

# MATH 2110 Calculus and Analytic Geometry III

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## Instructor Information:

Name  
Office phone  
Office location  
Office hours  
E-mail address

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## I. Course Description

A continuation of MATH 1920 and the third course in the traditional three-course calculus sequence. Topics include solid analytical geometry, the calculus of more than one independent variable, surfaces and curves in space, cylindrical and spherical coordinate systems, vectors and vector-valued functions, partial derivatives, multiple integrals, and applications.

**Credit Hours:** 4 credits      4 class hours

**Prerequisite:** MATH 1920

## II. Course Outcomes and Topics

Upon successful completion of this course, students will:

- Calculate operations on three-dimensional vectors, including the dot product and cross product, and determine what the results reveal about the relationship between the vectors.
- Classify cylinders and quadric surfaces from their equations.
- Write the equations of lines and planes and determine whether a set of lines is parallel, intersecting, or skew.
- Solve projectile motion applications using vector functions and explain the results.
- Use partial derivatives to find a linear approximation for a function of two variables.
- Apply the method of Lagrange multipliers to optimize a function subject to given constraints.
- Evaluate double integrals over rectangular and bounded regions, including the use of polar coordinates to find the volume of a solid.

## Topics

Three-Dimensional Coordinate Systems  
Vectors  
The Dot Product  
The Cross Product  
Equations of Lines and Planes  
Cylinders and Quadric Surfaces  
Cylindrical and Spherical Coordinates  
Vector Functions/Space Curves  
Derivatives/Integrals/Vector Functions  
Arc Length and Curvature  
Motion in Space/Velocity/Acceleration  
Functions of Several Variables  
Limits and Continuity  
Partial Derivatives  
Tangent Planes/Linear Approximations  
The Chain Rule  
Directional Derivatives/Gradient Vector  
Maximum and Minimum Values  
Lagrange Multipliers  
Double Integrals Over Rectangles  
Iterated Integrals  
Double Integrals/General Regions  
Double Integrals/Polar Coordinates  
Applications of Double Integrals  
Surface Area  
Triple Integrals  
Triple Integrals/Cylindrical/Spherical Coordinates  
Change of Variables/Multiple Integrals  
Vector Fields  
Line Integrals  
Fundamental Theorem/Line Integrals  
Green's Theorem  
Curl and Divergence  
Parametric Surfaces/Their Areas  
Surface Integrals  
Stokes' Theorem  
The Divergence Theorem  
Second-Order Linear Equations  
Nonhomogeneous Linear Equations  
Applications/Second Order Diff. Equations  
Series Solutions

### **III. Materials:**

**Students must check with the instructor before purchasing any materials**

- **Required: *Multivariable Calculus***, by James Stewart, 6<sup>th</sup> edition  
Publisher: Cengage, **ISBN 049542756X** (text bundled with solutions manual)

**-If purchased separately-**

- **Required text only: *Multivariable Calculus*, ISBN 0495011630**
- **Recommended: *Multivariable Solutions Manual*, ISBN 0495012289**

- Calculator/software: A graphing calculator is strongly recommended or required. The **TI-84+** calculator will be the demonstration tool in the classroom. Some software may be used. (The instructor will clarify.)

#### **IV. Course Policies**

##### Attendance:

Each Instructor will provide information regarding his/her attendance policy. Failure to attend class will result in a final course grade of "FA" or "FN" (see explanation below) depending on the individual instructor's course policy.

FA= failure, attendance-related (unofficial withdrawal) Last recorded date of attendance required

FN= failure, never attended class (unofficial withdrawal)

##### Method of Evaluation:

Grading: 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F

The instructor will clarify specific examination, homework, and other methods of evaluation.

#### **V. ADA Statement**

Nashville State Technical Community College complies with the Americans with Disabilities Act. If you wish to request any special accommodations for any courses in which you are enrolled, contact the Disability Coordinator at 353-3721. Such services must have proof of documentation that is not over three years old.

#### **VI. Classroom Behavior**

Nashville State Community College has a zero tolerance policy for disruptive conduct in the classroom. Students whose behavior disrupts the classroom will be subject to disciplinary sanctions.

The instructor has primary responsibility for control over classroom behavior and maintenance of academic integrity. He/she can order temporary removal or exclusion from the classroom of any student engaged in disruptive conduct or in conduct which violates the general rules and regulations of the College.

Disruptive behavior in the classroom may be defined as, but is not limited to, behavior that obstructs or disrupts the learning environment (e.g., offensive language, harassment of students and professors, repeated outbursts from a student which disrupt the flow of instruction or prevent concentration on the subject taught, failure to cooperate in maintaining classroom decorum, etc.), the continued use of any electronic or other noise or light emitting device which disturbs others (e.g., disturbing noises from beepers, cell phones, palm pilots, lap-top computers, games, etc.).

**Please be aware that children are not allowed in class or unattended on campus.**

## **Academic Dishonesty** (Honor Code)

Any form of academic dishonesty, cheating, plagiarizing, or other academic misconduct is prohibited. "Plagiarism may result from: (1) failing to cite quotations and borrowed ideas, (2) failing to enclose borrowed language in quotation marks, and (3) failing to put summaries and paraphrases in your own words" (A Writer's Reference 331). Academic dishonesty may be defined as, but is not limited to, intentionally trying to deceive by claiming credit for the work of another person, using information from a web page or source without citing the reference, fraudulently using someone else's work on an exam, paper, or assignment, recycling your own work from another course, purchasing papers or materials from another source and presenting them as your own, attempting to obtain exams/materials/assignments in advance of the date of administration by the instructor, impersonating someone else in a testing situation, providing confidential test information to someone else, submitting the same assignment in two different classes without requesting both instructor's permission, allowing someone else to copy or use your work, using someone else's work to complete your own, altering documents, transcripts or grades, and forging a faculty/staff member's signature.

In addition to other possible disciplinary sanctions that may be imposed through regular college procedures as a result of academic dishonesty the instructor has the authority to assign an "F" or a "Zero" for the exercise, paper, or examination or to assign an "F" for the course.

NOTE: This syllabus is meant simply as a guide and overview of the course, the topics, the objectives, the general assessments, and some standard college policies. Some items are subject to change or revision at the instructor's discretion. Each instructor will further clarify their criteria for grading, classroom procedures, attendance, exams and dates, etc.