MATH 031: Calculus III

Term: 2020 Summer Session **Instructor: Staff** **Language of Instruction: English** **Classroom: TBA** **Office Hours: TBA**
Class Sessions Per Week: 5 **Total Weeks: 5** **Total Class Sessions: 25** **Class Session Length (minutes): 120** **Credit Hours: 4**

Course Description:

Topics in this course include: Arc Length, Partial Derivatives (Differentials), Multiple Integrals, Vector Functions, Surface Integrals (Parametric surfaces), Line Integrals. Some of the important topics like Vector Calculus may be applied to numerous areas and better prepare students in Engineering, Physics, Pure Mathematics, Biology.

Prerequisite: MATH 021 or equivalent 2nd year calculus course.

Learning Objectives:

After studying this course, students are expected to:

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

Course Materials:

Essential Calculus: Early Transcendentals, James Stewart, 2nd edition

Calculus, Early Transcendentals, by W. Briggs and L. Cochran, 3rd edition

Course Format and Requirements:

The course format including lecture, problem solving and in-class discussion.

The specific topics that will be covered in the classes are listed in the course syllabus. The class period will consist of an active learning environment. During a majority of the class time, students will be actively working on problems under the instructor's guides.

Attendance:

Attendance will not be taken but is strongly recommended. Each student will have three allowed absences and no grade deduction will be made for the first three absences. More than three unexcused absences will result in an automatic reduction in your participation grade, for instance from A- to B+. Your active participation in the class is expected and encouraged.

Grading Scale:

A+: 98%-100%
A: 93%-97%
A-: 90%-92%
B+: 88%-89%
B: 83%-87%
B-: 80%-82%
C+: 78%-79%
C: 73%-77%
C-: 70%-72%
D+: 68%-69%
D: 63%-67%
D-: 60%-62%
F: Below 60%

Course Assignments:

Quizzes:

There will be 6 quizzes administered through the whole semester and the LOWEST score will be dropped. Quizzes will always be completed in the first ten minutes of class. The quiz problems

will be similar to problem sets and examples on slides. There will be no make-up quizzes.

Problem Sets:

This will cover the following topics: Curve Acceleration, Partial Derivatives, Graphing Surfaces, Differentiation Rules, Triangle Integrals, Change of Variables Theorem, Iterated Integrals, Double Integrals and Conservative Vector Fields.

Exam:

2 Midterm Exams

There will be 2 midterm exam in this course. The midterm exam will be based on concepts covered in class. They will be in-class, close-book and non-cumulative.

Final Exam

The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Course Assessment:

Quizzes (5 out of 6)	15%
Problem Sets (4)	20%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	25%
Total	**100%**

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's Academic Conduct Code. Any work suspected of violating the standards of the Academic Conduct Code will be reported to the Dean's Office.

Penalties for violating the Academic Conduct Code may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the Academic Conduct Code.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

Course Schedule:

Week	Topics	Activities
Week 1 (Class 1-5)	• Vectors in 2 and 3-D Space (Vector Fields) • R^n as A Vector Space • Dot Product, Angles and Orthogonal Projection • Lines, Planes, and Hyperplanes • Cross product • Functions of A Single Variable • Linear Subspaces • Multivariable Functions • Curve Acceleration • Arc Length • Graphing Surfaces • Partial Derivatives • Linear Approximation, Tangent Planes, and the differential	• Quiz 1 • Textbook review • Finish the hard copy of problem set about Curve Acceleration, Partial Derivatives and Graphing Surfaces assigned by teacher
Week 2 (Class 6-10)	• Differentiation Rules • Directional Derivatives • Extreme Values and Saddle Points • Optimization • Triangle Integrals • Geometry of Plane to Plane Maps • Fundamental Theorem of Calculus • Change of Variables Theorem	• Quiz 2&3 • Textbook review • Finish the hard copy of problem set about Differentiation Rules, Triangle Integrals and Change of Variables Theorem assigned by teacher • Midterm 1
Week 3 (Class 11- 15)	• Lagrange Multipliers • Iterated Integrals	• Quiz 4 • Textbook review

	• Double Integrals • Polar Coordinates • Area and Double Integrals in Polar Form • Triple Integrals in Rectangular Coordinates • Area of a Surface • Surface Integrals of Vector Fields	• Finish the hard copy of problem set about Iterated Integrals and Double Integrals assigned by teacher
Week 4 (Class 16-20)	• Cylindrical and Spherical Coordinates • Density and Mass • Moment of Inertia and surface area • Conservative Vector Fields • Path Independence • Conservative Vector Fields • Green's Theorem	• Quiz 5 • Textbook review • Finish the hard copy of problem set about Conservative Vector Fields assigned by teacher • Midterm 2
Week 5 (Class 21-25)	• Potential Functions • Gauss' Theorem • The Divergence Theorem • Flux through a Surface • Stoke's Theorem • Flux Integral	• Quiz 6 • Final exam (cumulative) TBA