

Tensor Analysis with Applications

MAT 4183 Fall 2017

Instructor: Barry Jessup

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Prerequisites: MAT2122 and MAT2125, and (MAT2141 or MAT2342). If you do not meet these, you must withdraw from the course. These are *serious* prerequisites.

Course web page: <http://mysite.science.uottawa.ca/bjessup/courses/Mat4183>

Lectures: Wednesdays 1:00 - 2:30pm, and Fridays 11:30am -1:00pm in CBY B202.

Office Hours: Please send a copy of your schedule by email to me by the end of the first week of classes so I can determine the most convenient times for office hours.

Approximate course content: We will begin with an introduction to multilinear algebra, proceed to some elementary manifold theory, and combine the two in an introduction to tensor fields. Our broad goal is to acquire enough mathematics to understand modern formulations of Maxwell's equations for electromagnetism and Einstein's equations for General Relativity. Time permitting, we will cover other topics.

Text: "Gauge Fields, Knots and Gravity" by John Baez and Javier P. Muniain.

References:

"Multilinear Algebra" by W. Greub (for the first part of the course),

"Differential Geometry", by Wulf Rossmann. The pdf file is available at:

<http://mysite.science.uottawa.ca/rossmann/>

"Foundations of Differentiable Manifolds and Lie Groups" by Frank Warner,

"Differential Geometry, Volume 1" by Mike Spivak,

"Foundations of Differential Geometry, Volume 1" by S. Kobayashi and K. Nomizu.

Evaluation: There will be a mid-term test during class time on 1-November in CBY B202, and 4 assignments, whose due dates will be announced soon. Students may also give a 20 minute, in-class presentation, to replace one assignment mark. This talk would be given during the exam period, and must be on a topic related to the course and approved by me - please see me for details. You must let me know if you intend to do this by 27-November.

Your final grade will be the weighted average of four assignments worth 7.5% each, the mid-term worth 20%, and a final exam worth 50%.