

**Syllabus for
Stat 4584
Advanced Calculus for Statisticians**

I. Sequences and Series

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|--------------------------------------|----|
| A. Summations | 5% |
| B. Infinite sequences and induction | 3% |
| C. Infinite series | 3% |
| D. Power series and Taylor's theorem | 7% |

II. Linear Algebra

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|---|-----|
| A. Solving systems of equations | 5% |
| B. Matrix transposes and inverses | 5% |
| C. Determinants and traces | 3% |
| D. Linear independence, rank, and dimension | 3% |
| E. Orthogonal matrices and projections | 7% |
| F. Symmetric matrices, quadratic forms and spectral decomposition | 10% |

III. Multivariate Derivatives

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| A. Critical points, maxima, and minima | 10% |
| B. Lagrange multipliers | 5% |
| C. Taylor's series | 7% |
| D. Newton's method | 3% |

IV. Multiple Integrals

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|---|----|
| A. Fubini's Theorem | 3% |
| B. Linear changes of variable and convolution | 5% |
| C. Nonlinear changes of variable | 8% |

D. Polar and spherical coordinates	3%
A. Gaussian integrals and Laplace's method	5%