School Of Mathematics, Statistics, and Operations Research
Te Kura Mātai Tatauranga, Rangahau Pūnaha

MATH 321/322/323 Applied Mathematics T1 and T2 2013

Module on Special Relativity

Administrivia:

- One module offered this year is a reading-course/project focussing on the mathematical structure of Special Relativity.
- The module boils down to reading the book *Spacetime Physics: introduction to special relativity*, by Taylor and Wheeler [Freeman, New York, 1998], and doing a selection of exercises from the text.
- There will also be a brief one-hour exam.
- Several copies of the textbook are available from the library.
- Make sure you access the library copies of the textbook well ahead of time to ensure you are not trapped in a mad last-minute dash to complete the module.
- There are also some supplementary notes available from the course website.
- For trimester 1 all assignments must be handed in by Friday 17 May 2013. (Approximately 3/4 through the trimester.)
- For trimester 1 the exam will be arranged sometime during the week of Monday 27 May to Friday 31 May. (2nd to last week of classes.)
- For the Math 321/322/323 Special Relativity module there are in total 6 assignments; for Honours-level Special Relativity (Math 466/467) there is a completely distinct module.
- This module is equivalent to 18 lectures.
- So that I have some idea of what to expect, I want everyone who is interested (and who has not already put their name on the sign-up sheet) to contact me *soon*.

- See the course website for more details:
  http://msor.victoria.ac.nz/Courses/MATH321_2013T1/ (trimester 1).
  http://msor.victoria.ac.nz/Courses/MATH321_2013T2/ (trimester 2).
- For the Honours-level course website see:
  http://msor.victoria.ac.nz/Courses/MATH466_2013T1/ (trimester 1).
  http://msor.victoria.ac.nz/Courses/MATH467_2013T2/ (trimester 2).
- All assignments (and supplementary notes) will be made available on the course website.
- Apart from this cover sheet, no physical pieces of paper will be handed out.
- No formal office hours — contact me via e-mail or drop by my office.

Topics to be covered:

- Spacetime, an overview.
- Floating free [Inertial frames].
- Same laws for all
  [the Relativity Principle; Einstein Equivalence Principle].
- Lorentz transformations.
- Trip to Canopus [the twin pseudo-paradox in detail].
- Trekking thru spacetime [worldlines, world and particle histories].
- Regions of spacetime
  [absolute future and past; elsewhen — the ambiguous now].
- Momenergy [energy-momentum and how it transforms].
- Collide. Create. Annihilate. [Relativistic kinematics].
- Gravity: Curved spacetime in action.

Matt Visser
E-mail: matt.visser@msor.vuw.ac.nz
URL: http://www.msor.vuw.ac.nz/~visser
Office: Cotton 321
Phone: 463-5115

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