Math 460-500, Fall 2015
Tensors and General Relativity

Instructor: Dean Baskin
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Lectures: MWF 9:10–10:00 in Blocker 164
Office Hours: W1:30–3:30pm and by appointment
(No appointment necessary for standard office hours)

Final exam. Monday, December 14, 8–10am.

Course description and prerequisites.

Description. Vectors and tensors in special relativity, curvature, manifolds, covariant differentiation, Einstein field equations, Schwarzschild geometry and black holes, cosmology, gauge field theories.

Prerequisites. MATH 308; PHYS 311 or MATH 323 or MATH 311; junior or senior classification.

Learning outcomes. The student will learn the basic facts about the mathematical structure and physical meaning of general relativity and will be able to carry out the simplest calculations. Proficiency at the level of graduate courses is not expected.

Textbook.


Optional text. We will also briefly discuss gauge theories as another application of the concept of a covariant derivative, following chapter 8 of Stephen Fulling’s book Aspects of Quantum Field Theory in Curved Space-Time. Copies of that chapter will be made available.

Schutz also has little to say about electromagnetism in relativity, so we will fill in the details as a major homework project.

Course website. The course website is http://www.math.tamu.edu/~dbaskin/math460-fall15/.

Grading policies. There will be one in-class exam and a final. You will additionally write a paper (as an extended homework assignment) about electricity and magnetism.

The date for the in-class exam is Wednesday, October 14.

The first draft of the electricity and magnetism paper is due Wednesday, September 30; the final version is due Wednesday, October 28.

<table>
<thead>
<tr>
<th>Grading scheme</th>
<th>Points</th>
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<tbody>
<tr>
<td>In-class exam</td>
<td>100</td>
</tr>
<tr>
<td>Final exam</td>
<td>200</td>
</tr>
<tr>
<td>E&amp;M paper</td>
<td>50</td>
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<tr>
<td>Other homework</td>
<td>100</td>
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<tr>
<td>Total</td>
<td>450</td>
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The curve will be at least as generous as the “standard” scale (90% will guarantee an A, and so on). Usually, grades in this course are more generous than that curve.

Class policies.

Make-up tests. Please cooperate in making the need for make-up tests as rare as possible. If you miss (or foresee that you will miss) the test, it is your responsibility to contact me as soon as possible to request, justify, and schedule a make-up test. If the absence is not clearly excused under the Attendance section of Student Rules, the request may be denied.
Americans with Disabilities Act (ADA) policy statement. The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for a reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disability Services Office, Department of Student Life, in Room B118 of Cain Hall.

Academic integrity statement and policy. Scholastic dishonesty will not be tolerated. Aggie Honor Code: An Aggie does not lie, cheat, or steal or tolerate those who do. For additional information, visit http://aggiehonor.tamu.edu.

Plagiarism. Finding information in books or on the internet is good; lying (even by silence) about where it came from is academic dishonesty. Whenever you copy from, or “find the answer” in, some other source, give a footnote or reference. Otherwise, you are certifying that it is your own work.

Joint work. On a homework assignment (not a take-home test) discussion with other students is permitted and encouraged. However, you will not get homework credit for parasitical “work” (and your test scores will suffer, too). Please follow these policies:

1. When two or more students work together on an assignment, they should all indicate so on their papers.
2. If the cooperation is of the divide and conquer variety, you are certifying that you have studied and understand every problem solution on your paper. Mindless copying is dishonest and academically worthless.

Copyright. Course materials should be assumed to be copyrighted by the instructor who wrote them or by the University.