

Notice of Student and Instructor Accountability

Students and Instructors are accountable for all information on this syllabus, which is located in this course's Blackboard Site.

Course Information

Mathematics
Calculus I
Math 170
Course Modality: F2F

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Course Description

This is the first course in the calculus sequence. It covers algebraic and transcendental functions; rate of change; limits; continuity; differentiation of algebraic, trigonometric, exponential, logarithmic, and hyperbolic functions; differentials; applications of differentiation; definite and indefinite integrals; area between curves; volumes; and other applications of integration, indeterminate forms, and L'Hôpital's rule. PREREQ: [MATH 147](#) (or [MATH 143](#) and [MATH 144](#)) or equivalent placement score. (*This CWI course meets Idaho State Board of Education GEM competency requirements for GEM 3 - Mathematical Ways of Knowing.*). (5 lecture hours, 0 lab hours, 5 credits)

Schedule

This is a dual-credit class at Meridian Technical Charter High School (MTCHS). It meets daily from 11:40am-12:29pm in room 109. This class will meet over the course of two semesters.

Instructor Availability

MTCHS building hours are Monday thru Friday from 7AM to 3PM. The instructor is available most days before and after school and at lunch time. The instructor is not available Wednesday mornings due to weekly staff meetings at this time.

The best way to contact the instructor is by email. All emails will be returned within 24 hours on business days.

Course Learning Outcomes

The Course Objective is to provide students with the mathematical foundation necessary (1) for students majoring in the mathematical and physical sciences, engineering, mathematics education, and related fields, and (2) to be able to develop strong mathematical reasoning skills, clear conceptual understanding, and the ability to think critically.

Students completing this course are expected to acquire the ability and skills to:

- A. Graph functions, including trigonometric functions.
 - 1. Find the domain and range of functions and graph functions, including polynomial functions, absolute-value functions, rational functions, square root and cube functions, power functions, algebraic functions, exponential functions, logarithmic functions, and trigonometric functions.
 - 2. Find sums, differences, products, quotients, and compositions of functions.
 - 3. Shift, scale, and reflect graphs of functions.
 - 4. Evaluate trigonometric functions for special angles.
 - 5. Use trigonometric identities, including the Pythagorean identity, the Addition formulas, the Double-Angle formulas, the Half-Angle formulas, and the Law of Cosines.
 - 6. Understand the limitations of using a graphing utility, such as choosing an appropriate window and obtaining a complete graph.
 - 7. Find inverse functions.
 - 8. Use properties of logarithms.
 - 9. Graph arcsine and arccosine and identify their domains and ranges.
- B. Find limits and determine whether a function is continuous.
 - 1. Calculate average and instantaneous rates of change.
 - 2. Find limits from graphs.
 - 3. Use the limit laws to calculate limits.
 - 4. Eliminate common factors to find limits of rational functions.
 - 5. Find limits of average rates of change.
 - 6. Use the Sandwich Theorem (aka Squeeze Theorem) to find limits of functions.
 - 7. Use the formal definition of a limit to prove limit statements.
 - 8. Find one-sided limits graphically and algebraically.
 - 9. Use the fact that the limit of the ratio of $\sin \theta$ and θ is 1, to find limits.
 - 10. Apply the Continuity Test to determine whether a function is continuous at a point.
 - 11. Find limits of continuous composite functions.
 - 12. Apply the Intermediate Value Theorem for continuous functions to find solutions to equations.
 - 13. Use limits involving infinity to find asymptotes.
- C. Calculate derivatives of functions.
 - 1. Find the tangent to the graph of a function.
 - 2. Find the derivative of a function at a given point using the limit of the difference quotient.
 - 3. Use the alternative formula for the derivative to calculate derivatives.
 - 4. Identify cases when the derivative does not exist.
 - 5. Understand the relationship between differentiability and continuity.
 - 6. Apply differentiation rules for constant functions, powers, sums, differences, products, and quotients of functions.
 - 7. Calculate higher-order derivatives.
 - 8. Solve problems involving motion along a line, such as find displacement, average velocity, speed, and acceleration.
 - 9. Calculate derivatives of trigonometric functions.

