SYLLABUS[1]

1. Information about the program

1.1 Higher education institution	Politehnica University of Timişoara
1.2 Faculty[2] / Department[3]	Mechanical Engineering / Materials and Manufacturing Engineering
1.3 Chair	—
1.4 Field of study (name/code[4])	Industrial Engineering/10
1.5 Study cycle	Master
1.6 Study program (name/code/qualification)	Integrated Engineering

2. Information about the discipline

2.1 Name of discipline			3D Measurements				
2.2 Coordinator (holder) of course activities			Assoc. Prof. PhD Eng. Aurel Tulcan				
2.3 Coordinator (holder) of applied activities [5]			Assoc. Prof. PhD Eng. Aurel Tulcan				
2.4 Year of study[6]	II	**2.5** Semester	1	**2.6** Type of evaluation	E	**2.7** Type of discipline	DA/Optional

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	3 , of which:	**3.2** course	1,5	**3.3** seminar/laboratory/ project/training	1,5
3.4 Total no. of hrs. in the education curricula	42 , of which:	**3.5** course	21	**3.6** applied activities	21

3.7 Distribution of time for individual activities related to the discipline	hrs.
Study using a manual, course materials, bibliography and lecture notes	50
Additional documentation in the library, on specialized electronic platforms and on the field	30
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays	40
Tutoring	6
Examinations	5
Other activities	
Total hrs. of individual activities	131

3.8 Total hrs. / semester[7]	173
3.9 No. of credits	7

4. Prerequisites (where applicable)

4.1 Curriculum	• background knowledge in tolerances
4.2 Competencies	• engineering 2D drawing and 3D model, knowledge and practice

5. Conditions (where applicable)

5.1 of the course	• Classroom: laptop, video projector, whiteboard
5.2 to conduct practical activities	• 3D measurement laboratory: laptop, video projector, whiteboard, coordinate measuring machine, laser scanner

6. Specific competencies acquired

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).
[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 GD no. 493/17.07.2013.
[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] It is obtained by summing up the number of hrs. from 3.4 and 3.7.

Professional competencies[8]	• Developing the capacity and skills to implement quality improvement methods of manufacturing processes, ensuring reliability and maintenance
Transversal competencies	• knowledges, skills and abilities for planning, optimization and management of the manufacturing processes and production systems

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

7.1 General objective of the discipline	• Graduates of this course should be able to understand and solve specific problems of integrated engineering, such as 3D measurement procedures in order to improve the quality of products
7.2 Specific objectives	• To give students advanced knowledge of the principles of 3D-measurement and be able to choose the technology and 3D-measurement equipment appropriate to dimensional and geometric control of the parts according to the geometry and complexity of the measured parts

8. Content

8.1 Course	No. of hours	Teaching methods
3D measurements technology	3	PPT presentations and lectures at the whiteboard, explanations, discussions, case studies
Coordinate measuring machines and in the manufacturing environment	1	
UCC Renishaw controller software presentation	1	
Probe system qualification	1	
Quindos7 measuring software presentation	1	
Measuring plane and spatial geometry	2	
Measuring program steps. Part coordinate systems	3	
Geometrical product specifications: datum and geometrical tolerances	3	
Measurement principles of geometrical features	2	
Dimensional and geometrical control for machined parts	1,5	
Dimensional and geometrical control for plastic injected parts	1,5	
Complex shape surfaces scanning	1	

[8] The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Naţional al Calificărilor din Învăţământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

Bibliography[9] Aurel Tulcan, Măsurări tridimensionale - note de curs, Timişoara, 2015-format electronic (https://cv.upt.ro) Aurel Tulcan, Liliana Tulcan, Tudor Iclănzan, Sisteme de control; Editura Politehnica, Timişoara, 2006 Robert J. Hocken, Paulo H. Pereira, Coordinate Measuring Machines and Systems -second edition, Taylor&Francis Group, 2012 Robert Roithmeier, Measuring Strategies in Tactile Coordinate Metrology, 3 complete revised edition, Oberkochen, 2014 David Flack, CMM Measurement Strategies, Queen's Printer and Controller of HMSO, 2014 Drake P. J., Dimensioning and Tolerancing Handbook, Mc-Grow-Hill, New York, 1999 ***, Quindos 7 - Tutorial: Messtechnick Wetzlar, Germania, 2015

8.2 Applied activities[10]	No. of hours	Teaching methods
TESA 343 Coordinate measuring machine	1,5	Topic presentation, discussions, questions, solving specific problems
UCC controller software and Quindos7 measuring software	3	
Qualifying of spherical and special probes	1,5	
Measuring plane and spatial features	3	
Part coordinate systemsl	3	
Realization of measuring program for machined parts control	3	
Realization of measuring program for plastic injected parts control	3	
Scannig part with laser scan dr. Picza	1,5	
Measuring report	1,5	

Bibliography[11] Aurel Tulcan, Măsurări tridimensionale – lucrări de laborator, Timişoara, 2015-format electronic Aurel Tulcan, Liliana Tulcan, Tudor Iclănzan, Sisteme de control; Editura Politehnica, Timişoara, 2006 Robert Roithmeier, Measuring Strategies in Tactile Coordinate Metrology, 3 complete revised edition, Oberkochen, 2014 David Flack, CMM Measurement Strategies, Queen's Printer and Controller of HMSO, 2014 Drake P. J., Dimensioning and Tolerancing Handbook, Mc-Grow-Hill, New York, 1999 ***, Quindos 7 - Tutorial: Messtechnick Wetzlar, Germania, 2015

9. Corroboration 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

- Knowledge of 3D measurements are important to the curriculum being considered as thorough discipline, contributing to the development of the technological and production skills and especially in the quality assurance of the products
- Most employers require specialists in their departments (design, manufacture, inspection / quality) who have skills acquired in this course

10. Evaluation

Type of activity	**10.1** Evaluation criteria	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Solving some theoretical topics and case studies. Grade 5 is granted to obtain at least grade 5 for each issue.	Written exam	60%
10.5 Applied activities	**S:**		
	L: Solving specific problems at applied activities: applications, case studies	Solving proposed topics, answers to questions. Rate the students during the applied activities.	40%
	P:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)			
• Using of correct notions and concepts presented.			

[9] At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.
[10] The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:", „Laboratory:", „Project:" and/or „Practice/Training:".
[11] At least one title must belong to the staff teaching the discipline.

- Explain and solve different topics of medium complexity.
- Practical skill in 3D measurements
- Active participation in teamwork.

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
12.12.2015	……	……
Head of Department (signature)	**Date of approval in the Faculty Council**[12]	**Dean (signature)**
……		……

[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.