

# General Theory of Relativity / Quantum Field Theory

Module No.: MN-P-SP-GR-QFT, MN-PN-GR-QFT, MN-PN-WaMa

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## Courses: Mathematics

Lecturers: various

Email: alexal@thp.uni-koeln.de

Category	Type	Language	Teaching Hours	CP	Semester
Specialized Course	Lecture	English	var	var	

### Requirements for participation:

Bachelor of physics or mathematics

### Type of module examinations:

Written or oral examination and one oral examination at the end of the module

### Duration of the course:

1 semester

### Aims of the courses:

Courses to provide background knowledge in mathematics disciplines fundamental to gravity and/or quantum field theory.

### Contents of the course:

- **Differential Geometry (4+2hpw, 6CP):** geometric structure of differentiable manifolds, Riemannian geometry, concepts of differential topology, theory of fibre bundles
- **Topology (4+2hpw, 6CP):** topological spaces, homotopy theory, homology, characteristic classes, knot theory
- **Theory of Groups (4+2hpw, 6CP):** Lie groups and algebras, representation theory, classical Lie groups.
- **Functional Analysis (4+2hpw, 6CP):** mathematics of infinite dimensional vector spaces, theory of functionals, infinite dimensional analysis, mathematics of Hilbert and Banach spaces.
- **Geometry and Analysis on Supermanifolds and Lie Supergroups (2 HPW, 3 CP)**