating solutions and recognizing unreasonable results.

• Considering a variety of approaches to a given problem, and selecting one that is appropriate.

• Interpreting solutions correctly.

b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.

c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.

d) Apply mathematical concepts, procedures, and techniques appropriate to the course.

e) Recognize and apply patterns or mathematical structure.

f) Utilize and integrate appropriate technology.

**GT Pathways Mathematics (GT-MA1) Competencies:**

**A. Quantitative Literacy**: Competency in quantitative literacy represents a student’s ability to use quantifiable information and mathematical analysis to make connections and draw conclusions. Students with strong quantitative literacy skills understand and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc.).

Students should be able to:

**1. Interpret Information**.

a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).

**2. Represent Information**.

a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

**3. Perform Calculations**.

a. Solve problems or equations at the appropriate course level.

b. Use appropriate mathematical notation.

c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.

**4. Apply and Analyze Information**

a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.

b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.

c. Make judgments based on mathematical analysis appropriate to the course level.

**5. Communicate Using Mathematical Forms.**

a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

**B. Problem Solving**: Competency in problem solving represents a student’s ability to design, evaluate, and implement a strategy to answer a question or achieve a goal.

Students should be able to:

**1. Define a Problem**.

a. Construct a detailed and comprehensive problem statement or goal.

b. Identify relevant contextual factors.

**2. Propose a Strategy**.

a. Identify reasonable approaches to solving the problem within the given context.

**3. Evaluate Potential Strategies**.

a. Provide an evaluation of the potential strategy(ies) which may include:

i. the history of the problem,

ii. the logic behind the potential strategy(ies),

iii. the feasibility of the proposed strategy(ies), and

iv. the potential impacts of the proposed strategy(ies).

b. Choose a feasible strategy.

**4. Apply a Strategy**.

a. Implement chosen approach(es).

b. Gauge success of the chosen strategy(ies) and revise as needed.

**V. Course Goals and Learning Objectives**

**CORE Learning Outcomes**

1. ***Calculate***: Accurately and logically manipulate a mathematical representation to attain desired information.

2. ***Represent*:** Able to translate between representations to clearly represent information and gain insight. Representations may be expressed symbolically, graphically, numerically, or verbally.

3. ***Interpret:*** Draw meaningful inferences and communicate insights from mathematical representations.

Mathematical representations may include statistical, graphical, algebraic, geometric, or symbolic.

4. ***Model:*** Develop and/or apply an appropriate mathematical model for a real-world problem. This can be demonstrated by e.g. developing a model, choosing an appropriate model from several, or explaining the primary assumptions needed to use a particular model.

**Course Learning Outcomes**

The following section lists the Learning Outcomes specific to the course (MATH 1120). Each Learning Outcome reflects one or more of the CORE Learning Outcomes.

***1. Angles & Their Measure***

Students will be able to…

* Convert between Decimals, Degrees, Minutes, Seconds ***(CORE Learning Outcome #1 – Calculate)***
* Convert between Degrees and Radians **(*Calculate)***
* Find the Arc Length of a Circle ***(Calculate)***
* Find the Sector Area of a Circle ***(Calculate)***

***2. Right Triangle Trigonometry***

Students will be able to…

* Find the Values of Trig Functions of an Acute Angle ***(Represent)***
* Use Fundamental Identities ***(Represent)***
* Find Values of Remaining Trig Functions Given One ***(Interpret)***
* Use the Complementary Angle Theorem ***(Calculate)***

***3. Computing the Values of Trigonometric Functions of Acute Angles***

Students will be able to…

* Find the Exact Value of Trigonometric Functions for ***(Calculate)***
* Use a Calculator to Approximate the Trigonometric Functions for Acute Angles ***(Calculate)***
* Model and Solve Applied Problems Involving Right Triangles ***(Model)***

***4. Trigonometric Functions of Any Angles***

Students will be able to…

* Find the Exact Values of Trigonometric Functions of any Angle ***(Interpret)***
* Use Coterminal Angles to Find the Exact Values of Trigonometric Functions ***(Represent)***
* Determine the Signs of the Trigonometric Functions of an Angle in a Given Quadrant ***(Interpret)***
* Find the Reference Angle of an Angle ***(Represent)***
* Use a Reference Angle to Find the Exact Value of a Trigonometric Function ***(Represent)***
* Find the Exact Values of Trigonometric Functions of an Angle, Given Information about the Functions ***(Interpret)***

