

1	Course Number	Study Program KEEP/INTAP	Semester 2-4	Offered in <input checked="" type="checkbox"/> WS, <input checked="" type="checkbox"/> SS	Duration 1 Semester	Course Type optional	Workload (h)	ECTS Points 4
2	Course Basic Elements of Feedback Control Technology		Teaching and Learning Forms Lectures, practices and exam preparation		Contact Time (SWS) (h) 4 40 (1h=45 min.)		Self-Study Time (h) 20	Language English
3	Learning Outcomes and Competences After successfully completing the module, students will be able to ... Know and understand - ... the basic elements and undamental concepts of control systems. - ... basic tools necessary to apply transfer functions, transfer elements and block diagrams in the analysis of engineering systems. Use, application and generation of knowledge <i>Use and transfer</i> - ... use basic analytical tools necessary to apply transfer functions, transfer elements and block diagrams in the analysis of engineering systems. <i>Scientific innovation</i> - ... independently carry out optimizations and further developments of control systems. Overarching competencies <i>Communication and Cooperation</i> - ... argue their point of view in technical discussions using basic relations from control systems. <i>Methodological competence</i> - ... have learned to solve control systems problems systematically. - ... name and apply the theoretical basics and methods from the field of control systems relevant to the problem at hand and apply them. Scientific self-image/professionalism - ... the students can work independently on scientific projects related to control system issues.							
4	Participation Requirements Mathematics, Applied Mechanics, Electric Circuits							
5	Course Contents <ul style="list-style-type: none"> ▪ Introduction to continuous-time control ▪ Descriptions of control loop elements ▪ Elementary transfer elements (P, I, D, dead time) ▪ Lag elements (PT1, IT1, DT1, PT2, PTn) ▪ Composition of transfer elements for control equipment ▪ Modelling of transfer systems ▪ Nyquist plots, Bode diagrams, Stability ▪ Controller design and control loop synthesis 							

6	<p>Course Calendar</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 35%; text-align: center;">Section 1</th> <th style="width: 35%; text-align: center;">Section 2</th> </tr> </thead> <tbody> <tr> <td>Week 1</td> <td>Introduction</td> <td>Description of Control Elements</td> </tr> <tr> <td>Week 2</td> <td>Basic Transfer Elements</td> <td>Exercises</td> </tr> <tr> <td>Week 3</td> <td>1st Order Lag Elements</td> <td>Exercises</td> </tr> <tr> <td>Week 4</td> <td>PT₂ Element Transfer Function</td> <td>Exercises</td> </tr> <tr> <td>Week 5</td> <td>PT₂ Element Step Response</td> <td>Exercises</td> </tr> <tr> <td>Week 6</td> <td>Midterm Exam</td> <td>PTn Element</td> </tr> <tr> <td>Week 7</td> <td>Feedback to Mediterm Exam / PID Element</td> <td>Exercises</td> </tr> <tr> <td>Week 8</td> <td>Modelling of Transfer Systems, Frequency Response</td> <td>Exercises</td> </tr> <tr> <td>Week 9</td> <td>Frequency Response, Stability</td> <td>Exercises</td> </tr> <tr> <td>Week 10</td> <td>Exam Preparation</td> <td>Exercises</td> </tr> <tr> <td>Week 11</td> <td>Final Exam</td> <td></td> </tr> </tbody> </table>		Section 1	Section 2	Week 1	Introduction	Description of Control Elements	Week 2	Basic Transfer Elements	Exercises	Week 3	1 st Order Lag Elements	Exercises	Week 4	PT ₂ Element Transfer Function	Exercises	Week 5	PT ₂ Element Step Response	Exercises	Week 6	Midterm Exam	PTn Element	Week 7	Feedback to Mediterm Exam / PID Element	Exercises	Week 8	Modelling of Transfer Systems, Frequency Response	Exercises	Week 9	Frequency Response, Stability	Exercises	Week 10	Exam Preparation	Exercises	Week 11	Final Exam	
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7	<p>Course Schedule Two sessions per week with 2 hours per session (1h=45 min.).</p>																																				
8	<p>Examination Forms and Prerequisites for Awarding ECTS Points Midterm and final exam written examination 90 min., graded The exam is an open book exam and the students can bring all documents in paper form (scripts and notes) and calculators.</p>																																				
9	<p>Estimated Student Workload 40 hours</p>																																				
10	<p>Further Use of Course Electrical Engineering, Mechatronics, Mechanical Engineering</p>																																				
11	<p>Grading Scheme Total grade: 1/3 midterm exam and 2/3 final exam</p> <p><i>Local grading scale Esslingen University:</i> 1,0/1,3 very good 1,7/ 2,0/ 2,3 good 2,7/3,0/3,3 satisfactory 3,7/4,0 adequate 4,3/4,7/5,0 insufficient/failed</p>																																				
12	<p>Course Manager and Full-Time Lecturer Prof. Dr.-Ing. Joachim Berkemer</p>																																				
13	<p>Literature Lecture scripts with notes, exercises with solutions. Further reading: H. Abel, Hermann Kull, J. van der List, D. P. Looze, G. Walliser: Feedback Control Technology, Esslingen University of Applied Sciences J. Di Stefani, A. Stubberud, I. Williams: Feedback and Control Systems. Schaum's Outlines, McGraw-Hill.</p>																																				
14	<p>Course Registration Since the course places are limited, please register in advance by email at: kremena.daneva@hs-esslingen.de</p>																																				
15	<p>Last Updated 26.08.2024</p>																																				