

**Course title:** Differential Geometry  
**Institute/Division:** Institute of Mathematics  
**Course code:** F2-DG  
**Erasmus subject code:** 11.1 Mathematics  
**Number of contact hours:** 45 hours  
**Course duration:** 1 semester  
**ECTS credits:** 6

**Course description:**

1. Manifolds, charts, atlas, sub-manifolds, smooth maps, submersion and immersion.
2. Vector bundles, tangent and cotangent bundle, vector and tensor fields, one-parameter group of a vector field, differential forms, the exterior differentiation  $d$ , the Lie differentiation.
3. The linear connection on a vector bundle, curvature tensor, torsion tensor, geodesics, normal coordinates, Bianchi identities.
4. Riemannian geometry, Riemannian space, the Levi-Civita connection, sectional curvature, manifolds of constant sectional curvature, metric in a Riemannian space, the Hopf-Rinow theorem.

**Literature:** K. Nomizu, S. Kobayashi Foundations of differential geometry

**Course type:** Lectures and exercises

**Assessment method:** Attendance, final exam

**Prerequisites:**

**Primary target group:** students of mathematics and physics

**Lecturer:** dr hab. Włodzimierz Jelonek

**Contact person:** dr hab. Włodzimierz Jelonek, [wjelon@pk.edu.pl](mailto:wjelon@pk.edu.pl)

**Deadline for application:** 15th of September

**Remarks:**