LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
DEPARTMENT OF MATHEMATICS, ENGINEERING AND COMPUTER SCIENCE

MAT 203 - CALCULUS III – ONLINE MODE
PRE-REQUISITES: MAT 202 (CALCULUS II)

CATALOG DESCRIPTION: This is the third course in the calculus sequence and is designed to build upon the concepts and techniques of MAT201 and MAT202 and provide a more rigorous conceptual grounding for the entire sequence. Topics include 3-dimensional analytic geometry and vector analysis, calculus of functions of several variables including limits and continuity; partial derivatives; maxima and minima; Lagrange multipliers; double, triple, line and surface integrals; Curl and Divergence; and Green's, Stokes and Divergence Theorems.

ENTRY LEVEL SKILLS: The student should have good computational skills for evaluating derivatives of polynomials, rational functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions, as well as functions obtained from these by elementary operations and/or composition. The student should also have good computational skills for evaluating various types of integrals using different integration techniques, such as integration by substitution, integration by parts, trigonometric substitutions, partial fraction decomposition, etc. The student is also expected to be familiar with polar coordinates.

TEXT: *Calculus: Early Transcendentals* (Eighth Edition) by James Stewart, Published by Brooks/Cole Cengage Learning (2016), ISBN: 9781285741550

Instructional Objectives: During this course, the instructor expects to:

1. Introduce the geometry and algebra of vectors in 2- and 3-dimensions.
2. Introduce and investigate limits and continuity of functions of several variables.
3. Introduce partial differentiation and directional differentiation and their applications.
4. Provide students with the theory of relative extrema for functions of several variables, including the generalized second derivative test and the method of Lagrange multipliers.
5. Introduce iterated and multiple integrals.
6. Introduce line and surface (flux) integrals.
7. Introduce Green's, Stoke's and Divergence Theorems and their applications, via boundary/surface parameterization.

Performance Objectives: At the conclusion of this course, students will be able to:

1. Calculate the dot and cross products of two vectors and write equations of lines and planes in 3-space.
2. Calculate limits of functions of several variables and determine their points of continuity.
3. Calculate partial derivatives and directional derivatives of functions of several variables.
4. Locate/analyze relative extrema using partial differentiation, the generalized second derivative test and the Lagrange multipliers method

5. Compute double and triple integrals.
6. Compute line integrals and surface integrals.
7. Convert area/volume integrals to line/surface integrals, and vice versa, by applying Green's, Stoke's and Divergence Theorems.

ATTENDANCE: Attendance is mandatory. A student who misses more than 15 minutes of a class will be marked as late by the instructor. Three lateness will be considered an absence. *More than 6 hours of unexcused absences may result in a WU or F grade.*

GRADING: Your grade will be based on your performance on the quizzes, Blackboard discussion board, tests, and a final exam that the instructor will give. Quizzes could be based on homework assignments. The instructor may also count solutions to homework assignments as a factor in the grade. In any case, you are encouraged to work out solutions to unassigned problems (in addition to the assigned problems) to acquire more practice, which is essential for success in mathematics. You are urged to meet with the instructor frequently during the semester to discuss your progress. The table below shows the list of grading categories. For the exact weight of each category please refer to the syllabus distributed by your instructor.

- **Homework and/or Blackboard Discussion Board**
- **Quizzes** (8 is recommended)
- **Tests** (3 is recommended)
- **Final Exam**

GENEREL POLICIES:

In certain instances, at the discretion of the instructor, a student may be asked to demonstrate his/her ability of conceptually understanding the work he/she submitted. In such instances, the instructor may ask any student for a written or oral (live video session) clarification or explanation of solutions to any assignment, including homework, quizzes, tests, final exam, etc.

Solutions submitted by students for any assignment in this course, including homework, quizzes, tests, final exam, etc., must be based on the covered material. Solutions that are based on material that was not or will not be covered in this course, or will be covered but has not been covered yet, will not be accepted and will receive no credit.

