San Diego Community College District
Mesa College
Course Syllabus, Summer 2018

Subject Area and Course Number: Mathematics 252
Course Title: Calculus with Analytic Geometry III **Units:** 4.0
Class Meets: Monday - Thursday 10:15 AM - 12:20 PM, room MS422 **CRN:** 92701
Instructor: Russell La Puma **Office:** MS222E
Voice mail: (619) 388-2767 x5503 **Office Hours:** M-Th 2:30 PM - 3:30 PM
Web: http://homework.sdmesa.edu/rlapuma **E-mail:** lapumath@gmail.com
WebAssign Class Key: `sdmesa 9167 5197`

Prerequisite: Math 151 with a grade of "C" or better, or equivalent.

Course Description: This course includes the algebra and geometry of 2 and 3 dimensional Euclidean vectors, the algebra and calculus of multivariable functions including composition of functions, limits, continuity, partial differentiation, gradients, higher order derivatives, the chain rule, constrained and unconstrained optimization including Lagrange's theorem, multiple integrals, integrals over paths and surfaces, and integral theorems of vector analysis. This course is intended as a general introduction to the theory and applications of multivariable calculus. This course is essential for most upper division courses in mathematics and forms part of the foundation for engineering and physics. The course is intended for the students interested and/or planning to major in mathematics, physics, astronomy, engineering, computer science, physical chemistry, operational research, or economics.

Student Learning Objectives:

Upon successful completion of the course the student will be able to:
1. Extend geometric concepts of the Cartesian plane to 3-dimensional topics, such as the distance between points, vector arithmetic, the Euclidean norm of a vector.
2. Calculate and apply the geometric interpretation of the inner product, the cross product, and triple scalar product of 3-dimensional vectors.
3. Calculate the angle between vectors, and determine if two vectors are orthogonal.
4. Formulate the equation of the line in both vector and parametric form, and the equation of a plane in 3-space, and calculate the distances between points, planes and lines.
5. Recognize, compare and contrast the different quadric surfaces.
6. Change variables between rectangular, cylindrical, and spherical coordinates.
7. Graph simple single variable vector-valued functions in R^2 and R^3.
8. Compute the limit, derivative, and integrals of vector-valued functions of one variable.
9. Determine continuity of a single variable vector-valued function at a single point and in a set.
10. Compute the unit tangent vector, principal unit normal vector, the arc length and the curvature of a vector-valued function.
11. Define and apply some elementary concepts in point set topology as they relate to sets in several dimensions.
12. Extend and apply the formal definitions of limits, and continuity from single variable calculus to functions of 2 and 3 variables.
13. Calculate first as well as higher order partial derivatives of multivariable functions.
14. Define the derivative and the concept of the differentials of multivariable functions, and calculate tangent planes to multivariable functions.
15. Apply the Chain Rule to a composition of multivariable functions.
16. Calculate the directional derivative of a multivariable function at a point in a given direction; and the gradient of such a function, applying the properties of the gradient to describe the behavior of the function.
17. Calculate the critical points of a differentiable multivariable function in an open ball.
18. Apply the second derivative test to determine if the critical points of a multivariable

function are relative maxima, relative minima, or saddle points.
19. Use Lagrange's Theorem to compute the extrema of a multivariable function subject to given constraints.
20. Calculate double and triple integrals over rectangular and non-rectangular regions, by iterating, by changing the order of integration, or by changing variables.
21. Apply multiple integrals to areas, volumes, surface area, mass, centers of mass, and moments of inertia.
22. Sketch a vector field and compute its curl and divergence.
23. Compute the line integral of a vector-valued function over a piecewise smooth contour.
24. Determine the work done by a vector-valued multivariable function over a piecewise smooth contour.
25. Apply the concept of path independence and determine if a vector field is conservative, and if so, calculate its potential energy function.
26. Apply Green's, Stokes' and the Divergence theorems, and calculate surface integrals over parametrized piecewise smooth surfaces.

Course Learning Outcome:

Students will solve a double integral by reversing the order of integration.
Students will find the work done by a given force field in moving an object along a given curve.

Evaluation: There will be three tests and a final examination. To avoid the need for make-up tests, the score of any missed test will be dropped and the final and remaining tests given extra weight. There will be no make-up tests. There will be short quizzes tentatively scheduled for every other class meeting, with the lowest two quiz scores dropped. Homework will be done either on line using WebAssign, or from the textbook. The final grade will be determined as 90-100% A, 80-89% B, 70-79% C, 60-69% D, with the following weights in effect:

Homework	10%	
Quizzes	10%	
Tests, best two @	24%	each
Test, worst	8%	
Final	24%	

Text/Calculators: *Multivariable Calculus,* 8th Ed., James Stewart, ISBN: 1-305-71887-9. WebAssign access, Cengage Learning. A graphing calculator (e.g. TI-84) is highly recommended. You will be allowed to use a calculator on any test unless otherwise directed.

Attendance Requirements: A student accumulating unexcused absences of more than 6% of the total hours that the class meets (equal to two class meetings) may be dropped by the instructor. If there are unexcused absences of more than 12% (four class meetings), district rules state the student *must* be dropped. The withdrawal deadline is **July 20**. Any student still enrolled in the course after that date cannot receive a "W." It is the student's responsibility to add, drop, or withdraw from classes before course deadlines.

