
MATH 201

Multivariable Calculus

Semester 1 Fall 2020



Dates / Synchronous meeting time: MoTuWeTh: 11:45--13:00/TuTh 21:20--22:20

Academic credit: 4 DKU credits

Online course format: video, lecture, discussion

Instructor's information

Dr. Lin Jiu,

Email:

Office:

Office Hours:

Zoom ID:

Lecturer of Mathematics, Duke Kunshan University

Assistant Professor of Practice, Duke University

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CC2057

Tuesdays 9:30--10:30 or by appointment

884 680 6884

What is this course about?

This course is a continuation of MATH 101/105 in which essential topics and concepts of single variable calculus are introduced. We live in a three-dimensional world. Whether to fully understand Kepler's Laws of planetary motion discovered four hundred years ago, or the two linked, intertwined parallel helixes as the structure of the DNA molecule discovered in the 1950s, whether to calculate atmospheric pressure at a given time which is a function of longitude and latitude, or to find the rate of fluid flow across a surface, and to answer many more questions in physical and social life sciences related to multi-dimensional structures, multivariable calculus is the course to start from. Main topics of this course include vectors and vector functions, the geometry of higher dimensional Euclidean spaces, partial derivatives, multiple integrals, line integrals, vector fields, Green's Theorem, Stokes' Theorem and the Divergence Theorem.

What background knowledge do I need before taking this course?

Prerequisite: MATH 101/105.

What will I learn in this course?

Upon successful completion of the course, students will be able to

- Interpret real-world situations in terms of related multivariable calculus concepts.
- Understand the concept of vectors and its connection to physics, apply operations on vectors
- Algebraically and geometrically, calculate the dot product and the cross product of vectors.
- Develop analytical and computational skills required for working with lines, curves, planes, and surfaces in space
- Find limits, partial derivatives, directional derivatives and the gradient of functions of several variables
- Understand the definitions of double integrals, triple integrals, line integrals, and surface integrals;
- recognize and implement appropriate techniques to evaluate them, and apply them to solve
- Problems in mathematics, physical and social life sciences.
- Apply the Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, and the

- Divergence Theorem, to simplify integration problems.

What will I do in this course?

The course will be comprised of video lectures, synchronous meetings dedicated to problem solving and lecturing, assigned readings, homework, and exams.

How can I prepare for the class sessions to be successful?

To succeed, students should be prepared to devote several hours to this course on a daily basis. They are strongly encouraged to use the online tutoring resources of ARC, to work with classmates, and to contact instructors in a timely manner for additional help as needed.

What required texts, materials, and equipment will I need?

Calculus: Early Transcendentals 8th Edition, James Stewart, ISBN-13: 978-1285741550

What optional texts or resources might be helpful?

Any multivariate calculus book can be used as a supplement for more practice problems.

How will my grade be determined?

1. Homework: 30% (=6% \times 5)
 - Sept. 4—Sept. 11
 - Sept. 11—Sept. 18
 - Sept. 18—Sept. 25
 - Sept. 25—Oct. 11
 - Oct. 11—Oct. 18
2. Midterm Exam 1: 20%
3. Midterm Exam 2: 20%
4. Final exam: 30%

Please refer to the following scale for your grading.

A+ = 98% - 100% **A** = 97% - 93%; **A-** = 90% - 92%; **B+** = 87% - 89%; **B** = 83% - 86%; **B-** = 80% - 82%; **C+** = 77% - 79%; **C** = 73% - 76%; **C-** = 70% - 72%; **D+** = 67% - 69%; **D** = 63% - 66%; **D-** = 60% - 62% **F** = 59% and below

What are the course policies?

Collaboration with peers on homework is allowed, but solutions are to be written individually. You are not allowed to use other books/online resources. Late homework will not be accepted.

During the exams you can use your notes and your calculus book, but you are not allowed to use other books/online resources or to collaborate with others.

We do not give make-up exams for any reason if you miss a midterm exam. Thus, missing an exam is a very serious matter. An unexcused delay in taking any exam will be counted as a zero. Excuses may be accepted, at the discretion of the instructor, and any alternative arrangements must be made well in advance.

Academic Integrity:

As a student, you should abide by the academic honesty standard of the Duke Kunshan University. Its community Standard states: "Duke Kunshan University is a community comprised of individuals from diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflecting upon and upholding these principles in all academic and non-academic endeavors, and to protecting and promoting a culture of integrity and trust." For all graded work, students should pledge that they have neither given nor received any unacknowledged aid.

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Please refer to <http://undergrad.dukekunshan.edu.cn/undergraduate-bulletin-2020-2021/> and <https://dukekunshan.edu.cn/en/academics/advising> for DKU course policies and guidelines.

