MA 242 Course Syllabus

MA 242 – Calculus III

Sections 001, 003

FALL 2019

4 Credit Hours

Course Description

Third of three semesters in a calculus sequence for science and engineering majors. Vectors, vector algebra, and vector functions. Functions of several variables, partial derivatives, gradients, directional derivatives, maxima and minima. Multiple integration. Line and surface integrals, Green's Theorem, Divergence Theorems, Stokes' Theorem, and applications. Use of computational tools.

Learning Outcomes

After successfully completing this course, students will be able to:

1. Use the techniques of partial differentiation and multivariable integration to explore the properties of functions of two or more variables
2. Set up and solve optimization problems in various contexts
3. Compute line, surface and volume integrals in various coordinate systems
4. Identify conservative vector fields and integrate them to find their potential functions
5. Apply the theorems of Green, Stokes and Gauss to various problems in geometry and the sciences

Course Structure

The course will consist of 3 lectures per week, complimented by two 1-hour recitation sessions. There will be four 1-hour exams during the semester plus a comprehensive final exam. See the "Course Schedule" below for test dates. In addition there will be online WebAssign homework for each section of the textbook that we cover.

Lecture Instructor: MA242.001 and MA242.003

Larry Norris (lkn)
Email: lkn@ncsu.edu
Web Page: http://lkn.math.ncsu.edu
Phone: 919-515-7932
Office Location: SAS 4216
Office Hours: M,W,F. noon-1pm

Recitation Instructors:

MA242.001A: K. Windoloski (kawindol@ncsu.edu) Office hours: Tuesday/Thursday 11:40a-12:40p for MA 242.001 in Language and Computers labs 208 (LAU 208)
MA242.001B: J. Aslam. (jkaslam@ncsu.edu). Office hours: Monday and Wednesday, 3:00 – 4:00 pm in Language and Computer Labs 208
MA242.001C: K. Windoloski ……Office hours: Tuesday/Thursday 11:40a-12:40p for MA 242.001 in Language and Computers labs 208 (LAU 208)
MA242.001D: J. Aslam ……Office hours: Monday and Wednesday, 3:00 – 4:00 pm in Language and Computer Labs 208

MA242.003A: C. Leonard. (cleonar@ncsu.edu).....Office hours: Monday and Friday, 1:30 – 2:30 pm in Language and Computer Labs 208
MA242.003B: J. Stevens (jnsteven@ncsu.edu).....Office hours: Monday and Wednesday from 3 - 4 pm in 3108 SAS Hall
MA242.003C: C. Leonard……..Office hours: Monday and Friday, 1:30 – 2:30 pm in Language and Computer Labs 208
MA242.003D: J. Stevens……Office hours: Monday and Wednesday from 3 - 4 pm in 3108 SAS Hall

Course Meetings

Lecture: MA242.001

Days: M,W,F
Time: 8:30am - 9:20am
Campus: Main
Location: 00G20 Kamphoefner Hall

Recitation: With recitation instructors

MA242.001A: TuTh 8:30am - 9:20am 01216 SAS Hall
MA242.001B: TuTh 8:30am - 9:20am 00209 COX Hall
MA242.001C: TuTh 3:00PM - 3:50PM 00120 Withers Hall
MA242.001D: TuTh 3:00PM - 3:50PM 0G106 Caldwell Hall

Lecture MA242.003

Days: M,W,F
Time: 10:40am - 11:30am
Campus: Main
Location: 124 Dabney Hall

Recitation: : With recitation instructors

MA242.003A: TuTh 10:40AM - 11:30AM 02102 SAS Hall
MA242.003B: TuTh 10:40AM - 11:30AM 00353 Daniels Hall

MA242.003C: TuTh 3:00PM - 3:50PM 0G123 Tompkins Hall
MA242.003D: TuTh 4:30PM - 5:20PM 00115 Withers Hall

Course Materials

Textbooks

Calculus for Engineers and Scientists, Vol. III - Franke, Griggs, and Norris
Edition: 1st
WebAssign Homework

Web Link: https://www.webassign.net/ncsu/login.html
Cost: $77.95
This textbook and homework is required.