Tardiness: Class begins at the set hour. It is understood that tardiness is occasionally unavoidable, but chronic tardiness disrupts the learning environment. Likewise, it is usually inappropriate to leave before the end of class without consulting the instructor. If the instructor is more than twenty minutes late, students may leave after signing an attendance sheet.

Classroom Behavior and Student Code of Conduct: Students are expected to respect and obey standards of student conduct while in class and on campus. The student Code of Conduct, disciplinary procedure, and student due process (Policy 3100, 3100.1, and 3100.2) can be

found in the current college catalog. Under most circumstances, food, beverages, and phones, are unnecessary and unwelcome in the classroom.

Collaboration and Cheating: You are encouraged to work with tutors or other students on homework and class topics, provided you share learning, not just answers. (Consider attending the MT2C Math & Science Tutoring, LRC 4th floor.) Collaboration on exams or quizzes, however, is regarded as cheating and will result in a zero for that exam.

Accommodation of Disability: Students with disabilities who may need academic accommodations should discuss options with their professors during the first two weeks of class.

Tentative Homework Assignments:

12.1: 3, 8, 10, 13, 17, 20, 27, 33.
12.2: 5, 9, 14, 17, 23, 25, 29, 30.
12.3: 3, 6, 11, 23, 29, 33, 37, 41.
12.4: 5, 9, 13, 17, 29, 37, 39.
12.5: 3, 7, 11, 17, 21, 27, 31, 37, 45, 51, 57, 73.
12.6: 3, 5, 7, 11, 15, 19, 21-28, 31, 35, 43.

13.1: 1, 3, 9, 13, 19, 21-26, 27, 29, 41.
13.2: 5, 9, 13, 17, 21, 25, 33, 35, 37, 41, 49, 53.
13.3: 3, 5, 13, 17, 23, 25, 47.
13.4: 3, 7, 11, 13, 15, 19, 37, 39, 41.

14.1: 9, 13, 17, 21, 25, 29, 32, 43, 47, 49, 59-62, 65.
14.2: 5, 7, 9, 13, 39.
14.3: 15, 19, 23, 24, 31, 35, 41, 42, 53, 57, 59, 63.
14.4: 3, 11, 15, 21, 25-35 odd.
14.5: 1, 5, 9, 13, 17, 21, 25, 29, 33, 35, 39, 43.
14.6: 5, 9, 13, 17, 21, 25, 29, 33, 41, 45, 55, 59.
14.7: 3, 11, 13, 15, 21, 23, 31, 35, 39, 43, 47, 51.
14.8: 1-19 odd.

15.1 7th edition: 11, 13, 17.
15.2 7th ed: 1, 7, 9, 13, 17, 19, 23, 25, 27, 31, 35, 37.
15.1 8th ed: 9, 11, 13, 21, 25, 29, 31, 35, 37, 39, 43, 47, 49.
15.3 7th | 15.2 8th: 1, 5, 9, 13, 15, 17, 21, 25, 29, 43, 47, 49, 53, 62, 63.
15.4 7th | 15.3 8th: 1, 5, 9, 11, 15, 19, 25, 29, 31.
15.5 7th | 15.4 8th: 5-15 odd.
15.6 7th | 15.5 8th: [skip]
15.7 7th | 15.6 8th: 7, 9, 13, 15, 19, 27, 31, 33, 35, 39, 41.
15.8 7th | 15.7 8th: 5, 6, 8, 9, 11, 17, 19, 21, 25, 29.
15.9 7th | 15.8 8th: 5-11 all, 13, 17, 19, 21, 27, 29, 35, 39.
15.10 7th | 15.9 8th: 1-19 odd, 25.

16.1: 5, 9, 11-18, 21, 25, 29-32.
16.2: 1-21 odd.
16.3: 1-23 odd, 29, 35.
16.4: 1-13 odd, 17.
16.5: 1-7 odd, 12, 13-17 odd.
16.6: 3, 5, 13, 19, 21, 23, 26, 33, 35, 39, 45, 49.
16.7: 5, 7, 17, 21, 23, 27, 29.
16.8: 1, 3, 7, 15, 19.
16.9: 1, 7, 11, 15, 17.

Math 252 – La Puma – Summer 2018				
week	Mon	Tue	Wed	Thu
1	Jun 18 intro 12.1 12.2	Jun 19 12.3 12.4	Jun 20 12.5	Jun 21 12.6 13.1
2	Jun 25 13.1 13.2	Jun 26 13.3 13.4	Jun 27 14.1 14.2	Jun 28 **Test 1**
3	Jul 2 14.3 14.4	Jul 3 14.5	Jul 4 *Independence Day*	Jul 5 14.6 14.7
4	Jul 9 14.7 14.8	Jul 10 14.8 15.1	Jul 11 15.2	Jul 12 15.3 15.4
5	Jul 16 **Test 2**	Jul 17 15.5 15.7	Jul 18 15.8	Jul 19 15.9 15.10 *Withdrawal deadline 7/20*
6	Jul 23 15.10 16.1	Jul 24 16.5 16.2	Jul 25 16.2 16.3	Jul 26 16.3
7	Jul 30 **Test 3**	Jul 31 16.4 16.6	Aug 1 16.7	Aug 2 16.8 16.9
8	Aug 6 16.9 16.10	Aug 7 16.10	Aug 8 review	Aug 9 **Final**

Schedule subject to change with prior notice.