Course title: Geometric methods in physics
Institute/Division: Institute of Materials Engineering, Faculty of Materials Engineering and Physics
Number of contact hours: 30
Course duration: 1 semester
ECTS credits: 2
Course description:

Main aim of this course is to introduce modern mathematical language that will help student to analyze contemporary problems in physics and technology including: nonlinear phenomena, classical field theory, dynamical systems and geometry of physics.
    Subjects include:
1. Classical Fields Theory: Eueler-Largange equations; Noether theorem and conserved currents; relativistic Klein-Gordon and Dirac equations; spontaneous symmetry breaking and Higgs Mechanism;
2. Differential Geometry: Differentiable Manifolds; Tangent and Cotangent spaces; Tensors; basics of Riemannian geometry;

Literature:

[1] T. Frankel — Geometry of Physics, Cambridge, 2011, Cambridge University Press
[2] M. Dunajski — Solitons, Instantons, and Twistors, Oxford, 2009, Oxford university Press
[3] M. Nakahara — Geometry, Topology and Physics, , 2003, CRC Press
[4] R. Rajaraman — Solitons and Instantons, , 1987, North Holland

Course type: Lectures (30 hours)
Assessment method: Attendance, activity, oral presentation
Prerequisites: Linear algebra; Differential and Integral Calculus; General Physics
Primary target group: Majors in Materials Engineering and Physics
Lecturer: Radosław Kycia, PhD (rkycia@pk.edu.pl)
Contact person: Radosław Kycia, PhD (rkycia@pk.edu.pl)