Name: **Control Theory in Robotics**		***NEPTUN-code:*** *NBXRI2SMNE*	***Number of periods/week:*** full-time: 1 lec + 0 sem+ 1 lab
Credit: 3 ***Requirement:*** mid-term mark		***Prerequisite:*** *NBXRI1EMNE* System- and Control Theory	
Responsible: József TAR, Ph.D.	***Position:*** professor, habil.	***Faculty and Institute name:*** John von Neumann Faculty of Informatics Institute of Applied Mathematics	
Way of assessment: – either oral exam or solving a numerical task			
Competences			
Course description:			
The goal is to provide the Students with the dynamic robot control methods of fundamenal significance for the robots of open kinematic chain. Control method based on the possession of the exact dynamic model: Computed Torque Control. Robust control: the Variable Structure/Sliding Mode Controller. Adaptive control methods usin inaccurate initial dynamic models: Lyapunovs stability definitions. Lyapunov's „2nd or Direct" method and classical examples: Adaptive Inverse Dynamics Controller, Adaptive Slotine-Li Controller. Alternatives of the use of Lyapunov functions in adaptive control: Banach's Fixed Point Theorem, The „Robust Fixed Point Transformaton-based Adaptive Controller", Novel Fixed Point Transformations and their convergence properties; Modification and combination of the Classical Adaptive Controllers with the Fixed Point Transformation-based control; The Model Reference Adaptive Control using Fixed Point Transformations.			
Literature			
G. G. Hall: Applied group theory. Published by: Longmans, Green and Co, London, 1967 J. K. Tar, L. Nádai, I. J. Rudas: System and Control Theory with Especial Emphasis on Nonlinear Systems, Typotex, Budapest, 2012 Mark W. Spong, Seth Hutchinson, and M. Vidyasagar: Robot Dynamics and Control, 2004 (electronic notes)			