

E – Charakteristika studijního předmětu/Subject Specification				
Název studijního předmětu / Subject title	Control Systems in Mechatronics			
Typ předmětu / Subject type	Compulsory elective subject		dopor. ročník / semester/ recommended year / semester	1st year 2nd term
Rozsah studijního předmětu / Study load in hours and credits		hod. za týden / weekly load	2 + 2	Kreditů / Credits
Jiný způsob vyjádření rozsahu / Other expression of study load	14 weeks, each 2 hours of lectures and 2 hours of seminary			
Způsob zakončení / Assessment	Written and oral exam		Forma výuky / Form of teaching	Lecturers and labs
Další požadavky na studenta / Other demands on students				
Vyučující / Lecturer	Doc.Ing.Osvald Modrlák,CSc.			
Stručná anotace předmětu / Subject annotation				
<p>This subject offers a comprehensive overview of control systems with accent on an appropriate balance between theoretical concepts and engineering practice in analysis, synthesis and identification of linear dynamic systems. The subject focuses on empirical identification, single loop control design method, problems of optimal PID control strategy and application of frequency domain methods.</p> <p>The important part consists of solving complicated control loops as feed forward, cascade, multiloop pairing and fundamental approach to state variable control. Theoretical and practical lessons involve utilization of MATLAB software tools. The implementation of the theory will be carried out on physical real models with industrial equipment in the Control laboratory. Extensive computer assisted laboratory exercises cover such tasks as rotation speed control of a system with DC-motor, tachometer and elastic clutch with a load, water temperature control of a circulation water boiler heater, level control, temperature control of air flow and others.</p> <p>The students will acquire good knowledge of practical parameter estimation for determined model structure, analysis and synthesis of dynamic systems, PID controller tuning, practical design of industrial control systems, review of Multi Input Multi Output systems and basic knowledge of state controller design. They will become familiar with implementation of control algorithms using modern software tools. Web based interactive modules assist student self study and help prepare practical experimentation.</p>				
Informace ke kombinované nebo distanční formě / Information for students in external form of study				
Rozsah konzultací (soustředění) / Consultations, study meetings		hodin za týden / hours per week		
Rozsah a obsahové zaměření individuálních prací studentů a způsob kontroly / Individual student work – type, load, content and way of checking				
Elaborates: 1) Identification measuring and data acquisition 2) Parametric identification by chosen model structure 3) Synthesis of PID controller by chosen method 4) PID - Real time control 5) Multiloop-pairing control Checking: passed – failed				
Studijní literatura a studijní pomůcky / Reading list and study utilities				
Kuo, B.C.: Automatic control systems. John Wiley & Sons, Inc. New York, 1995. ISBN 0-471-36608-0 Marlin, T. E.: Process control. Designing processes and control systems for dynamic performance. Mc Graw Hill, 2 nd ed, 2000. ISBN 0-07-039362-1. Bolton, W.: Mechatronics. Electronic control systems in mechanical and electrical engineering. Pearson Education Limited, 3-rd ed. 2003. ISBN 10: 0-13-121633-3.				