

**Modules:** ECThPhysics Elective Courses Theoretical Physics  
 physics70c Elective Advanced Lectures: Theoretical  
 Physics

**Course:**  **General Relativity and  
 Cosmology (T)**

**Course No.:** physics754

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+2	7	ST

**Requirements for Participation:**

**Preparation:**

physik221 and physik321 (Theoretical Physics I and II)  
 Differential geometry

**Form of Testing and Examination:**

Requirements for the examination (written): successful work with the exercises

**Length of Course:**

1 semester

**Aims of the Course:**

Understanding the general theory of relativity and its cosmological implications

**Contents of the Course:**

Relativity principle  
 Gravitation in relativistic mechanics  
 Curvilinear coordinates  
 Curvature and energy-momentum tensor  
 Einstein-Hilbert action and the equations of the gravitational field  
 Black holes  
 Gravitational waves  
 Time evolution of the universe  
 Friedmann-Robertson-Walker solutions

**Recommended Literature:**

S.Weinberg; Gravitation and Cosmology (J. Wiley & Sons 1972)  
 R. Sexl: Gravitation und Kosmologie, Eine Einführung in die Allgemeine Relativitätstheorie (Spektrum Akadem. Verlag 5. Aufl 2002)  
 L.D. Landau, E.M. Lifschitz; Course of Theoretical Physics Vol.2: Classical field theory (Butterworth-Heinemann 1995), also available in German from publisher Harry Deutsch