



INSTRUCTIONAL PACKAGE

MAT 240

Analytical Geometry and Calculus III

Effective Term

Fall 2022/Spring 2023/Summer 2023

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Part I: Course Information

Effective Term: Fall 2022/Spring 2023/Summer 2023

COURSE PREFIX: MAT 240

COURSE TITLE: Analytical Geometry and Calculus III

CONTACT HOURS: 4.0

CREDIT HOURS: 4.0

RATIONALE FOR THE COURSE:

This four-semester hour calculus course is used primarily by colleges and universities in their engineering, science and mathematics majors. The mathematics taught in this course is a continuation and furtherance of concepts learned in a typical Calculus I/Calculus II sequence, and is used in statistics, physics and other specialized courses in the student's major.

COURSE DESCRIPTION:

This course includes the following topics: multivariable calculus, including vectors; partial derivatives and their applications to maximum and minimum problems with and without constraints; line integrals; multiple integrals in rectangular and other coordinates; and Stokes' and Green's theorems. (Prerequisite: Analytical Geometry and Calculus II) This course is transferable to public senior institutions as part of the South Carolina Commission on Higher Education Statewide Articulation Agreement.

PREREQUISITES/CO-REQUISITES:

Credit level MAT 141 Minimum Grade of C or Credit level MAT 141 Minimum Grade of TC

***Online/Hybrid** courses require students to complete the [DLi Orientation Video](#) prior to enrolling in an online course.

REQUIRED MATERIALS:

1. Please visit the Bookstore online site for most current textbook information. Use the direct link below to find textbooks.
[BOOKSTORE](#).

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

2. Scientific/Graphing Calculator.

ENTRY LEVEL COMPETENCIES:

1. Find derivatives and antiderivatives of algebraic and transcendental functions.
2. Evaluate definite integrals of algebraic and transcendental functions.

3. Determine whether a given infinite series is convergent or divergent, and find power series representations of functions.
4. Understand the use of calculus concepts in parametric and polar form.

TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's student portal for course materials. myHGTC and college email access.

STUDENT IDENTIFICATION VERIFICATION

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual events to support student identification verifications. Please refer to your Instructor Information Sheet for information regarding this requirement.

CLASSROOM ETIQUETTE:

As a matter of courtesy to other students and your professor, please turn off cell phones and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate.

NETIQUETTE: is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat focused on online communications etiquette. For more information regarding Netiquette expectations for distance learning courses, please visit [Online Netiquette](#).

Part II: Student Learning Outcomes

COURSE LEARNING OUTCOMES and ASSESSMENTS*:

The student should be able to:

1. Understand the concept of vectors in the plane and perform vector operations.
2. Understand the three-dimensional coordinate system and the concept of vectors in space.
3. Find the dot product of two vectors and understand properties of the dot product.
4. Find the cross product of two vectors.
5. Find equations of lines, planes and surfaces in space.
6. Understand and apply cylindrical and spherical coordinates to represent surfaces in space.
7. Understand the definition of vector-valued functions, the definition of continuity of vector-valued functions, and find limits of vector-valued functions.
8. Find derivatives and indefinite integrals of vector-valued functions.
9. Use vector-valued functions to determine the velocity and acceleration of a moving object.
10. Find tangent and normal vectors.
11. Understand the definition of and notation for multivariate functions.
12. Investigate the continuity of and evaluate limits for multivariate functions.
13. Find partial derivatives.
14. Find and apply directional derivatives and gradients.
15. Find equations of normal lines and tangent planes.

16. Find absolute and relative maximum and minimum values of functions of two variables, and use these skills to solve optimization problems.
17. Use Lagrange multipliers to solve optimization problems with constraints.
18. Find iterated and double integrals, in both rectangular and polar form, and apply them to determine areas and volumes.
19. Find triple integrals, in rectangular, cylindrical and spherical coordinates.
20. Understand and apply the concepts of vector fields, and the curl and divergence of vector fields.
21. Evaluate line integrals.
22. Apply the Fundamental Theorem of Line Integrals.
23. Understand and apply Green's Theorem.
24. Understand the parametrization of surfaces, and evaluate surface integrals.
25. Understand and apply the Divergence Theorem.
26. Understand and apply Stokes's Theorem.