***5. Unit Circle Approach: Properties of the Trigonometric Functions***

Students will be able to …

* Find the Exact Values of the Trigonometric Functions Using the Unit Circle ***(Interpret)***
* Know the Domain and Range of the Trigonometric Functions ***(Interpret)***
* Use the Periodic Properties to Find the Exact Values of the Trigonometric Functions ***(Calculate)***
* Use Even-Odd Properties to Find the Exact Value of the Trigonometric Functions ***(Calculate)***

***6. Graphs of the Sine and Cosine Functions*** Students will be able to…

* Graph Sine/Cosine Functions Using Transformations ***(Represent)***
* Determine the Amplitude and Period of Sinusoidal Functions ***(Interpret)***
* Graph Sinusoidal Functions Using Key Points **(Represent)**
* Find and Equation for a Sinusoidal Graph ***(Represent)***

***7. Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions***

Students will be able to…

* Graph Tangent, Cotangent, Secant, Cosecant Functions in the form ***(Represent)***

***8. Phase Shift: Sinusoidal Curve Fitting***

Students will be able to…

* Graph Sinusoidal Functions of the Form ***(Represent)***
* Build Sinusoidal Models from Data ***(Model)***

***9. The Inverse Sine, Cosine, and Tangent Functions***

Students will be able to…

* Find the Exact Value of an Inverse Sine Function ***(Calculate)***
* Find an Approximate Value of an Inverse Sine Function ***(Calculate)***
* Use Properties of Inverse Functions to Find Exact Values of Certain Composition Functions ***(Calculate)***
* Find the Inverse Function of a Trigonometric Function ***(Calculate)***
* Solve Equations Involving Inverse Trigonometric Functions ***(Calculate)***

***10. The Inverse Trigonometric Functions (Continued)***

Students will be able to…

* Find the Exact Value of Expressions Involving the Inverse Sine, Cosine, and Tangent Functions ***(Interpret)***
* Define the Inverse Secant, Cosecant, and Cotangent Functions ***(Calculate)***
* Use a Calculator to Evaluate Inverse Secant, Cosecant, Cotangent Functions ***(Calculate)***
* Write a Trigonometric Expression as an Algebraic Expression ***(Represent)***

***11. Trigonometric Equations***

Students will be able to…

* Solve Equations Involving a Single Trigonometric Function ***(Calculate)***
* Solve Trigonometric Equations Using a Calculator ***(Calculate)***
* Solve Trigonometric Equations in Quadratic Form ***(Calculate)***
* Solve Trigonometric Equations Using Fundamental Identities ***(Represent)***
* Solve Trigonometric Equations Using a Graphing Utility ***(Calculate/Represent/Interpret)***

***12. Trigonometric Identities***

Students will be able to …

* Use Algebra to Simplify Trigonometric Expressions***(Represent)***
* Establish Identities ***(Represent)***

***13. Sum and Difference Formulas***

Students will be able to…

* Use Sum and Difference Formulas to Find Exact Values ***(Calculate)***
* Use Sum and Difference Formulas to Establish Identities ***(Represent)***
* Solve Trigonometric Equations Linear in Sine and Cosine ***(Calculate)***

***14. Double-Angle and Half-Angle Formulas***

Students will be able to…

* Use Double-angle Formulas to Find Exact Values ***(Calculate)***
* Use Double-angle Formulas to Establish Identities ***(Represent)***
* Use Half-angle Formulas to Find Exact Values ***(Calculate)***

***15. Applications involving right triangles***

Students will be able to…

* Solve Right Triangles ***(Calculate)***
* Solve Applied Problems ***(Modeling)***

***16. The Law of Sines***

Students will be able to…

* Solve SAA, ASA, SSA Triangles ***(Calculate)***
* Solve Applied Problems ***(Model)***

***17. The Law of Cosines***

Students will be able to…

* Solve SSS, or SAS Triangles ***(Calculate)***

***18. The Area of a Triangle***

Students will be able to…

* Find the Area of SAS and SSS Triangles ***(Calculate)***

***19. Polar Coordinates***

Students will be able to…

* Plot Points Using Polar Coordinates ***(Represent)***
* Convert between Polar Coordinates to Rectangular Coordinates ***(Represent)***
* Transform Equations between Polar and Rectangular Forms ***(Represent)***

***20. Polar Equations and Graphs***

Students will be able to…

* Identify and Graph Polar Equations by Converting to Rectangular Equations***(Represent)***
* Graph Polar equations Using a Graphing Utility ***(Represent)***
* Graph Polar Equations by Plotting Points ***(Represent)***

***21. The Complex Plane, De Moivre’s Theorem***

Students will be able to…

* Plot Points in the Complex Plane ***(Represent)***
* Convert Complex Numbers Between Rectangular Form and Polar Form ***(Represent)***
* Find Products and Quotients of Complex Numbers in Polar Form ***(Calculate)***
* Use De Moivre’s Theorem ***(Calculate)***

