Course Syllabus

Math 2415- Calculus III

Revision Date: 01/11/2017

Catalog Description: Advanced topics in Calculus, including vectors and vector-valued function, partial differentiation, Lagrange multipliers, multiple integrals, and Jacobians; application of the line integral, including Green's Theorem, the Divergence Theorem, and the Stokes' Theorem.

Lecture hours = 3, **Lab hours** = 1

Prerequisites: MATH 2414 – Calculus II

Semester Credit Hours: 4
Lecture Hours per Week: 3
Lab Hours per Week: 3
Contact Hours per Semester: 96
State Approval Code: 27.0101.61 19

Core Components and Related College Student Learning Outcomes
This course counts as part of the academic requirements of the Panola College Core Curriculum and an Associate of Arts or Associate of Science degree. ☐ Yes ☐No: If no, skip to Instructional Goals.

The items below marked with an X reflect the state-mandated outcomes for this course **IF this is a CORE course**:

☒ Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information
- ☐ CT1: Generate and communicate ideas by combining, changing, or reapplying existing information
- ☒ CT2: Gather and assess information relevant to a question
- ☒ CT3: Analyze, evaluate, and synthesize information

☒ Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication
- ☒ CS1: Develop, interpret, and express ideas through written communication
- ☐ CS2: Develop, interpret, and express ideas through oral communication
- ☐ CS3: Develop, interpret, and express ideas through visual communication

☒ Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- ☒ EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion
- ☐ EQS2: Manipulate and analyze observable facts and arrive at an informed conclusion

☐ Teamwork – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
- ☐ TW1: Integrate different viewpoints as a member of a team
- ☐ TW2: Work with others to support and accomplish a shared goal

☐ Personal Responsibility – to include the ability to connect choices, actions, and consequences to ethical decision-making

☐ PR1: Evaluate choices and actions and relate consequences to decision-making

☐ Social Responsibility – to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

☐ SR1: Demonstrate intercultural competence

☐ SR2: Identify civic responsibility

☐ SR3: Engage in regional, national, and global communities

Instructional Goals and Purposes:

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

Learning Outcomes:

Upon successful completion of this course, students will:

1. Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion.
2. Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals.
3. Find extrema and tangent planes.
4. Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
5. Apply the computational and conceptual principles of calculus to the solutions of real-world problems.

Course Content:

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

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 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

Major Assignments/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, class preparedness and participation. Collaborative learning projects, exams/tests/quizzes, homework, internet, library assignments, readings, research papers, scientific observations, student-teacher conferences, and written assignments.

The Mathematics Department will not accept late work.

Assessment(s):

1. Exam per Chapter
2. Comprehensive Final Exam

Course Grade:

Assignment Weights	
Class Participation	10%
Homework/Quiz Average	15%
Exams	55%
Comprehensive Final Exam	20%

Letter Grades for the Course will be assigned as follows:

A: 90 < Average < 100

B: 80 < Average < 90

C: 70 < Average < 80

D: 60 < Average < 70

F: 00 < Average < 60

Texts, Materials, and Supplies:

- Textbook: Calculus Hybrid , 10th Edition Larson
- Webassign Access (Bundled with Textbook)
- Canvas Access
- Scientific Calculator

Other:

- For current texts and materials, use the following link to access bookstore listings: http://www.panolacollegestore.com
- For testing services, use the following link: http://www.panola.edu/elearning/testing.html
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to http://www.panola.edu/student-success/disability-support-services/ for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder:* http://www.panola.edu/student-success/documents/pathfinder.pdf