

PHS6317 - Nano-engineering of Thin Films

Number of credits: 3 (3-0-6)

Department: Engineering Physics

Pre-requisite: Background in physics, materials science and engineering or similar is helpful but not essential

Comment: The course will be given in Winter 2022 in English, it will be given on Friday afternoon

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Syllabus:

Challenges in the field of surface engineering, thin films and coatings; Advanced thin film and coating fabrication techniques: Physical Vapor Deposition, Plasma Enhanced Chemical Vapor Deposition, complementary plasma-based processes; Concept of functional and multifunctional properties of thin films and coatings intended for applications in optics, photonics, aerospace, biomedical engineering, transport, energy, environment and others; Basics of plasma physics and plasma chemistry, reaction of plasma with surfaces (ions, electrons, photons); Film growth and microstructure evolution; Process diagnostics; Nanostructured film and coating systems: multilayer systems, inhomogeneous layers, nanocomposites and interface engineering; Optical properties of materials, design of simple and advanced optical filters, optical metrology - spectroscopic ellipsometry and reverse engineering; Nanomechanical and tribological properties – failure mechanisms, wear, erosion, corrosion, adhesion and residual stress; Active layers and smart materials possessing electro-, photo-, and thermo-chromic properties, piezo- and thermo-electric, photocatalytic and other properties. Examples of case studies.