

Preparation tips for the course

Handout 2

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From now on, we will call General Relativity as GR, and its younger brother "Special relativity" as SR. Although, it might not be the best thing to give short and sweet nicknames to a subject (GR) that is notoriously famous to be hard to learn/understand. Now, that is my job as a tutor to break that myth. While not underestimating the subject's rigidity, I do believe it does have an overrated difficulty. This can be especially true if you have a lot of gaps in your understanding of SR and other basic math/physics. For this purpose, I would recommend you some literature to read before jumping into the course.

Depending on your SR background, you can choose to skip the steps. (As far as I know, Prof. Amendola will do an intro to SR, still it never hurts to be over-prepared)

- Step 1 : For people feeling shaky about their basics of SR, in particular about Minkowski diagrams, Lorentz transformations and 4-vectors,
 - "The Theoretical minimum : Special relativity and Classical Field theory" - Leonard Susskind, Art Friedman (Atleast - first three chapters)
- Step 2 : For people confident about their SR, yet have forgotten some stuff,
 - "Introduction to Electrodynamics" - David Griffiths (Chapter 12.1 and 12.2, especially 12.2)
- Step 3 : For people who understand and can solve the exercises in the first two sections of the following document ,
 - (<http://www.damtp.cam.ac.uk/user/tong/gr/grprep.pdf>). Finish reading it and revise whichever concept you feel uncomfortable with.

According to me the main point of doing this would be to understand the following topics well : Metric tensor, Minkowski diagrams, 4-vectors (position, velocity, momentum), and some baby geodesics. (I will put a list of equations on my web-page/document that would be considered trivial as we proceed into the semester)

Another good read would be the SR chapters from the Feynman lectures (for any conceptual loopholes, always go back to Feynman lectures)

Apart from these books and resources, there have been some wonderful YouTubers who have given their heart and soul in trying to explain GR to a general audience. One of them is "ScienceClic English". I think that the author has done an absolutely fantastic job in the visuals and the explanations.

The videos (you can click these links) :

- A new way to visualize GR
- The math of GR (8 videos)

Some caveats about YouTube videos

- They are an excellent way to get a visual idea of what you have been doing. Watch them as you learn the things or watch them before to get a taste of what you are getting yourself into.

- They *cannot replace* a proper course. The only way to learn any Physics imo is by getting your hands dirty i.e. solving some nice problems.

Apart from YouTube videos, there also are many good video lectures and resources available out there. I will add the good ones in the slides for our first tutorial. (Obviously, your first preference would be the lectures you will be getting from Prof. Amendola, but it never hurts to watch different perspectives, especially on topics that you find hard to digest).