

Advanced Process Control					AR-301
Rota	Duration	Semester	SWS	Credit Points	Workload
annually WS	1 Term	3rd (Semester)	2 SWS	3	90 h
<b>1</b>	<b>Modul structure</b>				
	<b>Course (Abbreviation)</b>	<b>Type/ SWS</b>	<b>Presence</b>	<b>Self study</b>	<b>Credits</b>
	a) Advanced Process Control (APC)	Lecture / 1 SWS	15 h	30 h	2
	b) Advanced Process Control (APC)	Tutorial / 1 SWS	15 h	30 h	1
<b>2</b>	<b>Language</b> English				
<b>3</b>	<b>Content</b> <ul style="list-style-type: none"> <li>• Analysis of linear dynamic systems: Stability, controllability, observability, poles, zeros.</li> <li>• State space controller design techniques: Eigenvalue and eigenstructure assignment by state feedback, observers, Kalman filter, observers for systems unknown inputs, observer-based control.</li> <li>• Controller design techniques for nonlinear systems: nonlinear observers, extended Kalman filter, gain scheduled controllers, exact feedback linearization.</li> <li>• Advanced model-predictive control: Linear constrained model predictive control, nonlinear model predictive control, direct optimizing control.</li> </ul> <b>Literature:</b> <ul style="list-style-type: none"> <li>• Slides</li> <li>• Lecture Notes</li> </ul>				
<b>4</b>	<b>Goals</b> The course provides in-depth knowledge of state of the art techniques for advanced process control and prepares for further scientific work in this area and for industrial jobs in process control and operation departments or companies. The students understand the methods listed above and are able to choose the appropriate methods for the solution of practical problems, to synthesize a solution and to evaluate the results.				
<b>5</b>	<b>Examination Requirements</b> The final exam will be an oral (20 minutes) or written (1.5 hours) exam, depending on the number of participants (form will be announced second week of course). Active participation and collaboration in 75% of computer exercises is mandatory.				
<b>6</b>	<b>Formality of Examination</b> <input checked="" type="checkbox"/> Module Finals <span style="float: right;"><input type="checkbox"/> Accumulated Grade</span>				
<b>7</b>	<b>Module Requirements (Prerequisites)</b> Basic knowledge of dynamic systems and control, as e.g. provided by the course Control Theory and Applications.				
<b>8</b>	<b>Allocation to Curriculum:</b> Program: Automation & Robotics, Field of study: Process Automation Robotics, Cognitive Systems				
<b>9</b>	<b>Responsibility/ Lecturer</b> Prof. Dr. S. Engell/Prof. Dr. S. Engell				