



湖北工业大学
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Multivariable Calculus
Course Code	MATH 2231
Semester	Winter 2026
Course Length	5 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	MATH 1112 Calculus II

Course Description:

Multivariable Calculus applies the techniques and theory of differentiation and integration to a thorough study of vectors in two and three dimensions, vector-valued functions, calculus of functions of more than one variable, partial derivatives, multiple integration, Green's Theorem, Stokes' Theorem, Divergence Theorem; includes motion in two and three dimensions, curves and surfaces. Emphasis on techniques and application.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical thinking skills** – Students will engage in creative and/or innovative thinking, and/or inquiry, analysis, evaluation, synthesis of information, organizing concepts, and constructing solutions.
- **Communication skills** – Students will demonstrate effective written, oral, and visual communication.
- **Teamwork** – Students will demonstrate the ability to work effectively with others to support a shared purpose or goal and consider different points of view.
- **Social responsibility** – Students will demonstrate intercultural competency and civic knowledge by engaging effectively in local, regional, national, and global communities.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- perform vector operations in 3-space, including dot and cross products;
- differentiate and integrate functions of several variables;
- solve optimization problems involving multivariable functions;

- understand and compute line integrals and apply the Fundamental Theorem of Line Integrals;
- apply Green's theorem to relate line integrals and double integrals.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:

Calculus: Early Transcendentals (8th Edition) by James Stewart. Cengage Learning.

Course Requirements:

Homework Assignments

Homework assignments are generally assigned a week prior. Homework questions will mostly come from problems in your textbook. Sometimes, additional questions outside the textbook will be given. To incentivize good homework practices, I will often borrow homework problems for quizzes and tests.

Quizzes

Quizzes will be given at the end of every week. They will generally last for twenty minutes. There will not be any make-up quizzes.

Midterm Exams

The two midterms will be scheduled during official exam periods. Midterms are not cumulative and will only cover material discussed in class since the previous midterm.

Final Exam

The final will consist of two parts. The first part will be essentially a third midterm over the material you have not yet been tested on. The second part will be a review of the material learned throughout the semester.

Assessments: Activity	Percent Contribution
Homework Assignments	10%
Quizzes	20%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Grade	Percentage of available points
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73

D	64-69
D-	60-63
F	0-59

Course Schedule:

The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, major ones provided in writing.

MATH 2231 Schedule		
Lecture	Topic	Readings/ Activities
L1	Syllabus overview; Course Introduction Introduction to 3D coordinate systems	Chapter 12
L2	Vectors in 3D space	Chapter 12
L3	The dot product	Chapter 12
L4	The cross product	Chapter 12
L5	Equations of lines and planes	Chapter 12
L6	Vector functions and space curves	Chapter 13
L7	Derivatives and integrals of vector functions	Chapter 13
L8	Arc length and curvature	Chapter 13
/	Midterm 1	---
L9	Multivariable functions; domains and level sets.	Chapter 14
L10	Limits and continuity	Chapter 14
L11	Partial derivatives; higher derivatives.	Chapter 14
L12	Tangent planes and linear approximations	Chapter 14
L13	The chain rule, directional derivatives, gradient.	Chapter 14
L14	Lagrange multipliers	Chapter 14
L15	Double integrals over rectangles	Chapter 15
L16	Double integrals over general regions	Chapter 15
L17	Double Integrals in polar coordinates	Chapter 15
L18	Triple integrals in Cartesian form	Chapter 15
L19	Triple integrals in cylindrical and spherical coordinates	Chapter 15
L20	Change of variables; Jacobians	Chapter 15
/	Midterm 2	---
L21	Vector fields; divergence and curl	Chapter 16
L22	The fundamental theorem for line integrals	Chapter 16
L23	Green's Theorem	Chapter 16
L24	Parametrized surfaces and surface integrals	Chapter 16
L25	Stokes' Theorem and Divergence Theorem	Chapter 16
/	Final Exam	---

Accommodation Statement:

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or outside the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:**Attendance and Expectations**

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work

The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs and Disabilities

Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.