



Course Syllabus

Math 2415

Calculus III

Catalog Description:

Calculus III

Prerequisite: TSIP completed and Math 2414

Corequisite: none

Conic sections, polar equations, and their graphs, parametric equations, vector calculus, multivariable calculus, partial differentiation, double and triple integrals and applications of "Green's Theorem" and "Stoke's Theorem." Lab fee (2701015919) 4-3-3

Prerequisites:

TSIP complete and Math 2414

Corequisite:

none

Semester Credit Hours:

4

Lecture Hours per week:

3

Contact Hours per Semester:

64

State Approval Code:

2701015919

Course Subject/Catalog Number:

MATH 2415

Course Title:

Calculus III

Course Curriculum: State Criteria (those marked with an X reflect the state-mandated competencies taught in this course)

Basic Intellectual Competencies in the Core Curriculum

- Reading
- Writing
- Speaking
- Listening
- Critical thinking
- Computer literacy

Perspectives in the Core Curriculum

- Establish broad and multiple perspectives on the individual in relationship to the larger society and world in which he/she lives, and to understand the responsibilities of living in a culturally and ethnically diversified world.
- Stimulate a capacity to discuss and reflect upon individual, political, economic, and social aspects of life in order to understand ways in which to be a responsible member of society.
- Recognize the importance of maintaining health and wellness.
- Develop a capacity to use knowledge of how technology and science affect their lives.
- Develop personal values for ethical behavior.
- Develop the ability to make aesthetic judgments.
- Use logical reasoning in problem solving.
- Integrate knowledge and understand the interrelationships of the scholarly disciplines.

Core Components and Related Exemplary Educational Objectives

Communication (composition, speech, modern language)

The objective of a communication component of a core curriculum is to enable the student to communicate effectively in clear and correct prose in a style appropriate to the subject, occasion, and audience.

- To understand and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.
- To understand the importance of specifying audience and purpose and to select appropriate communications choices.
- To understand and appropriately apply modes of expression, i.e. descriptive, expositive, narrative, scientific, and self-expressive, in written, visual, and oral communication.
- To participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding.**
- To understand and apply basic principles of proficiency in the development of exposition and argument.
- To develop the ability to research and write a documented paper and/or to give an oral presentation.

Mathematics

The objective of the mathematics component of the core curriculum is to develop a quantitatively literate

college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.

- To apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations.**
- To represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically.**
- To expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments.**
- To use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results.**
- To interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them.**
- To recognize the limitations of mathematical and statistical models.**
- To develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines.**

Natural Sciences

The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the bases for building and testing theories.

- To understand and apply method and appropriate technology to the study of natural sciences.
- To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
- To identify and recognize the differences among competing scientific theories.
- To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
- To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.

Humanities and Visual and Performing Arts

The objective of the humanities and visual and performing arts in a core curriculum is to expand students' knowledge of the human condition and human cultures, especially in relation to behaviors, ideas, and values expressed in works of human imagination and thought. Through study in disciplines such as literature, philosophy, and the visual and performing arts, students will engage in critical analysis, form aesthetic judgments, and develop an appreciation of the arts and humanities as fundamental to the health and survival of any society. Students should have experiences in both the arts and humanities.

- To demonstrate awareness of the scope and variety of works in the arts and humanities.
- To understand those works as expressions of individual and human values within an historical and social context.
- To respond critically to works in the arts and humanities.
- To engage in the creative process or interpretive performance and comprehend the physical and intellectual demands required of the author or visual or performing artist.

- To articulate an informed personal reaction to works in the arts and humanities.
- To develop an appreciation for the aesthetic principles that guide or govern the humanities and arts.
- To demonstrate knowledge of the influence of literature, philosophy, and/or the arts on intercultural experiences.

Social and Behavioral Sciences

The objective of a social and behavioral science component of a core curriculum is to increase students' knowledge of how social and behavioral scientists discover, describe, and explain the behaviors and interactions among individuals, groups, institutions, events, and ideas. Such knowledge will better equip students to understand themselves and the roles they play in addressing the issues facing humanity.