COURSE SYLLABUS			
Lecture	**Topics**	**Sect.**	**Section Homework Assignment**
1	Three-dimensional Coordinate Systems Vectors	12.1 12.2	p. 796: 2,3,6,7,8,10,11,14,15,19,20,26,30,35,37,38,40 p. 805: 1,2,4,6,8,11,14,18,21,24,25,26,27,28,41,42
2	The Dot Product The Cross Product	12.3 12.4	p. 812: 1,4,6,7,8,10,14,19,20,22,24,25,28,30,31,32,36,43, 44,47 p. 821: 5,6,7,10,13,14,18,20,28,30,32,34,36,38,43,44
3	Equations of Lines and Planes	12.5	p. 831: 1,3,4,9 to 12,14,18,22,25,26,28,30,33,36,38,47,48, 53,54,55,58,59,68
	Cylinders and Quadratic Surfaces (Optional)	12.6	p. 839: 1 to 4,6,8,14,15,17,20 to 29,33,34,38,44
4	Vector Functions and Space Curves Derivatives/Integrals of Vector Functions	13.1 13.2	p. 853: 1 to 6,9,14,16,18,19,21 to 27,31,41 to 46 p. 860: 1,3,5,8,9 to 16,18,20,21,24 to 27,34 to 40,42
	Arc Length and Curvature (Optional)	13.3	p. 868: 1,4,6,11,14,18,19,22,23,24,29,30,33,38,48
	Motion in Space: Velocity and Acceleration (Optional)	13.4	p. 878: 1,2,4,6,8,11,13,14,16,19,20,21,37,40,41
5	Functions of several variables	14.1	p. 899: 2,5,7,9 to 12,14,15,18,20,21,27,28,32,33,36,38,41, 42,46,48,49,61 to 67,69
6	Limits and Continuity	14.2	p. 910: 1 to 6,8,11,12,13,14,16,17,18,20,26,29,32,33,37,38
7	Partial Derivatives	14.3	p. 923: 1,3,4 to 10,12,16,17,19,20,27,29,32,33,36,41,42, 45,49,50,53,60,62,65,69,71,73,76
8	Tangent Planes and Linear Approximation	14.4	p. 934: 2,3,4,6,12,13,16 to 19,26,30 to 34
9	**TEST 1**		
10	The Chain Rule	14.5	p. 943: 3,4,5,6,8,10,12 to 15,20,21,24,29,30,33,34
11	Directional Derivatives and the Gradient Vector	14.6	p. 956: 1,4,6,8,9,10,14,15,16,18,19,20,23,24,26,28,29,32, 43,45,46,49,50
12	Maximum and Minimum Values	14.7	p. 967: 1 to 4,6,9,12,15,16,19,20,22,31,34,37,43,44,45,48
13	Lagrange Multipliers	14.8	p. 977: 1,4,5,6,8,10,12,17,20 to 23,25,45
14	Double Integrals Over Rectangles	15.1	p. 999: 1,2,3,6,10,11,12,15,16,18,20,22,23,27,28,30,32,33, 36,38,40,41,42
15	Double Integrals Over General Regions Double Integrals in Polar Coordinates	15.2 15.3	p. 1008: 3 to 6,8 to 11,14,16,18,21,22,24,25,29,32,37,46, 47,49,50,52,55,56,58 p. 1014: 1 to 4,6 to 9,12,13,16,17,18,21,22,24,26,29,32
	Applications of Double Integrals (Optional)	15.4	p. 1024: 1,2,4,7,9,11,16,24,27,28,29
16	Triple Integrals	15.6	p. 1037: 2,5 to 10,12,13,15,16,17,19,20,22,28,29,30,33,36
17	Triple Integrals in Cylindrical Coordinates Triple Integrals in Spherical Coordinates	15.7 15.8	p. 1043: 2,4,6,7,8,10,16 to 24,29,30 p. 1049: 2,4,6,7,8,10,13,14,15,18 to 27,30,35,36,42,43
18	**TEST 2**		
19	Change of Variables in Multiple Integrals	15.9	p. 1060: 2,3,4,8 to 11,13 to 19,23 to 27
20	Vector Fields Line Integrals	16.1 16.2	p. 1073: 2,4,5,10 to 18,21,24,26,29 to 34 p. 1084: 2,3,5,6,7,11 to 14,17,18,20,22,39,40,41
21	Fundamental Theorem for Line Integrals Green's Theorem	16.3 16.4	p. 1094: 1,2,3,5 to 8,10 to 14,16,17,19 to 24,26,28,31 to 32 p. 1101: 1 to 5,7,9,10,12,13,14,18,28
22	Curl and Divergence	16.5	p. 1109: 1,3,4,6 to 12,14,15,17,18,19,22,25,26,27,30
23	Surface Integrals Stoke's Theorem	16.7 16.8	p. 1132: 1,2,5,6,8,9,12,14,15,17,19,20,21,23,24,26,28,31 p. 1139: 1,2,3,4,6,7,8,10,13,14,16,17,18
24	The Divergence Theorem	16.9	p. 1145: 1,2,4,5,7,8,9,11,12,18,19,24,27,28
	Final Exam		