10. Apply the chain rule to find derivatives.
 11. Use implicit differentiation to find derivatives.
 12. Apply the Derivative Rule for Inverses to find derivatives of inverse functions.
 13. Find derivatives of logarithms.
 14. Use logarithmic differentiation to find the derivative.
 15. Find derivatives of inverse trigonometric functions.
 16. Solve related rates problems.
 17. Approximate functions using linearization.
 18. Use differentials to estimate change.
- D. Use derivatives to solve application problems.
1. Find the absolute extrema of a continuous function.
 2. Find values that satisfy the conclusion of the Mean Value Theorem.
 3. Use the first derivative to determine the local extrema of a function.
 4. Use the second derivative to test for concavity and for local extrema.
 5. Use derivatives to graph functions.
 6. Apply L'Hopital's Rule to find limits of rational functions having appropriate indeterminate forms.
 7. Solve applied optimization problems, such as minimize perimeter or cost, or maximize volume or profit.
 8. Apply Newton's Method to approximate roots.
- E. Evaluate integrals.
1. Find antiderivatives.
 2. Approximate area with finite sums.
 3. Find limits of finite sums.
 4. Use properties of definite integrals to evaluate integrals.
 5. Use definite integrals to find area of nonnegative functions.
 6. Find the average value of a continuous function using a definite integral.
 7. Use the Fundamental Theorem of Calculus to find derivatives of integrals and to evaluate definite integrals using antiderivatives.
 8. Apply the Substitution Method to evaluate indefinite integrals.
 9. Find the area between two curves.
- F. Solve application problems involving definite integrals.
1. Find the volume of a solid by slicing with parallel planes.
 2. Find the volume of a solid of revolution using the Disk Method
 3. Find the volume of a solid of revolution using the Washer Method.
 4. Find the volume of a solid of revolution using cylindrical shells.
 5. Find work done by a variable force.
 6. Find the work done to pump liquids from containers.
- G. Solve problems involving integrals and transcendental functions.
1. Evaluate integrals that result in a logarithmic function.
 2. Evaluate integrals that result in an exponential function.

3. Solve separable differential equations involving exponential change, such as unlimited population growth, radioactivity, and heat transfer.
4. Find derivatives of hyperbolic and inverse hyperbolic functions.
5. Compare the growth rates of functions.

Outcomes Assessment

The student learning outcomes will be assessed using assignments, quizzes, unit tests, and a final exam. The results of the final exam will be used to report student success at meeting the student learning outcomes on the Outcomes Assessment Matrix.

Grading Policy

Grades are weighted. Tests are 55% (chapter tests are 35% and the final is 20%) of the overall grade. Quizzes are 30% and classwork is 10%. There will be a cumulative final exam. Students must score 60% or better on the final exam in order to receive a C or better for the course. This means that if a student fails the final exam, the student would earn either a D or an F for the course. Test and quiz problems are graded on a 7-point scale. Assignments are graded on completion. Incomplete assignments will not be accepted. Late assignments are graded at 70%. Students are provided notebooks for assignments and taking notes. A summary of grading criteria is outlined below:

7-Point Scale

- 7 Demonstrates excellent understanding. No errors.
- 6 Demonstrates very good understanding. Minor arithmetic error. No conceptual errors.
- 5 Demonstrates good understanding. One significant arithmetic error and/or minor conceptual error.
- 3 Demonstrates limited understanding. At least one significant conceptual error.
- 1 Insufficient work shown to evaluate understanding of concept.
- 0 No work shown.

Category	Weight
Final	20%
Chapter Tests	35%
Quizzes	30%
Classwork	15%

Letter Grade Scale:

A	90-100%
B	80-89%
C	70-79%

At MTCHS a grade lower than 70% results in an N/C. For CWI, a grade between 60-69% results in a D, 59% or below results in an F. The CWI grade is separate from the MTCHS grade.

Per departmental policy, a student must earn at least a 60% on the common final exam to be eligible to pass the class with a grade of C or better. Students whose overall average is 70% or better after failing the common final, will be given a letter grade of D and will be offered the opportunity to take a challenge exam.

- Challenge Exam: This exam is available for a limited time after the end of the semester. Students who can earn a 60% or better on the challenge exam will have their grade changed from the D given based on the departmental policy to the letter grade that matches

their *original* semester average. Students eligible for this challenge opportunity will be notified by their instructor of their eligibility along with details regarding dates of availability and the timeframe for grade changes. Please note: This opportunity is not available to all students who fail the final exam. It is only available to students who fail the final exam whose semester average stays at 70% or above after having done so.

Textbooks and Required Materials

The textbook for the course is Thomas' Calculus Early Transcendentals, 13th Edition, by Thomas, Weir, and Hass, Pearson, 2014.

A scientific calculator is needed for this course. A graphing calculator is encouraged.

