


Studiengang: <b>Master of Science Maschinenbau</b> Program: <i>Master of Science in Mechanical Engineering</i>				
1	Modul: <b>Maintenance Engineering</b> Module: <i>Instandhaltungswesen</i>	<b>English</b> <i>Englisch</i>		
		<b>Semester</b> <i>Semester</i>	<b>Dauer</b> <i>Duration</i>	<b>Status</b> <i>Status</i>
		2. Semester	1 Semester	elective
	<b>Kreditpunkte</b> <i>Credits</i>	<b>Aufwand</b> <i>Workload</i>	<b>Kontaktzeit</b> <i>Contact-hours</i>	<b>Selbststudium</b> <i>Student's efforts</i>
	5 ECTS	150hrs	4hrs/week = 60hrs Lecture	15hrs Preparation and post processing 75hrs Self-study
2	<b>Beschreibung</b> <i>Description</i> Maintenance is a very important factor in today's business. Customers calculate the costs of machines and machine plants for a certain life-time and do life-cycle costs analysis. Additionally machines are systems consisting of parts falling into the area of mechanical engineering, electric engineering, mechatronics and software. Such complex systems need special care during the whole process from the development up to the use. Certain aspects of quality management have to be considered to get full understanding and background for the right action. Maintenance engineering ensures that machinery and equipment runs smoothly in all areas of manufacturing, production, transportation and use at the customer's site. The topic is relevant in all industry branches, ranging from food and pharmaceuticals companies through to rail and aircraft engineering. A feedback loop from maintenance to product development is inevitable to create top quality, new and reliable products.			
3	<b>Lernziele</b> <i>Learning Outcomes</i> The main target of the course is to give students an understanding of the complexity of modern machinery, of system engineering and of the meaning of maintenance on life-cycle costs. Further important factors are the knowledge about fundamental features of maintenance and strategic approaches to gain optimum results for the customer considering low life-cycle costs and high reliability of his product in use. The feedback loop to product development has a key-function and closes the loop for starting permanent improvement of products.			
4	<b>Schlüsselqualifikationen</b> <i>Key qualifications</i>			
	Sozialkompetenz <i>Social Competence</i>	Methodenkompetenz <i>Competence in Methods</i>	Selbstkompetenz / Personenkompetenz <i>Self-Competence Personal Competence</i>	Interkulturelle Kompetenz <i>Intercultural Competence</i>
		X		(X)
5	<b>Lehrveranstaltung/ -methoden</b> <i>Course type and methods</i> <b>Lecture</b> <ul style="list-style-type: none"> <li>• Seminar-like teaching</li> <li>• Exercises and examples (case studies)</li> </ul>			
6	<b>Vorbedingungen / Vorkenntnisse</b> <i>Prerequisites</i> Sounding knowledge about product development and cost calculation			
7	<b>Arbeitsmittel / Literatur</b> <i>Required material / Literature</i> <ul style="list-style-type: none"> <li>• Literature according to the current list distributed in the class</li> <li>• Other Literature  W. F. Daenzer, F. Huber: Systems Engineering. Methodik und Praxis. 11. Auflage. Verlag Industrielle Organisation, Zürich 1999  Bush, L.: Maintenance Policy and Procedures Manual Ebook, ESNB: B10-851A-1b33-77A3  Hartmann, Edward H.: TPM - Effiziente Instandhaltung und Maschinenmanagement, Heidelberg: mi-Verlag, 2007</li> </ul>			

Detailinformationen																				
8	<b>Inhalte</b> <i>Course topics</i> <b>Introduction into Maintenance Engineering</b> <b>Philosophy and background</b> <ul style="list-style-type: none"> <li>• Maintenance and life-cycle costs</li> <li>• Quality Management</li> <li>• Risk Analysis, FMEA</li> <li>• OEE (Overall Equipment Effectiveness)</li> <li>• TEPP (Total Effective Productivity)</li> <li>• TDC (True Downtime Costanalysis)</li> <li>• TPM (Total Productive Maintenance)</li> </ul> <b>Systems Engineering</b> <ul style="list-style-type: none"> <li>• Software</li> <li>• Safety</li> <li>• Reliability</li> <li>• Interfaces</li> </ul> <b>Predictive Engineering</b> <ul style="list-style-type: none"> <li>• Feedback on the design process</li> <li>• Methods, tools and procedures ...</li> </ul>																			
9	<b>Prüfungsform</b> <i>Assessment</i> Written examination at the end of the term: 2 hours.																			
10	<b>Voraussetzung für die Vergabe von Kreditpunkten</b> <i>Requirements for granting of credits</i> <ul style="list-style-type: none"> <li>• Successful passing of examination according to 9</li> </ul>																			
11	<b>Weiterführende Veranstaltungen</b> <i>Related courses</i> <ul style="list-style-type: none"> <li>• Escorting seminar</li> <li>• Master Project &amp; Master Thesis</li> </ul>																			
12	<b>Zuordnung</b> <i>Classification</i> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 14.28%;">Mathematik &amp; Naturwissenschaft <i>Mathematics &amp; Natural Sciences</i></th> <th style="width: 14.28%;">Ingenieurwissenschaften <i>Engineering Science</i></th> <th style="width: 14.28%;">Ingenieur-anwendungen <i>Engineering Application</i></th> <th style="width: 14.28%;">Entwicklung &amp; Konstruktion <i>Design</i></th> <th style="width: 14.28%;">Werkstoffe <i>Material</i></th> <th style="width: 14.28%;">Wirtschaft, Management, Sprachen <i>General Education</i></th> <th style="width: 14.28%;">Anderes <i>Other</i></th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">(X)</td> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">(X)</td> <td style="text-align: center;">X</td> <td></td> </tr> </tbody> </table>						Mathematik & Naturwissenschaft <i>Mathematics &amp; Natural Sciences</i>	Ingenieurwissenschaften <i>Engineering Science</i>	Ingenieur-anwendungen <i>Engineering Application</i>	Entwicklung & Konstruktion <i>Design</i>	Werkstoffe <i>Material</i>	Wirtschaft, Management, Sprachen <i>General Education</i>	Anderes <i>Other</i>		(X)	X	X	(X)	X	
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13	<b>Modulbeauftragter / Lehrpersonen</b> <i>Responsible person / Lecturers</i> Prof. Dr.-Ing. J. Blechschmidt/ N.N., external personel from industry)																			