Materials

The textbook, which you will access via WebAssign, is in pdf format.

Requisites and Restrictions

Prerequisites

MA 241 *with grade of C- or better or AP Calculus credit, or Higher Level IB credit.*

Co-requisites

None.

Restrictions

None

General Education Program (GEP) Information

GEP Category

Mathematical Sciences

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions

None.

Grading

Grade Components

Component	Weight	Details
Webassign Homework	**20%**	There will be a WebAssign homework set for each section of the textbook
Midterm Tests	**50%**	There will be four 60 minute midterm tests.
Final Exam	**30%**	The comprehensive final exam will be 180 minutes.

Letter Grades

This Course uses Standard NCSU Letter Grading:

97 ≤ **A+** ≤ 100
93 ≤ **A** < 97
90 ≤ **A-** < 93
87 ≤ **B+** < 90
83 ≤ **B** < 87
80 ≤ **B-** < 83
77 ≤ **C+** < 80
73 ≤ **C** < 77
70 ≤ **C-** < 73
67 ≤ **D+** < 70
63 ≤ **D** < 67
60 ≤ **D-** < 63
0 ≤ **F** < 60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to http://policies.ncsu.edu/regulation/reg-02-20-15.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at http://policies.ncsu.edu/regulation/reg-02-20-04.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-3.

Late Assignments

- If a student has a University approved excused reason for turning in an assignment late, they will not be penalized if the assignment is turned in within one week of receiving the assignment (or another negotiated time). Students wishing to take advantage of this must contact their instructor.
- If the late assignment is unexcused, automatic extensions can be requested in WebAssign for a 24 hour period up to 5 days after an assignment is due with a 40% reduction in points earned during the extension period.

Attendance Policy

For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03

Attendance Policy

Attendance at face-to-face class meetings is required. During this time, students will actively engage with the material, leading to a deeper understanding. Attendance will be taken during each class meeting.

Absences Policy

Students with a University approved excused absence will not be penalized.

Makeup Work Policy

Test Make-Up Policy: All anticipated absences must be excused in advance of the test date. These include university duties or trips (certified by an appropriate faculty or staff member), required court attendance (certified by the Clerk of Court), or religious observances (certified by the Department of Parent and Family Services 515-2441). Emergency absences must be reported as soon as possible once returning to class and must be appropriately documented (illness by an attending physician or family emergencies by Parent and Family Services). If you are sick on a test day and decide not to take the test, go to the health center or other medical facility. Students who miss a test and have a university approved excuse must submit appropriate documentation.

Additional Excuses Policy

None.

Academic Integrity

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01

Both faculty and students at North Carolina State University have a responsibility to maintain academic integrity. An informational brochure about academic integrity is available from the university and students are encouraged to obtain a copy.

Academic Honesty

See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.

" *Cheating is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another person on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student's record or academic career."* (NCSU Code of Student Conduct)

Scholarly activity is marked by honesty, fairness and rigor. A scholar does not take credit for the work of others, does not take unfair advantage of others, and does not perform acts that frustrate the scholarly efforts of others. The violation of any of these principles is academic dishonesty. Penalties for a violation: For the first violation, you will receive a zero for your work and be put on academic integrity probation for the remainder of your stay at NCSU. The second violation may result in your suspension from NCSU. Both situations will involve the Office of Student Conduct. See the website for a full explanation:

http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Electronically-hosted Components: Class videos, notes, and other materials; homework assignments; forum discussions.

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the **Disability Resource Office** at Holmes Hall, Suite 304,Campus Box 7509, 919-515-7653 . For more information on NC State's policy on working with students with disabilities, please see the **Academic Accommodations for Students with Disabilities Regulation (REG02.20.01)**

Students with disabilities should additionally contact their instructor about accommodations.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Lecture F 8:30am - 9:20am — Semester Schedule — 08/21/2019 - 12/6/2019