- To employ the appropriate methods, technologies, and data that social and behavioral scientists use to investigate the human condition.
- To examine social institutions and processes across a range of historical periods, social structures, and cultures.
- To use and critique alternative explanatory systems or theories.
- To develop and communicate alternative explanations or solutions for contemporary social issues.
- To analyze the effects of historical, social, political, economic, cultural, and global forces on the area under study.
- To comprehend the origins and evolution of U.S. and Texas political systems, with a focus on the growth of political institutions, the constitutions of the U.S. and Texas, federalism, civil liberties, and civil and human rights.
- To understand the evolution and current role of the U.S. in the world.
- To differentiate and analyze historical evidence (documentary and statistical) and differing points of view.
- To recognize and apply reasonable criteria for the acceptability of historical evidence and social research.
- To analyze, critically assess, and develop creative solutions to public policy problems.
- To recognize and assume one's responsibility as a citizen in a democratic society by learning to think for oneself, by engaging in public discourse, and by obtaining information through the news media and other appropriate information sources about politics and public policy.
- To identify and understand differences and commonalities within diverse cultures.

Instructional Goals and Purposes:

Panola College's instructional goals include creating an academic atmosphere in which students may develop their intellects and skills and providing courses so students may receive a certificate and/or associate degree or transfer to a senior institution that offers baccalaureate degrees.

General Course Objectives:

Successful completion of this course will promote the general student learning outcomes listed below. The student will be able

1. To apply problem-solving skills through solving application problems.
2. To demonstrate arithmetic and algebraic manipulation skills.
3. To read and understand scientific and mathematical literature by utilizing proper vocabulary and methodology.
4. To construct appropriate mathematical models to solve applications.
5. To interpret and apply mathematical concepts.
6. To use multiple approaches - physical, symbolic, graphical, and verbal - to solve application problems

Specific Course Objectives:

Major Learning Objectives
Essential Competencies

Upon completion of **MATH 2415**, the student will be able to demonstrate:

- 1) Competence in solving problems related to vectors in 2- and 3- dimensions and their applications
- 2) Competence in determining and writing equations of surfaces in space
- 3) Competence in solving problems related to functions in several variables
- 4) Competence in problems related to limits and continuity
- 5) Competence in determining the derivatives of various functions and using these to solve problems in maxima, minima, curvature, graphics, velocity, and acceleration
- 6) Competence in determining single, double, and triple integrals of various functions and using these to solve problems in area, volume work, fluid pressure and mass moments
- 7) Competence in solving problems related to vector fields

- 8) Competence in determining line integrals and using these to solve problems related to work and mass
- 9) Competence in applying Green's and Stoke's theorems

Course Content:

After studying the material presented in the text(s), lecture, laboratory, computer tutorials, and other resources, the student should be able to complete all behavioral/learning objectives listed below with a minimum competency of 70%.

- 1) Find the component form of a vector.
- 2) Use the properties of vector operations.
- 3) Identify the direction cosines and angles for a vector.
- 4) Calculate the projection of one vector onto another.
- 5) Solve application problems using the dot and cross products.
- 6) Determine the standard, parametric, and symmetric equations for a line in space.
- 7) Determine the distance between a point and a line in space.
- 8) Identify and sketch quadric surfaces.
- 9) Convert equations and points between rectangular, cylindrical, and spherical coordinate forms.
- 10) Determine derivatives and integrals of vector-valued functions.
- 11) Solve application problems involving velocity and acceleration using vector-valued functions.
- 12) Solve application problems involving arc length and curvature using vector-valued functions.
- 13) Determine tangent and normal vectors to a surface in space.
- 14) Calculate limits and continuity for functions of several variables.
- 15) Determine partial derivative and differentials.
- 16) Use the chain rule for functions of several variables.
- 17) Calculate directional derivatives and gradients.
- 18) Determine tangent planes and normal lines.

