College of Dupage
Math 2233-002: Calculus and Analytic Geometry III
Monday, Wednesday, Friday 1:00 PM – 2:25 PM
January 22, 2024 – April 22, 2024
BIC 2C08

Contact Information:

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Course Objectives and Topic Outline:

Course description to appear in catalog: Geometry of space, cylindrical and spherical coordinate systems, vector functions with physics applications, arc length, curvature, multivariate functions, partial derivatives, multiple integrals and their applications, vector fields and their applications, line integrals and their applications, and Green's theorem in the plane.
Credit Hours: 4   Lecture Hours: 4   Lab Hours: 0
Prerequisite: MATH 2232 Calculus and Analytic Geometry II with a grade of "C" or better, or equivalent

  A. General Course Objectives:
Upon successful completion of the course the student should be able to do the following:

1. Use the tools of vector algebra to find the equations of lines and planes, and use these tools to extract geometric information concerning curves and surfaces in three-space
2. Identify and sketch surfaces in three dimensions, using Cartesian, cylindrical, and spherical coordinates
3. Evaluate limits and find derivatives and integrals for vector valued functions
4. Use vector analysis to determine projectile motion and three-dimensional trajectories
5. Evaluate limits and partial derivatives for functions of more than one variable
6. Describe the geometric meaning of a partial derivative
7. Determine when a multivariate function is differentiable
8. Demonstrate the ability to use a total differential to approximate change and estimate error, and to use the appropriate form of the chain rule for multivariate functions
9. Evaluate directional derivatives and determine the equations of tangent planes
10. Describe the geometric significance of the gradient vector and discuss its relationship with respect to level curves and surfaces
11. Evaluate extreme values for constrained and unconstrained functions of two and three variables
12. Demonstrate the ability to set up and evaluate multiple integrals using Cartesian, polar, cylindrical, and spherical coordinate systems
13. Use multiple integration to evaluate areas of planar regions, surface areas and volumes of solids, centers of mass, and moments of inertia
14. Demonstrate the ability to change variables in multiple integrals by using the Jacobian
15. Evaluate the divergence and curl for vector fields in the plane and in three-space

16. Demonstrate the ability to set up and evaluate line integrals along two and three dimensional curves
17. Evaluate the work done by a force field (conservative and non-conservative) along paths in the plane and in three-space
18. Evaluate line integrals using Green's theorem, discussing the geometrical interpretation of the divergence and curl of a vector field

B. Topical Outline
1.   Geometry of space
  a) Lines and planes in space
  b) Surfaces in space
  c) Cylindrical and spherical coordinates
2.   Vector valued functions
  a) Definition of a vector valued function
  b) Limits
  c) Differentiation and integration
  d) Velocity and acceleration
  e) Projectile motion
  f) Tangent and normal vectors
  g) Tangential and normal components of acceleration
  h) Arc length and curvature
3.   Functions of several variables
  a) Level curves
  b) Limits and continuity
  c) Partial derivatives
      i.   Definition
      ii.   Higher order
  d) Differentials
  e) Chain rule
  f) Directional derivatives and gradient vectors
  g) Tangent planes and normal lines
  h) Extrema
      i.   Functions of two variables
      ii.   Lagrange multipliers
4.   Multiple integrals
  a) Double integrals
      i.   Iterated integrals
      ii.   Applications
  b) Double integrals in polar coordinates
  c) Centers of mass and moments of inertia
  d) Surface area
  e) Triple integrals
      i.   Iterated integrals
      ii.   Applications
  f) Change of variables, including the use of Jacobians
5.   Topics in vector calculus
  a) Vector fields
  b) Line integrals
  c) Independence of path
  d) Work
  e) Green's theorem in the plane
  f) Optional topics
      i.   Surface integrals
      ii.   Stokes theorem
      iii. Divergence theorem

Textbook:

Calculus: Early Transcendentals, 14th ed. by Hass, Heil, Weir (ISBN-13: 9780134439020)

The online supplement to the textbook will not be required.

Classtime:

Students are expected to attend class and PARTICIPATE. Students are responsible for all material covered in each class, even if they missed that day. Exams will be held during class time.

While in class, students should be respectful of other students as well as the instructor. All students are welcome to share their thoughts and the classroom will be an inclusive space.

Students should not distract others with their computers or cell phones. Any distractible cell phone use should be done outside the classroom. All written communication between instructor and students will be conducted either through Blackboard or via a COD email account. Make sure you check your COD email regularly.

Homework:

Homework will be assigned for every lecture out of the textbook. Students need to spend time and attempt every assigned homework problem to master the material and be prepared for quizzes and exams.

Solution guides and online step-by-step solutions should not be overused when doing homework. Students who rely on these resources are not self-sufficient and will underperform on exams. When stuck on a problem, take the time to read class notes and the textbook for related examples. Set aside time for contacting the instructor or the Math Assistance Area for help.

Students should spend time working and completing the homework correctly so that they can then demonstrate their knowledge on quizzes and exams in the course. Completed homework does not guarantee success on in-class assessments. Most quiz and exam problems are direct homework problems or are questions inspired by the homework.

Quizzes:

Quizzes will be taken in class and will be a check on how well students understand the material without using outside resources.

Calculators are not allowed during quizzes unless students are instructed otherwise. Quizzes in general are easier than exams with regards to the complexity or length of the questions asked.

In-class quizzes will be timed.

The lowest quiz will be dropped before computing the quiz average in the final grade. All quizzes will be weighted equally when computing the quiz average.

