

# WALTERS STATE COMMUNITY COLLEGE

## COURSE SYLLABUS

**COURSE NAME AND NUMBER:** Calculus III - MATH 2110

**SEMESTER AND YEAR:**

**INSTRUCTOR:**

Mathematics Division Fax: 423-585-6873

Division Secretary: 423-585-6864

Tutoring: Mrs. Beth Dixon at [Beth.Dixon@ws.edu](mailto:Beth.Dixon@ws.edu) or 423-585-6872 or MBSS 222

or Ms. Mary Breedlove at [Mary.Breedlove@ws.edu](mailto:Mary.Breedlove@ws.edu) or 423-585-6920 or CCEN 261

Office Hours: Posted on office door. Office hours are times the instructor is on campus.

It is recommended that students make an appointment.

**REQUIRED TEXTBOOK:** Calculus Single and Multivariable 4<sup>th</sup> Edition Hughes-Hallett, Wiley

**REQUIRIED TECHNOLOGY:** A TI-89, TI-89 Titanium, Voyage 200, TI-92 Plus, or TI-92 calculator is required. Ask about WSCC calculator loaner program for Calculus III.

**Students may need a ream of computer paper to print materials.**

**CATALOG DESCRIPTION:**

Calculus of functions in two or more dimensions. Includes solid analytic geometry, partial differentiation, multiple integration, and selected topics in vector calculus. (Prerequisite: MATH 1920)

4 Semester Credits

**COURSE OUTCOMES:** The student should be able to:

1. Do computations with vectors.
2. Find the dot and cross product.
3. Find the equation of lines and planes on three dimensions.
4. Graph surfaces in three dimensions.
5. Express position, velocity, and acceleration as vector functions.
6. Represent a function of two independent variables as a surface in three dimensions or a contour map in two dimensions.
7. Differentiate a function of two independent variables with respect to either variable (take partial derivatives) and understand the graphical interpretation of the answer.
8. Find the equation of the tangent plane and normal line at any point on a surface in three dimensions.
9. Given a function of two or three independent variables, find the gradient at any point and understand its meaning.
10. Given a function of two or three independent variables, find the directional derivative at any point in any direction and understand its meaning.
11. Find partial derivatives using the chain rule.
12. Find linear approximations of functions in several variables.
13. Find the maxima and minima of functions of two independent variables.
14. Find area between curves in Cartesian and polar coordinates using double integration.
16. Find volume between surfaces in Cartesian, spherical and cylindrical coordinates using triple integration.
17. Evaluate line and surface integrals.

## **COURSE CONTENT:**

### Chapter 12 – Functions of Several Variables

- 12.1 Functions of Two Variables
- 12.2 Graphs of Functions of Two Variables
- 12.3 Contour Diagrams
- 12.4 Linear Functions
- 12.5 Functions of Three Variables
- 12.6 Limits and Continuity

### Chapter 13 – A Fundamental Tool: Vectors

- 13.1 Displacement Vectors
- 13.2 Vectors in General
- 13.3 The Dot Product
- 13.4 The Cross Product

### Chapter 14 – Differentiating Functions of Several Variables

- 14.1 The Partial Derivative
- 14.2 Computing Partial Derivatives Algebraically
- 14.3 Local Linearity and the Differential
- 14.4 Gradients and Directional Derivatives in the Plane
- 14.5 Gradients and Directional Derivative in Space
- 14.6 The Chain Rule
- 14.7 Second-Order Partial Derivatives
- 14.8 Differentiability

### Chapter 15 – Local and Global Extrema

- 15.1 Local Extrema
- 15.2 Optimization
- 15.3 Constrained Optimization: Lagrange Multipliers

### Chapter 16 – Integrating Functions of Several Variables

- 16.1 The Definite Integral of a Function of Two Variables
- 16.2 Iterated Integrals
- 16.3 Triple Integrals
- 16.4 Double Integrals in Polar Coordinates
- 16.5 Integrals in Cylindrical and Spherical Coordinates
- 16.7 Change of Variables in a Multiple Integral