***22. Vectors***

Students will be able to…

* Graph vectors ***(Represent)***
* Find a Position Vector ***(Calculate)***
* Add and Subtract Vectors Algebraically ***(Calculate)***
* Find a Scalar Multiple and the Magnitude of a Vector ***(Calculate)***
* Find a Unit Vector ***(Calculate)***
* Find a Vector from Its Direction and Magnitude ***(Calculate)***
* Model with Vectors ***(Model)***

***23. The Dot Product***

Students will be able to…

* Find the Dot Product of Two Vectors ***(Calculate)***
* Find the Angle between Two Vectors ***(Calculate)***
* Determine Whether two Vectors are Parallel ***(Interpret)***
* Determine Whether To Vectors are Orthogonal ***(Interpret)***
* Compute Work ***(Calculate)***

**VI. Course Schedule:** I will keep a weekly calendar in our classroom and on my website. If the schedule changes, I will update both in a timely fashion.

**VII. Assignments**

**Exams: Exams: Exams/Quizzes:** A student will be allowed to make up a test or quiz if their absence is unexcused. HOWEVER, the student will take the assessment on the next day that they show up to class and a penalty of one letter grade will be deducted from the students score. This is in accordance with the Jefferson County School district policy.

**Homework Assignments:** Assignments will be given daily (with few exceptions) and quizzes may happen without prior notice. Assignments are to be handed in the day they are due. Late work will be accepted in all cases when an absence is excused for full credit if and only if they are turned in within two days of the absence. Late work will be accepted from students due to an unexcused absence for partial credit if and only if the assignment is turned in by the date communicated to the student.

**VIII. Grading Summary** Course grades will be the result of the accumulation of points throughout the semester. A final examination will be given at semester end worth 20% of total points.

Three six-week progress grades will be given with points accumulated from:

Tests (50%), Homework / In class activities (10%), Quizzes (20%), Final (20%)

Grading Scale:

A 90.0 – 100%

B 80.0 – 89.9%

C 70.0 – 79.9%

D 60.0 – 69.9%

F below 60.0%

**CU Succeed Final Exam: The final exam is mandatory. Not taking the final exam will result in a score of zero on the exam.**

**COURSE PROCEDURES**

**IX. Course Policies – Grades Attendance Policy:**  Attendance and participation are required to be successful in this course. The BCHS Attendance policy will be strictly enforced.

**Incomplete Policy**: Incomplete grades (I) are not granted for low academic performance.  To be eligible for an Incomplete grade, students must (1) *successfully* complete at least 75 percent of the course, (2) have special circumstances (verification may be required) that preclude the student from attending class and completing graded assignments, and (3) make arrangements to complete missing assignments with the original instructor using a CLAS Course Completion agreement.

**X. Course Policies – Technology and Media Email –** Students can communicate with me regarding attendance, meeting arrangements, grades, and/or questions regarding the course content, assignments, and due dates.

**Computing Technology –** During the semester, we will explore in this class graphically, numerically, and algebraically. This course will utilize the TI-84 calculator, with graphics capability, to facilitate the study of trigonometry. This calculator is a requirement, it will be used in class on a daily basis and on some exams, and will help in the learning of trigonometry.

**XI. Getting Help Instructor Office Hours/By Appointment** Feel free to see me with questions not answered during lecture, additional explanation, or homework assistance.

**XII. Academic Honesty** Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed in the Catalog and on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, go to  
[http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/policies/Pages/DefinitionofAcademicDishonesty.aspx](https://webmail.ucdenver.edu/owa/redir.aspx?C=BfBWQwuda0CUVe6g28JkZBZvKxcFx89IJ1lXMnn5FaKv7PlETK7UuHK7os2Vu4AzvjxWF7A5b5g.&URL=http%3a%2f%2fwww.ucdenver.edu%2facademics%2fcolleges%2fCLAS%2ffaculty-staff%2fpolicies%2fPages%2fDefinitionofAcademicDishonesty.aspx).   
This course assumes your knowledge of these policies and definitions. Failure to adhere to them can result in possible penalties ranging from failure of this course to dismissal from the University; so, be informed and be careful. If this is unclear to you, ask me. The College of Liberal Arts and Sciences (CLAS) Ethics Bylaws allow the instructor to decide how to respond to an ethics violation, whether by lowering the assignment grade, lowering the course grade, and/or filing charges against the student with the Academic Ethics Committee. Violating the Academic Honor Code can lead to expulsion from the University.