"Free Passes":

Each student is allowed two "free passes" for the semester, good for a 48-hour extension on any assignment. *No more than one* of these passes may be used on a unit exam, and a free pass cannot be

used on any assignments in the last week of the course.

  The 48-hour extension begins from the original deadline of the assignment, and students must complete the form found here *before* the original deadline or quiz/exam start time.

  All exams or in-class quizzes must be taken in a COD Testing Center or using the Virtual Testing Center. There are no extensions after the 48 hours, even if the Testing Center has limited hours during that time. No free passes are available in the final week of the course.

Exams:

There will be three (3) unit exams and a cumulative final exam given in class.

  Scratch work will be graded on exams, and correct work will be awarded partial credit even if the final answer is not correct.

  The cumulative final exam grade will replace the lowest unit exam grade if it benefits the final grade.

Attendance Policy:

Students are expected to attend every class and to understand material for classes they miss. All quiz and exam solutions will be posted online, and students must go over their quiz and exam results using the solutions to remediate errors

  The exam dates are all posted on the calendar. If a student knows in advance they will not be in class that day, they must plan to take the exam on an earlier day in a COD Testing Center. These situations are planned on an individual basis and the instructor should be notified at least two days in advance. Any exam missed without consulting the instructor beforehand will receive 0 points unless a free pass is requested using the online form before the exam start time.

  Exams CANNOT be made up after their due date under any circumstances except as an accommodation required by the Center for Access and Accommodations or as one of the free passes. Quizzes cannot be made up unless a request for a free pass is requested using the online form.

Grade Calculation:

Graded Assessment	Percentage of Final Grade
Quizzes (lowest dropped)	20%
Three Unit Exams	18% Each
Final Exam (also replaces lowest unit exam)	26%

Letter Grade	A	B	C	D	F
Percentage	89.5% and Up	79.5% - 89.4%	69.5% - 79.4%	59.5% - 69.4%	Below 59.5%

Written Style:

Student should practice and use good style when answering problems to receive any partial credit. That means that any answer which requires an explanation should be written in complete sentences, all mathematical notation should be consistent and make sense, and anybody reading the solutions for the first time (namely, the grader) should have no confusion as to both the final answer and the work involved to get there. For example, "1 + 1 =2" is a complete sentence. It has a subject (1+1), a verb (=) and an object (2).

Academic Integrity:

Students should be aware of the Code of Academic Conduct and know the consequences should the code be violated. The document can be found at

Code of Academic Conduct

If a student is caught violating the Code they will receive a grade penalty and will be reported through COD's academic integrity reporting system.

Student academic dishonesty includes but is not limited to**:**

· Dishonest use of course materials, such as student papers, examinations, reports and material posted on the Internet.

· Knowingly posting course materials of any kind on Internet sites such as (but not limited to) Course Hero and Chegg without the consent of the instructor.

· Knowingly assisting others in the dishonest use of course materials such as student papers, examinations and reports.

· Knowingly providing course materials such as papers, lab data, reports and/or electronic files to be used by another student as that student's own work.

· Plagiarizing, i.e., using language or ideas from materials without acknowledgement and/or copying work from other sources and submitting it as one's own.

· Examples of plagiarism include but are not limited to:

§ Copying a phrase, a sentence, or a longer passage from a source (including an Internet source) and submitting it as one's own.

§ Summarizing or paraphrasing someone else's ideas without acknowledging the source.

§ Submitting group assignments individually as one's own independent work.

§ Copying or taking pictures of course materials such as videos, exams, quizzes or assignments and posting the copied items and/or pictures on the Internet **or** sharing these copied items and/or pictures with other students who have not yet completed the assignments.

§ Taking pictures or copying course materials that are considered confidential by the instructor such as exams or quizzes.

If an exam is being proctored, students should comply with the proctor's instructions. If a proctor accuses a student of violating the Code of Academic Conduct or not conforming to the assessment's instructions, and the student does not agree with the accusation, the student should provide countervailing written or video evidence to support their case.

Center for Access and Accommodations:

The College of DuPage is committed to the equitable access of educational opportunities for students with disabilities in accordance with The Americans with Disabilities Act, As Amended and Section 504

of the Rehabilitation Act of 1973. Any student who feels they may need an accommodation on the basis of an illness, injury, medical condition, or disability should contact the Center for Access and Accommodations to determine eligibility for accommodations and to obtain an official Letter of Accommodation. The Center for Access and Accommodations can be reached via email at access@cod.edu. Students may also initiate a request for services by going to www.cod.edu/access and clicking on the green box labeled "complete form to request accommodations." If you are already registered with the Center for Access and Accommodations, please email me your Letter of Accommodation as soon as possible. Please DO NOT send any private health documentation or Doctor's notes to the course instructor.

Communicable Disease Reporting

Students should adhere to COD's safety protocols throughout the semester if visiting campus. All relevant policies regarding masking, vaccinations, and reporting of communicable diseases can be found on the COD website at Communicable Disease Reporting | College of DuPage (cod.edu)

Withdrawal Policy:

The final day for a student to withdraw from any course will be equal to 75% of the time for the respective academic session (see the Academic Calendar) through myACCESS https://myaccess.cod.edu or in person at the Registration office, Student Services Center (SSC), Room 2221.

After the deadline, students will be required to appeal for late withdrawal and provide appropriate documentation to the Student Registration Services Office for all requests. Students who are granted approval to withdraw by petition will not be eligible for refunds of tuition or fees and will receive a 'W' grade on their transcript. Appeals must be submitted prior to the designated final exam period for 16-week classes and before the last class meeting for all other session classes