### Chapter 17 – Parameterization and Vector Fields

- 17.1 Parameterized Curves
- 17.2 Motion, Velocity, and Acceleration
- 17.3 Vector Fields
- 17.5 Parameterized Surfaces

### Chapter 18 – Line Integrals

- 18.1 The Idea of a Line Integral
- 18.2 Computing Line Integrals over Parameterized Curves
- 18.3 Gradient Fields and Path-Independent Fields
- 18.4 Path-Dependent Vector Fields and Green's Theorem

## Chapter 19 – Flux Integrals

- 19.1 The Idea of a Flux Integral
- 19.2 Flux Integrals for Graphs, Cylinders, and Spheres
- 19.3 Flux Integrals over Parameterized Surfaces

## Chapter 20 – Calculus of Vector Fields

- 20.1 The Divergence of a Vector Field
- 20.2 The Divergence Theorem
- 20.3 The Curl of a Vector Field
- 20.4 Stokes' Theorem
- 20.5 The Three Fundamental Theorems

### **INSTRUCTIONAL AND EVALUATION METHOD:**

### **FINAL EXAM:**

### **COURSE GROUND RULES:**

All students attending Walters State Community College, regardless of the time and location of the class, must abide by the rules and regulations outlined in the current *Walters State Catalog/Student Handbook* and the current *Walters State Timetable of Classes*. A copy of the Catalog/Handbook and the Timetable of Classes may be obtained from the admissions office on the main campus or at any of our off-campus sites. You may also access the Catalog/Handbook on-line at the following web address: <http://www.ws.edu/catalog>

Students should attend the first day of class or contact the instructor prior to the first class. Failure to do this may result in being dropped from the class.

Plagiarism, cheating, and other forms of academic dishonesty are prohibited.

Students with disabilities must register with Student Support Services (CCEN), Room 262 (phone 423-585-6892) if they need any special facilities, services, or consideration.

Students in need of tutoring assistance are encouraged to contact the Office of Student Tutoring located in the College Center (CCEN), Room 261. The phone number is 423-585-6920.

Students receiving any type of financial aid or scholarship should contact the Financial Aid Office before making any changes to their schedule. Schedule changes without prior approval may result in loss of award for the current term and future terms.

Students who have not paid fees on time and/or are not correctly registered for this class and whose names do not appear on official class rolls generated by the Admissions and Records Office will not be allowed to remain in class or receive credit for this course.

Cellular phone use during classroom interaction is prohibited. Cellular phones must be turned to the non-audible mode until after class, at which time calls can be received or checked. (See *the Walters State Catalog/Handbook*)

For information related to the cancellation of classes due to inclement weather, please check the college's Web site at [www.ws.edu](http://www.ws.edu) or call the college's student information line, 1-800-225-4770, option 1; InfoConnect, (423) 581-1233, option 1045; the Sevier County Campus, (865) 774-5800, option 9; or the Greeneville/Greene County Center for Higher Education, (423) 798-7940, option 4. Also, please monitor local TV and radio stations for weather-related announcements. For additional information on this policy see the college catalog.

In the event of a pandemic or other college declared critical event that impacts the college's ability to proceed with academic course activities as planned, the college reserves the right to alter this course plan. In the event of a pandemic or other event, please refer to the college's home web page, [www.ws.edu](http://www.ws.edu) or call InfoConnect, (423) 581-1233 for further information.

Regular class attendance is a student's obligation. (See *the Walters State Catalog/Student Handbook*) If for some reason a student misses class, it is his or her responsibility to see the instructor regarding missed assignments and/or activities and to be prepared for the next class. Excessive absences may substantially lower the semester grade. The college requires the instructor to keep accurate records and to report when students are not attending class.

**ALTERNATE TEACHING PLAN:** Email instructor for additional information (go to <https://elearn.ws.edu>).

**DROP DEADLINE:**

**WEB RESOURCES:** <https://elearn.ws.edu>