JOLIET JUNIOR COLLEGE 1901

Dept. of Mathematics

Math 172 Calculus w/Analytic Geometry III
Spring 2018

Instructor's Name:

Office Location:

Office Hours:

Office Phone:

E-mail:

Course Description
This is the third course in calculus and analytic geometry. The course explores multivariable calculus. It includes vectors, partial derivatives, multiple integrals, parametric curves and surfaces, vector fields, line integrals, and applications of all of these.

Illinois Articulation Initiative (IAI) number: M1 900-3

Credit and Contact Hours:

Lecture	**4**
Lab	**0**
Credit Hours	**4**

Prerequisites: Satisfactory placement test score or grade of "C" or better in Math 171 or equivalent

Books, Supplies, and Supplementary Materials

A. Textbooks

Required: Calculus Early Transcendentals w/Quick Reference Card, 7th Ed., 2011; Stewart, ISBN: 9781285741550, Cengage

Multivariable Calculus student solutions manual (optional), Stewart, ISBN: 781305271821, Cengage

B. Other Required Materials

TI-83+ or TI-84+ graphing calculator or equivalent

Methods of Instruction:

Lecture

Student Learning Outcomes: General Education Student Learning Outcomes:
Students will demonstrate the ability to accurately apply correct mathematical methods and techniques in various applications such as applied sciences, theoretical mathematics, physics, natural sciences and other applied sciences.

Objectives

1. Represent and interpret a function of two variables graphically, numerically, and analytically.
2. Analyze the behavior of functions using cross sections of their graphs and level curves in their contour diagrams.
3. Represent functions of three variables using level surfaces.
4. Interpret and apply vector operations geometrically (sum, difference, scalar product, dot product, cross product).
5. Approximate partial derivatives of a function of two variables using tables, graphs, and contour diagrams.
6. Compute partial derivatives algebraically.
7. Determine an equation of the plane tangent to the graph of a function of two variables at a point.
8. Use the local linearity of a differentiable function of two variables to approximate it near a point.
9. Calculate and interpret directional derivatives numerically, graphically, and algebraically.
10. Calculate a gradient vector and recognize it's meaning with respect to direction and magnitude of most rapid rate of change.
11. Calculate partial derivatives algebraically using the chain rule for composite functions.
12. Calculate second order partial derivatives and interpret their geometric meaning on contour diagrams.
13. Determine local and global extrema and saddle points from graphs, contour diagrams, gradient fields, and tables.
14. Determine local extrema and saddle points using the second derivative test.
15. Recognize whether a region in the plane is closed or bounded, and apply these concepts in conjunction with the Extreme Value Theorem.
16. Solve applied optimization problems using functions of two variables
17. Solve constrained optimization problems using Lagrange Multipliers.
18. Approximate double integrals using Riemann sums numerically, graphically (from graphs and contour diagrams), and analytically.
19. Evaluate double integrals over a region by iteration.
20. Change the order of integration in evaluating a double integral.
21. Evaluate triple integrals and describe the region of integration.
22. Determine the region of integration for a double integral in polar coordinates, change the order of integration, and evaluate.
23. Determine regions of integration in cylindrical and spherical coordinates, and evaluate triple integrals in these systems.
24. Interpret motion described parametrically in graphical or algebraic form.
25. Write and interpret various parameterizations of a given curve.
26. Given parametric equations for a curve, determine associated velocity and acceleration vectors, and arc lengths.
27. Given a space curve, compute its curvature.

28. Given a space curve, compute the unit tangent vector, unit normal vector, and unit binormal vector.
29. Given a space curve, reparameterize it with respect to arc length.
30. Parametrize a surface.
31. Interpret vector fields graphically and analytically.
32. Interpret the flow of a vector field graphically and analytically.
33. Interpret a line integral in a vector field graphically.
34. Calculate line integrals analytically.
35. Determine whether a given vector field is a gradient field and whether it is conservative.
38. Find potential functions for conservative vector fields.
37. Use Green's Theorem to evaluate line integrals.
38. Interpret curl and divergence of a vector field both geometrically and analytically
39. Compute surface integrals.
40. Interpret the flux of a vector field across a surface both geometrically and analytically.
41. Understand when Stokes' Theorem applies and use Stokes' Theorem to calculate the circulation of a vector field around the boundary of an oriented surface.
42. Understand when the Divergence Theorem applies and use the Divergence Theorem to compute the outward flux of a simple solid region.

TOPICAL OUTLINE

Days	Topic or Class Activity
9	Euclidean Space, Vectors, Equations of Lines and Planes, Graphs of Cylinders and Quadric Surfaces, Cylindrical and Spherical Coordinates
3	Vector Valued Functions, Space Curves, Derivatives and Integrals of Vector Valued Functions
3	Arc Length, Curvature, Standard Vectors T, N and B, and Velocity and Acceleration
11	Functions of Many Variables, Differentiation, Linear Approximation, Chain Rule, Directional Derivatives, Optimization, Lagrange Multipliers
11	Multiple Integrals in Rectangular, Cylindrical and Spherical Coordinates Surface area, Change of Variables
9	Vector Fields, Line Integrals, The Fundamental Theorem for Line Integrals Green's Theorem, Divergence and Curl
8	Parametric Surfaces, Surface Integrals, Stokes' Theorem and Divergence Theorem
10	Leeway and exams

Graded Assignments and Policies

Graded Assignments

In class Quizzes	0 – 20%
Participation	0 - 5 %
Projects	0 – 20%
Homework	0 – 30%
Tests	50 - 85%
Final	15 – 30%

Grading Policy
The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly.

Each instructor will set minimum standards for performance on tests.

Major Tests and Quizzes
The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. Each instructor will set minimum standards for performance on tests. A comprehensive final examination will be given.

Classroom Policies and Procedures

General Information

Attendance Policy

Make-up Policy

Extra-credit Policy

Final Exam Information
A comprehensive final examination will be given.

Academic Honor Code
The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one's academic behavior.

College Statement about grades of "F" and Withdrawal from Class
Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of "F" in the course.

At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

Intellectual Property
Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college's internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

Student Code of Conduct
Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.

Sexual Harassment Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See the Catalog or Student Handbook.

Student Support http://jjc.edu/services-for-students/pages/default.aspx

a. Disability Services: http://www.jjc.edu/disability-services/Pages/default.aspx. Student Accommodations and Resources (StAR): If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class. New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.
b. Tutoring: http://jjc.edu/tlc/Pages/default.aspx
c. Counseling and Advising: http://www.jjc.edu/counselingadvising/Pages/default.aspx
d. Academic Resources: http://www.jjc.edu/academic-resources/Pages/default.aspx
e. Support Programs and Services: http://www.jjc.edu/support-programs-services/Pages/default.aspx
f. Technology Support: http://jjc.edu/services-for-students/Pages/technology-support.aspx
g. My Degree Progress: My Degree Progress is a computerized system to track a student's progress toward graduation. The report indicates every course and places these courses into their appropriate category as a General Education, Major Course, or Elective, according to the degree requirements. This tool is useful for preparing before an advising appointment, for planning, for registering, and for checking that the student is on track for graduation. https://eresources.jjc.edu

*** Instructor reserves the right to modify, add to or change the syllabus. Any changes to the syllabus or schedule will be announced in class.**

Prepared by:

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Department Chair Date

Revised 04/16
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