Summary
Introduce the students to general relativity and its classical tests.

Content

Special Relativity (Review):
• Lorentz transformations
• Energy-momentum tensor

General relativity:
• Equivalence principle
• Tensor analysis and physics in curved space-time
• Einstein’s equations
• Schwarzschild solution
• Classical tests of Einstein’s theory
• Gravitational waves

Learning Prerequisites
Required courses
Analytical mechanics
Classical Electrodynamics

Learning Outcomes
By the end of the course, the student must be able to:
• Explain the basic concepts of special and general relativity
• Describe physical phenomena in different coordinate systems
• Compute Christoffel symbols and curvatures from a given line element
• Solve Einstein’s field equations for static spherically symmetric problems
• Explain the observational effects at the scale of the Solar System that cannot be described by Newtonian gravity

Teaching methods
Ex cathedra and exercises in classroom
Assessment methods
final exam 100%

Supervision
Office hours    Yes
Assistants     Yes

Resources
Bibliography
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Ressources en bibliothèque
- Gravitation and Cosmology / Weinberg
- Gravitation / Mizner
- The classical theory of fields / Landau

Moodle Link