

**Mathematics 151A Au**                      **5 cr. each**                      **Calculus and Analytic Geometry**  
**Mathematics 152A Wi**  
**Mathematics 153A Sp**  
**Mathematics 254A Au**

**Prerequisite:**

The prerequisites are the same as those for 151, 152, 153, 254; e.g. for 151A the prerequisite is Math 150 (C- or better) or satisfactory score on the mathematics placement test.

**Catalog Description:**

The catalog descriptions are the same as those for 151, 152, 153, 254.

**Purpose of Course:**

To introduce students to one-variable calculus with an emphasis on understanding fundamental concepts and how to apply them in a variety of different contexts. Examples and problems are taken from diverse fields and use graphical and numerical, as well as analytical methods.

**Follow-up Course:**

After finishing 151A students should be encouraged to take Math 152A, 153A and 254A. Students should be able to switch between the "A" sequence and the traditional calculus sequence.

**Text:**

Calculus: Single & Multivariable EGrade Combination with Student Solutions Manual & Syllabus, Hughes-Hallett, Gleason, et al., 4<sup>rd</sup> edition, Wiley, ISBN 0-471-78820-1.

**Topics List**

**151A:**

Section	Title	Section	Title
1.1	Functions & Change	3.1	Powers & Polynomials
1.2	Exponential Functions	3.2	The Exponential Function
1.3	New Functions From Old	3.3	The Product & Quotient Rules
1.4	Logarithmic Functions	3.4	The Chain Rule
1.5	Trigonometric Functions	3.5	The Trigonometric Functions
1.6	Powers, Polynomials, & Rational Functions	3.6	The Chain Rule & Inverse Functions
1.7	Introduction to Continuity	3.7	Implicit Functions
1.8	Limits	3.9	Linear Approximation & The Derivative
2.1	How Do We Measure Speed?	3.10	Theorems About Differentiable Functions
2.2	The Derivative At A Point	4.1	Using First & Second Derivatives
2.3	The Derivative Function	4.2	Families of Curves
2.4	Interpretations Of The Derivative	4.3	Optimization
2.5	The Second Derivative	4.4	Applications to Marginality
2.6	Differentiability	4.5	Optimization & Modeling
4.6	Rates & Related Rates		

**Continued.**

# Mathematics 151A, 152A, 153A, 254A

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### 152A:

Section	Title	Section	Title
5.1	How Do We Measure Distance Traveled?	7.2	Integration By Parts
5.2	The Definite Integral	7.3	Tables Of Integrals
5.3	The Fundamental Theorem & Interpretations	7.3.1	Algebraic Identities & Trigonometric Substitutions
5.4	Theorems About Definite Integrals	7.7	Improper Integrals
6.1	Antiderivatives Graphically & Numerically	7.8	Comparison Of Improper Integrals
6.2	Constructing Antiderivatives Analytically	8.1	Areas & Volumes
6.3	Differential Equations	8.2	Applications To Geometry
6.4	Second Fundamental Theorem Of Calculus	8.4	Density & Center Of Mass
6.5	The Equations Of Motion	8.5	Applications To Physics
7.1	Integration By Substitution		

### 153A:

Section	Title	Section	Title
9.1	Sequences	12.2	Graphs Of Functions Of Two Variables
9.2	Geometric Series	12.3	Contour Diagrams
9.3	Convergence of Series	12.4	Linear Functions
9.4	Tests For Convergence	12.5	Functions Of Three Variables
9.5	Power Series & Interval Of Convergence	12.6	Limits & Continuity
10.1	Taylor Polynomials	13.1	Displacement Vectors
10.2	Taylor Series	13.2	Vectors In General
10.3	Finding & Using Taylor Series	13.3	The Dot Product
10.4	The Error In Taylor Polynomial Approximations	13.4	The Cross Product
12.1	Functions Of Two Variables	17.1	Parameterized Curves
		17.2	Motion, Velocity, & Acceleration

### 254A:

Section	Title	Section	Title
14.1	The Partial Derivative	17.3	Vector Fields
14.2	Computing Partial Derivatives Algebraically	18.1	The Idea Of A Line Integral
14.3	Local Linearity & The Differential	18.2	Computing Line Integrals Over Parameterized Curves
14.4	Gradients & Directional Derivatives In The Plane	18.3	Gradient Fields & Path-Independent Fields
14.5	Gradients & Directional Derivatives In Space	18.4	Path-Dependent Vector Fields & Green's Theorem
14.6	The Chain Rule	19.1	The Idea Of A Flux Integral
16.1	The Definite Integral Of A Function Of Two Variables	19.2	Flux Integrals For Graphs, Cylinders, & Spheres
16.2	Iterated Integrals	20.1	The Divergence Of A Vector Field
16.3	Triple Integrals	20.2	The Divergence Theorem
16.4	Double Integrals In Polar Coordinates	20.3	The Curl Of A Vector Field
16.5	Integrals In Cylindrical & Spherical Coordinates	20.4	Stokes' Theorem