Instructional Conversation

Learning is an active exchange between faculty and student.

As a faculty, I will

- Instruct through direct instruction and collaboration.
- Assess through observation and evaluating coursework.
- Inform through answering student questions and providing important course information.
- Facilitate through whole class learning and small groups.

As a student, you will

- Attend class regularly.
- Submit assignment and assessments.
- Participate by engaging in mathematical discussion with peers and instructor.
- Interact by communicating with instructor regarding course content, questions, etc.

Course Calendar

Week	Topics
1	1.1 Functions 1.2 Combining Functions
2	1.3 Trigonometric Functions 1.5 Exponential Functions
3	1.6 Inverse Functions and Logarithms Ch. 1 Test
4	2.1 Rates of Change and Tangents to Curves 2.2 Limit of a Function and Limit Laws
5	2.3 Precise Definition of a Limit 2.4 One-Sided Limits
6	2.5 Continuity 2.6a Limits at Infinity
7	2.6b Infinite Limits; Asymptotes of Graphs Ch. 2 Test
8	3.1 Tangents and Derivatives at a Point 3.2 The Derivative as a Function
9	3.3 Differentiation Rules 3.4 The Derivative as a Rate of Change

10	3.5 Derivatives of Trigonometric Functions 3.6 The Chain Rule
11	Rocks on The Moon Project Ch. 3 Part 1 Test
12	3.7 Implicit Differentiation 3.8 Derivatives of Inverses and Logarithms
13	3.9 Inverse Trigonometric Functions 3.10 Related Rates
14	3.11 Linearization and Differentials Ch. 3 Part 2 Test
15	4.1 Extreme Values of Functions 4.2 Mean Value Theorem
16	4.3 Monotonic Functions and the First Derivative Test 4.4 Concavity and Curve Sketching
17	4.5 Indeterminate Forms and L'Hopital's Rule 4.6 Applied Optimization
18	4.7 Newton's Method 4.8 Antiderivatives
19	Ch. 4 Test Optimizaiton Task
20	5.1 Area nd Estimating wtih Finite Sums 5.2 Sigma Notation and Llimits of Finite Sums
21	5.3 The Definite Integral 5.4 The Fundamental Theorem of Calculus
22	5.5 Indefinite Integrals and the Substituion Method 5.6 Definite Integral Substitutions and the Area Between Curves
23	5.6 Continued Ch. 5 Test
24	6.1a Volumes Using Cross-Sections: Slicing Method 6.1b Volumes Using Cross-Sections: Disk Method
25	6.1c Volumes Using Cross Sections: Area Between Curves 6.2 Volumes Using Cylindrical Shells
26	6.5 Work and Fluid Forces
27	Ch. 6 Test 7.1 The Logarithm Defined as an Integral
28	7.2 Exponential Change and Separable Differential Equations 7.3 Hyperbolic Functions
29	7.4 Relative Rates of Growth Ch. 7 Test
30	Final Exam

Course Expectations

- Students are encouraged to take responsibility for their learning. Only the student knows what they know and what they do not know, so it is up to the student to ask for additional help when necessary. The average student can expect to spend approximately two-four hours per week preparing for class.

- Smoking/Eating/Drinking will not be allowed in the classroom
- Late Work Policy as Outlined in MTCHS Handbook: Students may receive no more than a 70% for any late assignment. Late work policies are defined by individual instructors in course syllabi. No late work will be accepted after the end of grading terms such as quarter and semester. Any late or missing assignment will be scored based on original scoring. If the student earns a 70% or higher, then the student will receive a 70% on the assignment. If the student earns less than a 70%, he/she will earn that percentage. Extenuating circumstances will be dealt with by the instructor.
- Attendance Policy as outlined in the MTCHS handbook.

Personal Technical Skills

This course will not provide information on how to use a computer, use Blackboard, navigate the web or manage electronic files. Students who are having difficulty should contact their instructor, [IT Help Desk](#) or [Tutoring Services](#). Please use the resources listed above or speak with the instructor before dropping a course.

Students must be able to do the following with or without accommodation:

- Use an internet browser to navigate the internet and Blackboard.
- Download, upload, create, save, edit and open documents using Microsoft Office applications, such Word, Excel and PowerPoint.
- Download and upload audio and video files.

Civility and Behavioral Expectations

The College of Western Idaho is committed to educational excellence and recognizes that to achieve that excellence, students, faculty, and staff have a right to be in a safe environment, free of disturbance and civil in all aspects of human relations. Membership in the CWI learning community places a special obligation on all members to preserve the safe learning environment, regardless of the medium of the environment. It is the responsibility of instructors to determine, maintain, and enforce the standards of behavior required to preserve that safe environment.

