Course Name	Differential Geometry
Contents and Objectives	Content: • Curves and surfaces in euclidean space • Curvature (e.g. Gaussian curvature and mean curvature) • Theorem of Gauss-Bonnet • Inner geometry of surfaces, Theorema egregium • Differentiable manifolds, tangent spaces and flows of vector fields • Geodesics • Riemannian and semi-riemannian manifolds • Connections and covariant derivatives • Tensors, in particular curvature tensor and Einstein tensor • Various curvature notions (sectional curvature, Ricci curvature, scalar curvature) • Holonomy groups • Applications in science, e.g. in general relativity Objectives: This course provides an introduction to fundamental principles of differential geometry. Starting with curves and surfaces in 3-space, notions such as differentiable manifolds, (semi-)Riemannian metrics, covariant derivatives and various notions of curvature are explained. Applications to geometry, topology (such as Gauss-Bonnet theorem) and to physics (such as general relativity and cosmological models) are treated.
Teaching	This course consists of lectures and exercise classes. • Lecture: Differential Geometry (4h/week) • Exercise class: Differential Geometry (2h/week) This class can be taught remotely.
Prerequisites	
Examination	Oral exam (30 minutes)
Credits	8 ECTS points
Frequency	This course is given at least every second year.
Workload	The estimated total working time for this course is 240 hours.
Duration	This course is given during one semester.