Analytical Geometry – Calculus III MATH:223 MTuWF

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OFFICE: CAS 275 PHONE: 972-6779
OFFICE HOURS: MTuW 1:00-2:00
Text and Coverage: Calculus, James Stewart, 6th edition, Chps. 12, 13, 14, 15, 16, 17.
Website for schedule, homework problems and announcements:
https://sforcey.github.io/sf34/class_home/calc/calc3/calc3s25.htm

GRADING POLICY: The following points/percentages will be used in grading:

100 pts: Homework, In-class assignments, quizzes (10%)	90% guarantees an A
	80% guarantees a B
600 pts: 2 Tests at 300 pts each. (60%)	70% guarantees a C
300 pts: Final Exam (30%)	60% guarantees a D

Course Outline with dates:

- Jan 13. Day one. (Jan 19: Last day to add.)
- Jan. 20: No class on MLK day.
- Chapter 13 : Vectors and Geometry of Space.
- Chapter 14 : Vector Functions: Scalar input, vector output.
- Jan. 26: Last day to drop.
- **TEST 1.**
- Feb. 18: No class on Pres. day.
- Chapter 15 : Partial Derivatives: Multivariable points as input, scalar output.
- Mar. 2: Last day to w/draw.
- Chapter 16 : Multiple Integrals
- **TEST 2**
- Mar. 24-30: Spring break..
- Chapter 17 : Vector Fields: Multivariable points as input, vector outputs.
- May 4: Last day.
- COMPREHENSIVE FINAL EXAMINATION.

Evaluation Procedure:

- When graded, quizzes and homework will be given a grade out of ten points, where full credit will be assigned when the graded problems (if any) have correct answers with all correct work shown. Points may be subtracted for each graded problem with an incorrect answer, incorrect work, or not all work shown. The quiz/homework average will be calculated by dropping a total of 20 homework points. This will have the effect of making a 100% homework average possible despite 2 missed homeworks/quizzes.

- **No notes, formula sheets or books may be used on the Final or any test.**

Homework may not be copied, but collaboration and research are allowed. All other work is individual. Any incidence of academic dishonesty carries a minimum penalty of a non-removable zero for that work. No active cellular phones, pagers, media players, computers or other electronic communication devices are permitted in the classroom. Usage of or an attempt to use any of these devices during exams carries a minimum penalty of a non-removable zero for that exam.

Rough idea Glossary (using a mix of layman's and Calc I terminology.) Intro, Test 1, Test 2, Test 3.

Function: A rule or formula giving one output for each input (inputs and outputs may be scalars or vectors.)
Derivative: What you get by differentiating a function. Evaluating at an input point gives tangent slope.
Anti-derivative: What you get by integrating (indefinitely). Evaluating over a region gives the definite integral.
Scalar: For this class, a real number.
Point: A location (x,y) in 2d space or (x,y,z) in 3d space. The ordered scalars x,y,z are called coordinates.
Vector: Ordered pair <x,y> or triple <x,y,z> of scalars called components, which we can add component-wise.
Magnitude: The length of a vector, or its strength in an application.
Unit vector: A vector of magnitude 1.
Parallel: Two vectors are parallel if one is a scalar multiple of the other.
Perpendicular = Orthogonal: Two vectors are orthogonal if the angle between them is $\pi/2$, or 90 degrees.
Dot product: A way to combine two vectors to get a scalar.
Cross product: A way to combine two vectors to get a vector.

Projection: Finding a shadow of one vector on another: finding a component of one vector using another as an axis.
Line: Given a starting point and a direction vector, all the points that can be reached using that direction.
Skew lines: two lines whose vectors are not parallel, but which never cross.
Plane: Three points not all in a line determine a plane.
Normal to plane: Every plane has a vector that is at right angles to it.
Cylinder: The solution set of any equation with two variables, considered in 3d.
Quadric surface: The solution set of an equation in three variables, using powers of 2.
Vector function: Input a scalar, get out a vector. Really the same as a parameterized curve. A short piece is an arc.
Tangent vector: Given a vector function, by taking its derivative at a point on its curve we can find a tangent vector.
Unit tangent vector: Tangent vector divided by its own length.
Tangent line: Line formed by using a point on a vector function and the tangent vector at that point.
Tangent velocity: If the vector function (parameterized curve) gives position, then its derivative is velocity.
Speed: The magnitude of the velocity.
Acceleration: The derivative of the velocity function.
Tangential component of acceleration: The projection of the vector acceleration at a point on a curve to the tangent.
Normal component of acceleration: The component of acceleration perpendicular to the tangent.
Curvature: Determines how much acceleration you feel at a constant speed.

Surface: A multivariable input function taking a point (x,y) as input and giving a scalar z as output.
Level curve: The curves in the xy-plane below the points on a surface at a given z-value.
Partial derivative: Take the derivative of a multivariable input function with respect to just one variable.
Gradient: Vector made up of all the partials of a multivariable input function. Gives direction of maximum increase.
Tangent Plane: A plane that is approximating a surface near the point where it touches.
Normal vector to tangent plane: The gradient of the surface with an extra component of -1 in the z direction.
Critical point: A point (x,y) below a surface where the tangent plane is horizontal. (or where partials don't exist.)
(Local) Minimum: A point on a surface where moving in any direction results in increasing or staying at the same z-value.
(Local) Maximum: A point on a surface where moving in any direction results in decreasing or staying at the same z-value.
Extrema: Local maximums (max) and minimums (min).
Saddle point: The surface looks like a saddle near this point.
Lagrange multiplier: The extrema of a surface constrained by a level curve occur when the gradients are parallel.
Iterated integral: Taking double or triple definite integrals (in sequence) of a multivariable function.

Vector Field: A function that takes a multivariable point as input and gives a vector as output.
Curl: A new vector field that is formed from the partial derivatives of the components of a vector field.
Divergence: A scalar function that is formed from the partial derivatives of the components of a vector field.
Line integral: We can integrate surfaces and components of vector fields over arcs of curves.
Green's theorem: A short-cut for finding line integrals over simple closed curves.