WASHINGTON STATE UNIVERSITY
VANCOUVER
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School of Engineering and Computer Science

Mech 467: Automation

Catalog Data:	**Mech 467 Automation**; 3 credits Automation systems, discrete event control using programmable logic controllers (PLC), robot programming, process control. Credit not granted for both Mech 467 and 567.
Class Schedule:	Two 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	One three-hour lab session per week, for one semester
Prerequisites by Course:	Mech 304, Mech 348
Prerequisites by Topic:	1. Differential equations, 2. Basic understanding of transducers and computer interfacing, 3. Basic understanding of computer programming.
Required Texts:	H. Gurocak, *Automation Laboratory Book,* Fall 2005.
Course Coordinator:	Dr. Hakan Gurocak
Course Objectives:	1. Understand dynamic behavior of engineering systems 2. Be familiar with the fundamental analysis and design methods for process controller design 3. Know most widely used control modes in industry 4. Gain hands-on experience in laboratory 5. Use software tools for controller analysis, design and implementation 6. Understand logic control and associated technologies 7. Be familiar with fundamental concepts of industrial robot programming
Topics Covered:	1. Introduction to automation 2. Control modes: process control and event-driven control 3. Dynamic response, transfer functions, poles, zeros 4. First and second order system response 5. System types and steady-state error 6. PI, PD and PID controller design using the root-locus method 7. PLC architecture 8. Development of an I/O map 9. Ladder logic programming, interlocking 10. PLC Timer/counter programming 11. PLC math instructions 12. Robot programming
Lab Experiments and Activities:	1. Familiarization with the lab hardware/software, safety orientation 2. System identification and parameter estimation 3. PI controller design for thermal and mechanical systems 4. PD controller design for thermal and mechanical systems 5. Start/stop logic implementation using PLC 6. Discrete state control using PLC 7. PLC timer and counter programming 8. Robot programming

Course Outcomes:	Students will be able to:			
	Assessed for Program Outcomes	B-4. Validate theory with experimental results. E-3. Design controllers using the root-locus method. K-2. Write PLC programs, simulate system response. K-4. Use MATLAB software for analysis.		
	Other	G-1. Produce lab reports explaining lab activities and results.		
Required or Elective Course:		Elective		
Contribution to Professional Component:		Engineering Topics		
Relationship of Course to Program:		Meets: Educational Objectives 1, 2, 4 Program Outcomes B, E, G, K		
Prepared by:		Dr. Hakan Gurocak	Date:	October 10, 2008
Approved by CAC:				