

C – Charakteristika studijního předmětu nebo tématického bloku	
Název studijního předmětu	Nanotechnology in the textile industry
Způsob zakončení	zkouška
Další požadavky na studenta	
Přednášející	prof. Ing. Jiří Militký, CSc.
Stručná anotace předmětu	<p>The nanometer range is characterized by the transition of a material's behavior from “quantum like” behavior of atoms and molecules to the “continuum like” behavior of bulk materials. Nanotechnology has made a tremendous impact on functionality and performance.</p> <p>Nanomaterials when engineered at the atomic and molecular level and are integrated into fabrics can exhibit certain properties which alter the physical properties of textiles. Nanotechnology also has real commercial potential for the textile industry. This is mainly due to the fact that conventional methods used to impart different properties to fabrics often do not lead to permanent effects, and will lose their functions after laundering or wearing. This technology provides high durability for fabrics because nanoparticles have a large surface area-to-volume ratio and high surface energy thus presenting better attraction to fabrics and increase in durability of the function. In the textile branch the following nanomaterials and nanostructures are used: nano fibers (electrospinning), surface nano roughening, nanocoatings, nanoparticles (powders), nano porous materials, nano composites, quantum dots and carbon nanotubes. The application of nanotechnology in the textile branch is described e.g. in the review.</p> <p>Topics:</p> <ul style="list-style-type: none"> Definition of nanotechnology and nanomaterials Comparison of bulk and nanomaterials properties Physics of size effects Transport phenomena in nanoscale Nanoparticles Nanofoams Nanosurfaces Nanocoating and nanofinishing Nanostructures and nanomaterials preparation and stabilization Nanostructures and nanomaterials application in the textile industry Health impact of nanofabrication
Odborná literatura	<p>Jeevani T.: Nanotextiles-a broader perspective, J. Nanomedic. Nanotechnol. 2, 2-7 (2011)</p> <p>Sawhney A.P.S., et al.: Modern Applications of Nanotechnology in Textiles, Text. Res. J. 78; 731 – 739, (2008)</p> <p>Qian L., Hinestroza J. P.: Application of nanotechnology for high performance textiles, JTATM 4, 1-7 (2004)</p> <p>Brown P., and Stevens K.: Nanofibers and Nanotechnology in Textiles. Elsevier Science, 2007</p>