UNIT I: Vectors and the Geometry of Space

Vectors and the Geometry of Space (Chapter 11)

1. Vectors in the Plane (11.1)
2. Space Coordinates and Vectors in Space (11.2)
3. The Dot Product of Two Vectors (11.3)
4. The Cross Product of Two Vectors in Space (11.4)
5. Lines and Planes in Space (11.5)
6. Surfaces in Space (11.6)
7. Cylindrical and Spherical Coordinates (11.7)

UNIT II: Vector-Valued Functions

Vector-Valued Functions (Chapter 12)

1. Vector-Valued Functions (12.1)
2. Differentiation and Integration of Vector-Valued Functions (12.2)
3. Velocity and Acceleration (12.3)
4. Tangent Vectors and Normal Vectors (12.4)
5. Arc Length and Curvature (12.5)**

UNIT III: Functions of Several Variables

Functions of Several Variables (Chapter 13)

1. Introduction to Functions of Several Variables (13.1)
2. Limits and Continuity (13.2)
3. Partial Derivatives (13.3)
4. Differentials (13.4)**
5. Chain Rules for Functions of Several Variables (13.5)
6. Directional Derivatives and Gradients (13.6)
7. Tangent Planes and Normal Lines (13.7)
8. Extrema of Functions of Two Variables (13.8)
9. Applications of Extrema (13.9)
10. Lagrange Multipliers (13.10)

UNIT IV: Multiple Integration

Multiple Integration (Chapter 14)

1. Iterated Integrals and Area in the Plane (14.1)
2. Double Integrals and Volume (14.2)
3. Change of Variables: Polar Coordinates (14.3)
4. Center of Mass and Moments of Inertia (14.4)**
5. Surface Area (14.5)**
6. Triple Integrals and Applications (14.6)
7. Triple Integrals in Other Coordinates (14.7)
8. Change of Variables: Jacobians (14.8)**

UNIT V: Vector Analysis

Vector Analysis (Chapter 15)

1. Vector Fields (15.1)
2. Line Integrals (15.2)
3. Conservative Vector Fields and Independence of Path (15.3)
4. Green's Theorem (15.4)
5. Parametric Surface (15.5)
6. Surface Integrals (15.6)
7. Divergence Theorem (15.7)
8. Stokes's Theorem (15.8)

**AS TIME PERMITS

****Students – please refer to the Instructor's Course Information sheet for specific information on assessments and due dates.***

Part III: Grading and Assessment**EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS***

****Students, for the specific number and type of evaluations, please refer to the Instructor's Course Information Sheet.***

GRADING SYSTEM:

- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F Below 60%

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of

that course of action. Ds, Fs, Ws, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the academic calendar for deadlines for add/drop ([ACADEMIC CALENDAR](#)). You must attend at least one meeting of all of your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly.

Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes in order to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a student has missed over 20% of the course or has missed two (2) consecutive weeks, the faculty is obligated to withdraw the student and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

For online and hybrid courses, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

Part V: Student Resources



THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers to all students the following **free** resources:

1. **Academic tutors** for most subject areas, **Writing Center support**, and **college success skills**.
2. Online **tutoring** and academic support resources.
3. Professional and interpersonal communication **coaching** in the EPIC Labs.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at sstc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email sstc@hgtc.edu or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the [Online Resource Center](#) to access on-demand resources.



STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following free resources:

1. **Getting around HGTC:** General information and guidance for enrollment, financial aid, registration, and payment plan support!
2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **Chat with our staff on TECH Talk**, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552.

Visit the [Tech Central](#) website for more information. Live Chat and Center locations are posted on the website. Or please call (843) 349 – TECH (8324), Option #1.

STUDENT TESTING:

Testing in an **online/hybrid** course may be accomplished in a variety of ways:

- Test administered within D2L
- Test administered in writing on paper
- Test administered through Publisher Platforms

Further more tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

The **Instructor Information Sheet** will have more details on test requirements for your course.

DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability staff will review documentation of the student's disability and, in a confidential setting with the student, develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided.

STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:

Horry-Georgetown Technical College prohibits discrimination and harassment, including sexual

harassment and abuse, on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation in educational programs and/or activities.

TITLE IX REQUIREMENTS:

All students (as well as other persons) at Horry-Georgetown Technical College are protected by Title IX—regardless of their sex, sexual orientation, gender identity, part- or full-time status, disability, race, or national origin—in all aspects of educational programs and activities. Any student, or other member of the college community, who believes that he/she is or has been a victim of sexual harassment or sexual violence may file a report with the college’s Chief Student Services Officer, campus law enforcement, or with the college’s Title IX Coordinator, or designee.

*Faculty and Staff are required to report incidents to the Title IX Coordinators when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:

Student and prospective student inquiries concerning Section 504, Title II, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs.

Dr. Melissa Batten, VP Student Affairs

Title IX Coordinator

Building 1100, Room 107A, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5228

Melissa.Batten@hgtc.edu

Employee and applicant inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources.

Jacquelyne Snyder, VP Human Resources

EEO and Title IX Coordinator

Building 200, Room 212A, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5212

Jacquelyne.Snyder@hgtc.edu