Aim: General Relativity is one of the greatest intellectual triumphs of modern science. In developing this theory Einstein realized that the necessary mathematical tools for his physical intuitions on gravity had already been developed by Gauss and Riemann in their work on differential geometry. Therefore, this theory is a superb example of a successful partnership between physics and mathematics. The aim of this course is to understand General Relativity with emphasis on its mathematical structure.

Syllabus:

- Special Relativity (a short introduction)
- Manifolds (tensors, differential forms, metric, connection, Lie derivatives, covariant derivatives, parallel transport, geodesics, curvature, Killing vectors)
- Einstein's Field Equations (properties, cosmological constant)
- The Schwarzschild Black Hole
- Further Topics (if time permits)

Textbooks:


Some Supplementary Books:


Grading: It will be based on written exams, homeworks and class participation. There may also be presentations at the end of the semester.

Prerequisites: A good knowledge of mechanics, calculus and differential equations is necessary.

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