# Week-by-Week Schedule for MA242.001 and MA242.003, Fall, 2019

| Week of | Section | Topic |
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| 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 |
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| 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 |
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| 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. |
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| 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 $\vec{a}(t) = \frac{dv}{dt}(t)\widehat{T}(t) + \kappa(t)v^2(t)\widehat{N}(t)$ |
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| 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; |
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| 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? |
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| 9/30 – 10/04 | 3.5 | The Chain rules for multivariable functions |
| | | Tangent planes to graphs z = f(x,y); The general chain rule |

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| | 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 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 |
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| 12/2 | 7.3 | Green's theorems |
| 12/4 | 7.4 | The Divergence Theorem |

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| 12/6 | 7.5 | Stokes' Theorem |
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| | Final exam Ma242.001 | Monday, December 9, 8:00 – 11:00 am |
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| | Final exam Ma242.003 | Wednesday, December 18, 8:00 – 11:00 am |
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