SYLLABUS [1]

1. Information about the program

1.1 Higher education institution	Politehnica University Timisoara
1.2 Faculty[2] / Department [3]	Management in Production and Transportation / Management
1.3 Chair	–
1.4 Field of study (name/code[4])	Engineering and Management / 207010230
1.5 Study cycle	Master
1.6 Study program (name/code/qualification)	Quality and Competitiveness Engineering and Management

2. Information about discipline

2.1 Name of discipline			Total Productive Maintenance				
2.2 Coordinator (holder) of course activities			Assoc. Prof. Adrian Pavel Pugna, PhD. Eng.				
2.3 Coordinator (holder) of applied activities [5]			Assoc. Prof. Adrian Pavel Pugna, PhD. Eng.				
2.4 Year of study [6]	2	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Type of discipline	DA

3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities [7])

3.1 Number of hours fully assisted/week	4 ,of which:	**3.2** course	2	**3.3** seminar/laboratory/project			2
3.1* Total number of hours fully assisted/sem.	56 ,of which:	**3.2*** course	28	**3.3*** seminar/laboratory/project			28
3.4 Number of hours partially assisted/week	,of which:	**3.5** project, research		**3.6** training		**3.7** hours designing M.A. dizertation	
3.4* Number of hours pasrtially assisted/ semester	,of which:	**3.5*** project of research		**3.6*** training		**3.7*** hours designing M.A. dizertation	
3.8 Number of hours of unassisted activities/ week	3.5 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					1
		Study using a manual, course materials, bibliography and lecture notes					1
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					1.5
3.8* Total number of hours of unasssited asctivities/ semester	49 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					14
		Study using a manual, course materials, bibliography and lecture notes					14
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					21
3.9 Total hrs./week [8]	7.5						
3.9* Total hrs./semester	105						
3.10 No. of credits	5						

4. Prerequisites (where applicable)

4.1 Curriculum	•
4.2 Competencies	•

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex 3), updated based on the Specific Standards ARACIS of December 2016.
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs
[3] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[4] Fill in the code provided in HG no. 376/18.05.2016 or in HG similars annually updated.
[5] The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] The year of study to which the discipline is provided in the curriculum .
[7] Within UPT, the number of hours from 3.1*, 3.2*,…,3.9* are obtained by multipling by 14 (weeks) the number of hours from 3.1, 3.2,…, 3.9. The information from 3.1, 3.4 și 3.8 are keys of verification used by ARACIS under the form: (3.1)+(3.4) ≥ 28 hrs./week and (3.9) ≤ 40 hrs./week.
[8] The total number of hours/week is obtained by summing up the number of hours from 3.1, 3.4 şi 3.8.

5. Conditions (where applicable)

5.1 of the course	• Large classroom, Support materials: projector, laptop, whiteboard
5.2 to conduct practical activities	• Large classroom,Support materials: projector, laptop, whiteboard

6. Specific competencies acquired through this discipline

Specific competencies	• The master students enrolled in this program will be able to identify and utilize various maintenance improvement and competitiveness specific tools and methodologies as directly related to companies and industries of their choice. The education they will obtain through this program will prepare them to become leading practitioners in any of a large number of technical and specialized functions as required by specific industry needs.
Professional competencies ascribed to the specific competencies	• C2 - Statistical computing competences and use of quality and competitiveness specific tools to analyze, process and interpret information from engineering and management systems. • C3 - Addressing engineering and managerial issues specific to quality and competitiveness in a creative, efficient and effective way. • C4 - Critical and constructive analysis to improve projects, processes, engineering and managerial systems.
Transversal competencies ascribed to the specific competencies	• CT 1 - Development of analytical, synthetic, comparative and critical thinking, adaptability and communication ability in different situations and conditions. • CT 2 - Identifying roles and responsibilities in an interdisciplinary team and applying relationship and collaboration techniques within the team, demonstrating initiative spirit and innovative capabilities in physical and virtual environments.

7. Objectives of the discipline (based on the grid of specific competemcies acquired)

7.1 The general objective of the discipline	• Identifying, assessing and applying various maintenance tools and competitiveness specific tools and methodologies for process improvement and cost reduction.
7.2 Specific objectives	• Learning how to select a TPM team, how to assess Overall Equipment Efficency, how to asses different conditions, how to implement Jishu-Hozen - Autonomous Maintenance, how to implement SMED - Single Minute Exchange of Die or deciding on the most adequate Maintenance Strategy.

8. Content

8.1 Course	Number of hours	Teaching methods
1. Basic, Use, and Ideal Conditions. • Pillars of TPM, Fault Development, Basic Condition, Overall Equipment Efficiency, Natural and Forced Deterioration, Use Conditions, Ideal Condition, Improvement Methodology.	2	Lecture with PowerPoint presentation, examples and case studies.
2. Jishu-Hozen - Autonomous Maintenance. • The TPM Initial Clean and Inspect and F-Tagging.	2	
3. Analyzing and Categorizing the Failure Data • Defect Map.	2	
4. Creating Standards and Preparation for Autonomous Maintenance. • PM Teams (Kobetsu Kaizen).	4	
5. Education & Training and Safety Pillars. • Education & Training Pillar, Equipment training, Area map, Hazard map, Risk assessment.	4	
6. SMED - Single Minute Exchange of Die. • Creating the SMED Team, Select the Tool, Document the Changeover, Define the Target Time for the Changeover, SMED	4	