Behavior that has a negative impact on the learning environment is prohibited. Such behavior may include, but is not limited to, rude, sarcastic, obscene, or disrespectful and/or disruptive behavior. Instructors will determine the appropriate response to problematic behavior in line with the procedures stated in the CWI Student Handbook. Problematic behavior may result in a student being removed from the class session and/or referred to the CWI Academic Conduct Process. For information on how problematic behavior will be managed, see the [CWI Student Handbook](#). It is the student's responsibility to check their email to receive notification of any scheduled appointments or other urgent communications.

Any student or other member of the learning community may report a violation of the Student Code of Conduct [here](#).

Academic Integrity

One of the College's Core Themes is [Instructional Excellence](#), and in order to achieve instructional Excellence, academic integrity must be upheld. Academic Integrity is the "commitment to five fundamental values: honesty, trust, fairness, respect, and responsibility. ... these five values, plus the courage to act on them even in the face of adversity, are truly foundational to the academy" ([The](#)

[Fundamental Values of Academic Integrity](#), 2013). These values are especially important in how students represent their own learning, ideas, and work. Practicing academic integrity includes, but is not limited to, non-participation in the following behaviors: cheating, plagiarism, falsifying information, unauthorized collaboration, facilitating academic dishonesty, and violating program policies and procedures.

For additional information on academic integrity expectations, see the [Student Code of Conduct](#). Violations may result in disciplinary action ranging from failure of the assignment to failure of the entire course. Acts of academic dishonesty, especially when sanctions are given, are reported and run through the Academic Conduct Process. Repeated acts of academic dishonesty have more severe institutional consequences.

Title IX & A Respectful Community

Title IX guarantees all students the right to an education free from discrimination on the basis of sex. This includes the right to an education free from sexual harassment, including sexual assault. This may include unwelcome conduct of a sexual nature in class, or in online discussion boards or through chat or video conferences. This law also protects students from discrimination based on pregnancy or being a parent and provides support options as well. If you, or someone you know, may have been experienced sexual harassment or discrimination of any kind, you are encouraged to report it to the College Title IX Coordinator by completing a [report here](#), or by e-mailing respectfulcommunity@cw.edu. Filing a report allows the College to provide supportive measures to those involved. It does not obligate a student to go forward with an investigation, and all information reported is protected under federal law. For more information, [click here](#).

Student Services

CWI provides a number of offices and services to assist students on their academic journey. Below is a list of the services most commonly accessed by students:

- [One Stop Service Centers](#) – Provides assistance with admissions, advising, registration, financial aid, and most other common needs you may have. They are a good first stop for any questions.
- [Student Disability Services](#) – Provides accommodations and support for students with a range of disabilities.
- [Counseling Services](#) – Short-term counseling for students provided free of charge.
- [Library & Research Support](#) – Assists students with research, study skills, textbook reserves and other services key to academic success.
- [Tutoring Center](#) – Free tutoring services on a range of academic subjects, available to all enrolled students.
- [Writing Center](#) – Provides strategies to help students identify opportunities to improve the quality of their writing, free of charge.
- [Assessment & Testing](#) – Proctoring services for a range of course exams, accommodated testing, and outside certification tests.
- [Student Affairs](#) – Provides a range of engagement opportunities, including professional and interest organizations, student government, support for veteran students & families, and CARE Services to support students through unexpected life events.

CWI COVID-19 Response

CWI is committed to providing a safe learning environment for all of our students. We will be monitoring the class environment and delivery to ensure continued compliance with CDC and State of Idaho guidelines. Any change to course delivery will be communicated directly to students.

Emergency Procedures

Periodically, it is necessary to practice emergency school lockdowns, egress, evacuation, and loss of power exercises in accordance with the MTCHS Emergency Response Plan. The MTCHS Emergency Response Plan and Procedures can be found on the school's website and is updated annually.

Idaho General Education Matriculation (GEM) Competency

This course meets the Idaho State Board Gen Ed Matriculation (GEM) course competencies for **Mathematical Ways of Knowing** courses. For more information see the [State Board competencies](#).

Signature Assignments

This course meets the Gen Ed Program Outcome of **Solve Problems** through its Signature assignment. For more information see the [CWI Gen Ed Program Outcomes](#)

Affidavit of Syllabus as Contract

Student

Parent