Duke Kunshan University is a community comprised of individuals from diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflecting upon and upholding these principles in all academic and non-academic endeavors, and to protecting and promoting a culture of integrity and trust. To uphold the Duke Kunshan Community Standard, each student is expected to pledge to hold him/herself to the highest standards for honesty, integrity, fairness, and responsibility in his/her academic and non-academic endeavors, to respect other cultures and embrace all forms of diversity, and to uphold the standards if they are compromised.

Academic Policy & Procedures:

You are responsible for knowing and adhering to academic policy and procedures as published in University Bulletin and Student Handbook. Please note, an incident of behavioral infraction or academic dishonesty (cheating on a test, plagiarizing, etc.) will result in immediate action from me, in consultation with university administration (e.g., Dean of Undergraduate Studies, Student Conduct, Academic Advising). Please visit the Undergraduate Studies website for additional guidance related to academic policy and procedures. Academic integrity is everyone's responsibility.

Academic Disruptive Behavior and Community Standard:

Please avoid all forms of disruptive behavior, including but not limited to: verbal or physical threats, repeated obscenities, unreasonable interference with class discussion, making/receiving personal phone calls, text messages or pages during class, excessive tardiness, leaving and entering class frequently without

notice of illness or other extenuating circumstances, and persisting in disruptive personal conversations with other class members. Please turn off phones, pagers, etc. during class unless instructed otherwise. If you choose not to adhere to these standards, I will take action in consultation with university administration (e.g., Dean of Undergraduate Studies, Student Conduct, Academic Advising).

Academic Accommodations:

If you need to request accommodation for a disability, you need a signed accommodation plan from Campus Health Services, and you need to provide a copy of that plan to me. Visit the Office of Student Affairs website for additional information and instruction related to accommodations.

What campus resources can help me during this course?

Academic Advising and Student Support

Please consult with me about appropriate course preparation and readiness strategies, as needed. Consult your academic advisors on course performance (i.e., poor grades) and academic decisions (e.g., course changes, incompletes, withdrawals) to ensure you stay on track with degree and graduation requirements. In addition to advisors, staff in the Academic Resource Center can provide recommendations on academic success strategies (e.g., tutoring, coaching, student learning preferences). Please visit the [Office of Undergraduate Advising website](#) for additional information related to academic advising and student support services.

Writing and Language Studio

For additional help with academic writing—and more generally with language learning—you are welcome to make an appointment with the Writing and Language Studio (WLS). You can register for an account, make an appointment, and learn more about WLS services, policies, and events on the [WLS website](#). You can also find writing and language learning resources on the [Writing & Language Studio Sakai site](#).

IT Support

If you are experiencing technical difficulties, please contact IT:

- China-based faculty/staff/students 400-816-7100, (+86) 0512- 3665-7100
- US-based faculty/staff/students (+1) 919-660-1810
- International-based faculty/staff/students can use either telephone option (recommend using tools like Skype calling)
- Live Chat: <https://oit.duke.edu/help>
- Email: service-desk@dukekunshan.edu.cn

What is the expected course schedule?

Week 1 (Aug. 28— Sept. 29)	<ul style="list-style-type: none"> ● Three-dimensional coordinate systems ● Vectors ● Dot product and cross product
Week 2 (Aug. 31— Sept. 4)	<ul style="list-style-type: none"> ● Equations of lines and planes ● Cylinders and quadric surfaces ● Vectors functions and space curves ● Derivatives and integrals of vector functions ● Arc length and curvature
Week 3 (Sept. 7—11)	<ul style="list-style-type: none"> ● Motion in space: velocity and acceleration ● Functions of several variables ● Limits and continuity ● Partial derivatives ● Tangent planes and linear approximations <p style="text-align: right;">Midterm 1</p>
Week 4 (Sept. 14—18)	<ul style="list-style-type: none"> ● The Chain Rule ● Directional derivatives and the gradient vector ● Maximum and minimum values ● Lagrange multipliers ● Double integrals over rectangles ● Iterated integrals
Week 5 (Sept. 21—26)	<ul style="list-style-type: none"> ● Double integrals over general regions ● Double integrals in polar coordinates ● Applications of double integrals ● Surface Area (reading, get back to it in week 7) ● Triple integrals ● Triple integrals in cylindrical coordinates ● Triple integrals in spherical coordinates

Week 6 (Sept. 28—30)	<ul style="list-style-type: none"> ● Vector fields ● Line integrals ● The fundamental theorem for line integrals ● Green's Theorem <p style="text-align: center;">Midterm 2</p>
Week 7 (Oct. 12—16)	<ul style="list-style-type: none"> ● Curl and divergence ● Parametric surfaces and their areas ● Surface integrals ● Stokes' Theorem ● The Divergence Theorem

Final Exam schedule TBA