Analysis.		
7. Deciding on a Maintenance Strategy. • The PM Analysis: TPM or RCM?	4	
8. RCM - Reliability Centered Maintenance.	2	
9. Time - and Condition-Based Maintenance.	2	
10. Predictive Maintenance	2	

Bibliography [9]

1.Boris,S., (2006) - Total Productive Maintenance – McGraw-Hill, New-York.
2. Palmer, R.D. (2006) – Maintenance Planning and Scheduling Handbook - McGraw-Hill, New-York.
3. Dhillon, B.S. (2002) - Engineering maintenance : a modern approach - CRC Press LLC., Boca Raton, Florida.
4. Mobley, R. K., (2002) - An introduction to predictive maintenance, 2nd ed., Butterworth-Heinemann (Elsevier Science).
5. Bloom, B.N., (2006) - Reliability Centered Maintenance (RCM). Implementation Made Simple - McGraw-Hill, New-York.
6. Blischke, W.R., Murthy, D.N.P, (editors) (2003) - Case Studies in Reliability and Maintenance - John Wiley & Sons, Inc.
7. Pugna, A., Tăucean, I., (coordinators) (2012) **-** Actual challenges in logistics and maintenance of industrial systems – Ed. Politehnica Timisoara

8.2 Applied activities [10]	Number of hours	Teaching methods
1. Identify an equipment/tool for Jishu-Hozen - Autonomous Maintenance.	2	Discussions, questions and solving a specific Autonomous Maintenance issue.
2. Establish the AM team. 2.1 Create the training documents. 2.2 Train the team members on the equipment/tool. 2.3 Create initial safe working procedures and risk assessments. 2.4 Create an initial cleaning map of the equipment/tool. 2.5 Create an F-tag log sheet. 2.6 Arrange to have a pile of “blue dots” and F-tags (white and red). Number the dots and the tags as ONE sequence of numbers. 2.7 Identify and record the obvious areas of contamination. 2.8 Modify the risk assessments on the basis of the contamination seen. 2.9 Create or modify the safe working procedures to include the specific cleaning tasks. Train the team members on the tasks. 2.10 Complete the task certification sheet. 2.11 Create a skill log/task transfer sheet. Assess the skill level of the team members based on the individual tasks Enter the skill data into the skill log/task transfer sheet. 2.12 Create a chart to monitor the progress of the F-tags. 2.13 Create a defect map showing the areas of contamination. Learn the categories of deterioration. 2.14 Create an F-tag category spreadsheet. 2.15 Create a “5 Why’s” analysis sheet. 2.16 Analyze the F-tags, categorize them, and enter the data in the spreadsheet. 2.17 Update the activity board with the new charts and data. 2.18 Conclusions	26	

[9] At least one title must belong to the department staff teaching the discipline, and at least one title must refer to a relevant work for the discipline, a national and international work that can be found in the UPT Library.

[10] The types of applied activities are those mentioned in 5. If the discipline containes more types of applied activities then they are marked, consecutively, in the table below. The type of activity will be marked distinctively under the form: „Seminar:”, „Laboratory:”, „Project:” and/or „Practice/Training:”.

Bibliography [11]

1. Boris,S., (2006) - Total Productive Maintenance – McGraw-Hill, New-York.
2. Palmer, R.D. (2006) – Maintenance Planning and Scheduling Handbook - McGraw-Hill, New-York.
3. Dhillon, B.S. (2002) - Engineering maintenance : a modern approach - CRC Press LLC., Boca Raton, Florida.
4. Mobley, R. K., (2002) - An introduction to predictive maintenance, 2nd ed., Butterworth-Heinemann (Elsevier Science).
5. Bloom, B.N., (2006) - Reliability Centered Maintenance (RCM). Implementation Made Simple - McGraw-Hill, New-York.
6. Blischke, W.R., Murthy, D.N.P, (editors) (2003) - Case Studies in Reliability and Maintenance - John Wiley & Sons, Inc.
7. Pugna, A., Tăucean, I., (coordinators) (2012) **-** Actual challenges in logistics and maintenance of industrial systems – Ed. Politehnica Timisoara.

9. Coroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- The employers need specialists in Total Productive Maintenance for continuous improvement purposes. The knowledge and specific competencies in this domain helps engineers/managers/directors in career development and cost control/performance improvement.

10. Evaluation

Type of activity	**10.1** Evaluation criteria [12]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Solving course related theoretical subjects.	Written exam.	60%
10.5 Applied activities	**S:**		
	L:		
	P: Implementing a Jishu-Hozen - Autonomous Maintenance for an equipment/tool.	Project presentation and discussions.	40%
	Pr:		
	Tc-R[13]:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [14]			
• The correct usage of discussed theoretical concepts and solving specific problems of medium complexity.			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
	……	……
Head of Department (signature)	**Date of approval in the Faculty Council [15]**	**Dean (signature)**
……		……

[11] At least one title must belong to the staff teaching the discipline.
[12] The Syllabus must contain the evaluation method of the discipline, specifying the criteria, the metods and the forms of evaluation, as well as mentioning the share attached to these within the final mark. The evaluation criteria msut correspond to all activities stipulated in the curriculum (course, seminar, laboratory, project), as well as to the methods of continuous assessment (homework, essays etc.)
[13] Tc-R= Homework-Reports
[14] For this point turn to "Ghidului de completare a Fișei disciplinei" found at: http://univagora.ro/m/filer_public/2012/10/21/ghid_de_completare_fisa_disciplinei.pdf
[15] The approval is preceeded by discussing the study program's board's point of view with redgards to the syllabus.