

Course title: Advanced Surface Engineering	Neptun code: GEMTT525-a
Course coordinator: Dr. László Kuzsella, associate professor, Ph.D	
type and number of lesson: lecture/seminar/practical lesson/ <u>consultation</u> 24 hours / semester	
method of accountability: colloquium/practical mark/ <u>other</u> , project work	
curriculum location of the subject: autumn/ <u>spring</u>	
pre-study conditions: None	
The task and purpose of the subject:	
In the course, the student gets an overview of the surface modification techniques and its characterisation. The additional goal of the subject is for the student to acquire in-depth knowledge of a selected topic through independent literature processing, thereby proving his ability to critically analyze and synthesize the literature, and develop the student ability for independent research tasks.	
Course description:	
Classification of principle possibilities and techniques of surface modification. Special tests for the characterization of surface-treated materials. Overview of procedures based on the latest research results of material science and using modern technological possibilities (radiation and plasma technologies), description of the technical and economic advantages of their application, and the aspects of their selection. Surface treatments based on structural modification: surface strengthening technologies (rolling, shot blasting), surface hardening (flame, induction, laser, electron beam), remelting of surfaces. Chemical composition modifying surface treatments and coating technologies: Ion implantation, laser surface alloying, laser surface melting, thermal spraying, PVD, CVD processes. Duplex surface treatments, comparison of individual technological processes, aspects of their selection with regard to environmental protection and economic factors.	
Required literature:	
<ol style="list-style-type: none"> 1. ASM Handbook, Volume 4A, Steel Heat Treating Fundamentals and Processes, J. Dossett, G.E. Totten editors, ISBN: 978-1-62708-011-8, 2013. 2. ASM Handbook, Volume 18, Friction, Lubrication, and Wear Technology, Peter J. Blau editors, ISBN-10: 1-62708-141-0, 2017. 3. Bunshah, Roitan F: Handbook of Deposition Technologies for Films and Coatings (Second ed.). William Andrew Publishing. ISBN 978-0815517467, 1994. 4. Glocker, D; Shah, S.: Handbook of Thin Film Process Technology. CRC Press. ISBN 978-0750308328. 2001. 	
Recommended literature:	
<ol style="list-style-type: none"> 1. Stachowiak, Gwidon W.: Wear, Materials, Mechanism and Practice, Tribology in Practice Series, Editor: Stachowiak, John Wiley & Sons Inc., ISBN-13: 978-0-470-01628-2, 2005. 2. Hutchings, I.M.: Tribology: Friction and wear of engineering materials, ISBN 0-340-56184-x Edward Arnold A division of Hodder & Stoughton, P:77-78. 1992. 3. Bhushan, Bharat: Modern tribology handbook, Volume One, 2001, CRC Press, ISBN 0849384036, 2001. 	