**Definition of Academic Dishonesty** Students are expected to know, understand, and comply with the ethical standards of the University. In addition, students have an obligation to inform the appropriate official of any acts of academic dishonesty by other students of the University. Academic dishonesty is defined as a student's use of unauthorized assistance with intent to deceive an instructor or other such person who may be assigned to evaluate the student’s work in meeting course and degree requirements. Examples of academic dishonesty include, but are not limited to, the following:

**Plagiarism:** Plagiarism is the use of another person’s distinctive ideas or words without acknowledgment. The incorporation of another person’s work into one’s own requires appropriate identification and acknowledgment, regardless of the means of appropriation. The following are considered to be forms of plagiarism when the source is not noted:

1. Word-for-word copying of another person's ideas or words.
2. The mosaic (the interspersing of one’s own words here and there while, in essence, copying another's work).
3. The paraphrase (the rewriting of another’s work, yet still using their fundamental idea or theory).
4. Fabrication of references (inventing or counterfeiting sources).
5. Submission of another’s work as one's own.
6. Neglecting quotation marks on material that is otherwise acknowledged.

Acknowledgment is not necessary when the material used is common knowledge.

**Cheating:** Cheating involves the possession, communication, or use of information, materials, notes, study aids or other devices not authorized by the instructor in an academic exercise, or communication with another person during such an exercise. Examples of cheating are:

1. Copying from another's paper or receiving unauthorized assistance from another during an academic exercise or in the submission of academic material.
2. Using a calculator when its use has been disallowed.
3. Collaborating with another student or students during an academic exercise without the consent of the instructor.

**Fabrication and Falsification:** Fabrication involves inventing or counterfeiting information, i.e., creating results not obtained in a study or laboratory experiment. Falsification, on the other hand, involves deliberately alternating or changing results to suit one’s needs in an experiment or other academic exercise.

**Multiple Submissions:** This is the submission of academic work for which academic credit has already been earned, when such submission is made without instructor authorization.

**Misuse of Academic Materials:** The misuse of academic materials includes, but is not limited to, the following:

1. Stealing or destroying library or reference materials or computer programs.
2. Stealing or destroying another student’s notes or materials, or having such materials in one’s possession without the owner’s permission.
3. Receiving assistance in locating or using sources of information in an assignment when such assistance has been forbidden by the instructor.
4. Illegitimate possession, disposition, or use of examinations or answer keys to examinations.
5. Unauthorized alteration, forgery, or falsification.
6. Unauthorized sale or purchase of examinations, papers, or assignments.

**Complicity in Academic Dishonesty:** Complicity involves knowingly contributing to another’s acts of academic dishonesty.

**Student Code of Conduct:** As members of the University community, students are expected to uphold university standards, which include abiding by state civil and criminal laws and all University policies and standards of conduct. These standards are outlined in the student code of conduct which can be found at:  
 <http://www.ucdenver.edu/life/services/standards/students/Pages/default.aspx>

**Spring 2019 Schedule and Deadlines\***

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| --- | --- |
| **Monday**  **1/7/19** | **Registration Opens:**  You may begin your application and registration for your Fall 2018 CU Succeed Courses. Please refer to the CU Succeed Website for detailed instructions and links. |
| **Monday**  **2/6/19** | **Last Day to Request to Register:**  Registration must be completed no later than this day. **If you do not complete the form by this day, you will not receive credit. *There will be no exceptions.***  **CU Succeed Parent/Guardian Financial Responsibility Form due:**  Turn in Financial Responsibility Form to your teacher by this day. |
| **Monday**  **2/25/19** | **Last Day to Drop:**  Courses dropped by this date will not appear on your CU Academic Record and you will not be responsible for the tuition. You must return a drop form to our office by this day.  Drop instructions are on the CU Succeed Website. |
| **Monday**  **3/18/19** | **Last Day to Withdraw:**  You will be responsible for tuition payment and the course will appear on your CU Academic Record as a ‘W’.  Withdraw instructions are on the CU Succeed Website. |
| **Wednesday**  **3/29/19** | **Tuition Due:**  Payment instructions are located on the CU Succeed Website. A reminder e-mail will be sent to the e-mail supplied on the application; **bills will not be mailed!** |

**Note: Grades will be recorded on an official CU transcript, and will become a part of the student’s permanent academic record at the University of Colorado. Grades and transcripts will be available by the end of June 2019.**

***Have questions? Contact us!***

CU Succeed Programs

[**www.ucdenver.edu/cusucceed**](http://www.ucdenver.edu/cusucceed)

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\*The CU Succeed Office holds the right to make extensions and adjustments. Exceptions to deadlines will NOT be honored.