- 19) Determine extrema and saddle point for functions of several variables.
- 20) Determine Lagrange multipliers.
- 21) Solve application problems involving area and volume using iterated integrals.
- 22) Solve application problems involving center of mass, moments of inertia, and surface area.
- 23) Solve application problems using triple integrals.
- 24) Determine triple integral using cylindrical and spherical coordinates.
- 25) Determine double integrals using a change of variables and the Jacobian.
- 26) Use the properties of vector fields.
- 27) Determine the curl of a vector field.
- 28) Determine line integrals.
- 29) Solve application problems for line integrals using independence of path.
- 30) Determine surface integrals.
- 31) Apply Green's theorem and Stokes' theorem to certain line and surface integrals.

Methods of Instruction/Course Format/Delivery:

Methods employed will include Lecture/demonstration, discussion, problem solving, analysis, and reading assignments. ***Homework will be assigned.***

Faculty may choose from, but are not limited to, the following methods of instruction:

- (1) Lecture
- (2) Discussion
- (3) Internet
- (4) Video
- (5) Television
- (6) Demonstrations
- (7) Field trips

(8) Collaboration

(9) Readings

Assessment: Faculty may assign both in- and out-of-class activities to evaluate students' knowledge and abilities. Faculty may choose from – but are not limited to -- the following methods

- Attendance
- Book reviews
- Class preparedness and participation
- Collaborative learning projects
- Compositions
- Exams/tests/quizzes
- Homework
- Internet
- Journals
- Library assignments
- Readings
- Research papers
- Scientific observations
- Student-teacher conferences
- Written assignments

Course Grade:

Letter Grades for the Course will be assigned as follows:

A:	$90 \leq \text{Average} \leq 100$
B:	$80 \leq \text{Average} < 90$
C:	$70 \leq \text{Average} < 80$
D:	$60 \leq \text{Average} < 70$
F:	$00 \leq \text{Average} < 60$

Texts, Materials, and Supplies:

For current texts and materials, use the following link to access bookstore listings: <http://www.panola.edu/collegestore.htm>

Other: For testing services, use the following link:
<http://www.panola.edu/instruction/dl/tsting.htm>

Scholastic Dishonesty

Students are expected to maintain complete honesty and integrity in their educational pursuits. Scholastic dishonesty shall include, but not be limited to:

1. Cheating on a test

- a. Copying from another student's test paper.
- b. Using test materials not authorized by the person administering the test.
- c. Collaborating with or seeking aid from another student during a test without permission from the test administrator.
- d. Knowingly using, buying, selling, stealing, or soliciting, in whole or in part, the contents of an un-administered test.
- e. The unauthorized transporting or removal, in whole or in part, of the contents of the un-administered test.
- f. Substituting for another student, or permitting another student to substitute for oneself, to take a test.
- g. Bribing another person to obtain an un-administered test or information about an un-administered test.

2. Plagiarism shall be defined as the appropriating, buying, receiving as a gift, or obtaining by any means another's work and the unacknowledged submission or incorporation of it in one's own written work.

3. Collusion shall be defined as the unauthorized collaboration with another person in preparing written work for fulfillment of course requirements.

[All students who violate this scholastic dishonesty policy shall be subject to disciplinary action.]

Source: *The Pathfinder*, pp. 18-19

(<http://www.panola.edu/students/pathfinder/pathfinder.pdf>)

The instructor has the authority to deal with a cheating incident directly and may use his or her discretion to the extent of assessing a maximum penalty of "F" for the course. The instructor is encouraged to discuss the incident with the instructional administrator prior to assessing the penalty. If the teacher elects to assess any penalty, a written report should outline the incident, citing proof of the charge. Caution: instructors must never accuse a student of cheating or plagiarism unless there is firsthand proof of the infraction.

Source: Panola College *Faculty Handbook*

(http://www.panola.edu/admin1/dean/fac_handbook/fachndbk.pdf)

Additional Notations

Any and all typographical and/or accounting errors in this document are subject to correction and/or revision.

"If you have a disability, including a learning disability, for which you request an accommodation, please contact the **Office of Disabled Student Services** so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Support Services counselor. For more information, call or visit the **Office of Disabled Student Services** in the Martha Miller Administration Building. The telephone number is **903.693.1123**."

(-- LINKS --)

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[Mathematics Department](#)

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Last Revised: Spring 2008