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Outline of Content

1. Special Relativity
2. Tensors in Special Relativity
3. Tensors in General Coordinates Systems
4. Geodesics and Curvature
5. General Relativity
6. Geometrical Formulation of Vectors and Tensors (not examinable)

Mastery: no additional content is required for the Mastery question.

Sessions: Tuesday 10:00-11:00 (weeks 2-11) Huxley 130, Thursday 12:00-13:00 (weeks 1-10) Huxley 139, Friday 15:00-16:00 (weeks 1-10) Huxley 340.

A complete set of notes is available on Blackboard

5 non-assessed Problem Sheets and Solutions will be uploaded at regular intervals

Ed Stem discussion forum. Post questions (anonymously or not) on the discussion forum. The forum is active until the final exam.

Office hour: TBC

Assessment:

In-class Test 1 (week 4) 3pm Friday 3 February. Duration: 40 minutes. This test will be based on Chapters 1&2.

In-class Test 2 (week 8) 3pm Friday 3 March. Duration: 40 minutes. This test will be based on Chapters 3&4.

Each test contributes 5% to your final mark for Tensor Calculus and General Relativity. The tests will be similar in style to those from 2019, 2020, 2021 and 2022 (available on Blackboard). If you are unable to attend a test for a good reason you are advised to submit a mitigating circumstances claim.

Final Examination. May/June 2023. Worth 90%

References:

There is a huge literature on this subject. This module does not follow any particular book. However, the following books are a good match.

1. 'A Short Course in General Relativity' (3rd edition) by James Foster and David Nightingale. This book covers essentially the whole module. However, the discussion of Special Relativity is confined to an appendix.
2. 'A First Course in General Relativity' (2nd Edition) by Bernard Schutz (Cambridge University Press). This book covers topics 1 to 6 at an appropriate level (see chapters 1 to 11 of Schutz excluding chapter 9).

Notation: unfortunately authors of general relativity textbooks tend to disagree about conventions. This module follows the conventions of Foster and Nightingale *except* for the Ricci tensor (here Foster and Nightingale's convention leads to awkward minus signs).