

**Modules:**

physics700 **Elective Advanced Lectures**  
 physics730 **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:****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