MA 242 Day-by-day Schedule Fall, 2019

Week of	Section	Topic
8/21 – 8/23	1.1	Cartesian Coordinates: In 2 and 3 dimensional space
	1.2	Vectors in 2 and 3 Dimensions:
	1.2	Continue study of vectors
8/26 – 8/30	1.3	The Angle Between Two Vectors: The Dot Product
	1.4	The Cross Product:
	1.5	Lines and Planes in 3-dimensional Space
		More on equations of lines and planes
9/2	Monday	Holiday
9/3 – 9/6	2.1	The Calculus of Vector-valued Functions: Limits, derivatives and integrals
	2.2	Parameterized Curves in Space: Newton's second law. Free fall under gravity.
	2.2	Projectile motion under gravity.
9/9 – 9/13	2.3	Fundamental Quantities Associated with a Curve: Tangent vectors, arc length and curvature
	2.4	The Intrinsic Geometry of Curves in 3-Space; curvature and the **osculating plane**
	2.4	More on the geometry of curves in space; the **osculating circle**
	2.5	The decomposition of the acceleration vector into its normal and tangential components and the formula $\vec{a}(t) = \frac{dv}{dt}(t)\hat{T}(t) + \kappa(t)v^2(t)\hat{N}(t)$
September 16	Monday	TEST #1
		Multivariable Functions: Material up through level curves
9/18 – 9/20	3.1	Level surfaces of functions of 3 variables. Parametric surfaces.
	3.2	Limits and Continuity: Theorems on limits; Continuity;
	3.3	Directional Derivatives: Partial derivatives; higher derivatives;
9/23 – 9/27	3.3	Geometrical interpretation of partial derivatives; Tangent plane to the graph of f(x,y)
	3.4	Differentiability of multivariable functions: Definition; Differentiability and continuity; Theorem 9 on characterizing differentiability.
	3.5	The Directional Derivative and the Gradient: Formula for the directional derivative in terms of the gradient (Corollary 2).
		What does the gradient vector say about a function?
9/30 – 10/04	3.5	The Chain rules for multivariable functions
		Tangent planes to graphs z = f(x,y); The general chain rule

	3.6	Optimization: local and global extreme values of f(x,y)
	3.6	More on extreme values
	4.1	Double Integrals over a rectangle as a limit of Riemann sums
		Fubini's Theorem for double integrals over rectangles; iterated integrals
10/7	4.1	More on Fubini's Theorem
10/8	Tuesday	Review in Problem Sections
10/9	Wednesday	Test #2
10/10 – 10/11	Thur. – Fri.	Fall Break
10/14 – 10/18	4.1	Double integrals over general regions
	4.1	Reversing the order of integration;
	4.2	Applications of Double Integrals
		More on applications of double integrals
10/21 – 10/25	4.3	Triple Integrals in Cartesian Coordinates: Over rectangular solid regions
		Triple integrals over z-simple regions
		Triple integrals over x- and y- simple regions
		Applications of Triple Integrals
10/28 – 11/01	5.1	Double Integrals in Polar Coordinates: over polar rectangles Double Integrals in Polar Coordinates over general regions
	5.2	Triple Integrals in cylindrical coordinates
11/04	5.3	Triple integrals in spherical coordinates
	5.3	More on triple integrals in spherical coordinates (in recitation section)
11/06	Wednesday	TEST #3
11/08	6.1	Vector Fields
11/11 – 11/15	6.2	Line Integrals of functions
	6.3	Line Integrals of vector fields; The Fundamental Theorem for Line Integrals
		Conservative vector fields and potential functions; Conservation of total energy
11/18 – 11/22	6.4	Parametric Surfaces in Space: graphs, spheres and cylinders
	6.5	Surface Integrals: Surface Area of a Parametrized Surface Tangent planes to parametric surfaces
	6.5	Surface Integral of a Vector Field
11/22	Friday	Test #4
11/25	7.2	The Divergence of a Vector Field
11/26	7.2	The Curl of a Vector Field
11/27 – 11/29		Thanksgiving Vacation
12/2	7.3	Green's theorems
12/4	7.4	The Divergence Theorem
12/6	7.5	Stokes' Theorem

	Final exam Ma242.001	Monday, December 9, 8:00 – 11:00 am
	Final exam Ma242.003	Wednesday, December 18, 8:00 – 11:00 am