

Text: Theodore Shifrin, *Multivariable Mathematics: Linear Algebra, Vector Calculus, and Manifolds*, John Wiley & Sons, 2005. (Up-to-date list of typos at http://math.uga.edu/~shifrin/Multivariable_Errors.pdf)

Recommended for those seeking help with proofs: Kevin Houston, *How to Think Like a Mathematician: A Companion to Undergraduate Mathematics*, Cambridge University Press, 2009.

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Web page for the class: <http://www.math.uga.edu/~shifrin/MATH3500>

Office Hours: to be decided in class and posted on the web page.

This two-semester class is a theoretical and more challenging amalgamation of MATH 2270/2500 and MATH 3000. Proofs of theorems and additional physical applications will be stressed, and harder computational problems will be included.

You are expected to attend class *every day*, participate in class, and read the text and do homework *every night*. I encourage (indeed, expect) you to come regularly to office hours, but *you must have thought about and attempted the problems first*. Homework will be collected once a week and *selected exercises* will be graded carefully. Please write up your problems clearly: A classmate (or you, a few weeks later) should be able to understand your solution fully. The computational portion of the homework will be WeBWork problems that you do on-line; to help you study for exams, I recommend that you keep a notebook in which you work these problems neatly. “Challenge problems” will count as extra credit (up to 10% of your grade). Your grade will be calculated as follows:

hour exams (3)	30%
final exam	30%
homework and class participation	30%
your best component	10%

Hour exams are tentatively scheduled for September 16, October 21, and December 2, 2014. The last day to withdraw with the possibility of a WP is October 23. The final exam is Monday, December 15, 2014, 12:00–3:00 p.m.

N.B.: No late homework or makeup exams. Although I encourage you to work on homework with one or two other students, you **must** write up your assignments by yourself. Perusing the Instructors’ Solutions Manual is considered unethical and dishonest. You must comply with UGA’s Academic Honesty Policy; see particularly Sections 5, 7, and 8 at http://www.uga.edu/honesty/ahpd/culture_honesty.htm

All students are responsible for maintaining the highest standards of honesty and integrity in every phase of their academic careers. The penalties for academic dishonesty are severe and ignorance is not an acceptable defense.

Course Outline for MATH 3500(H)–3510(H)

1. Vector algebra and geometry, matrices, linear maps, determinants.
 2. Functions, limits, continuity; the derivative.
 3. Solving linear systems: Gaussian elimination, linear independence, basis and dimension. What is a manifold?
 4. Maximum/minimum problems, quadratic forms, projections.
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5. Integration, applications to physics, determinants and the change of variables theorem.
 6. Nonlinear problems and manifolds.
 7. Differential forms and integration on manifolds. Stokes’s Theorem. Applications to physics (div, curl, and all that) and topology.
 8. Eigenvalues and eigenvectors, difference and differential equations, spectral theorem and applications to quadratic forms.