SYLLABUS

1. Information about the program

1.1 Higher education institution	Universitatea Politehnica Timișoara
1.2 Faculty[1] / Department[2]	ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES / Applied Electronics
1.3 Field of study (name/code[3])	Electronics, Telecommunications and Information Technologies Engineering /20/20/10
1.4 Study cycle	Master
1.5 Study program (name/code/qualification)	AUTOMOTIVE ELECTRONIC SYSTEMS/ 20/20/10 / APPLIED ELECTRONICS

2. Information about discipline

2.1a Name of discipline/The educational classe[4]			Quality Management in the Automotive Industry/DF				
2.1b Name of discipline in Romanian			Quality Management in the Automotive Industry				
2.2 Coordinator (holder) of course activities			S.L. dr. ing. Maranescu Valentin				
2.3 Coordinator (holder) of applied activities[5]			S.L. dr. ing. Maranescu Valentin				
2.4 Year of study[6]	1	**2.5** Semester	2	**2.6** Type of evaluation	E	**2.7** Regime of discipline[7]	DOP

3. Total estimated time (direct activities (fully assisted), partially assisted activities and unassisted activities[8])

3.1 Number of hours fully assisted/week	4 ,of which:	course	2	seminar/laboratory/project			1
3.1* Total number of hours fully assisted/sem.	42 ,of which:	course	28	seminar/laboratory/project			14
3.2 Number of on-line hours fully assisted/sem	10 ,of which:	course	6	seminar/laboratory/project			4
3.3 Number of hours partially assisted/week	,of which:	project, research		training		hours designing M.A. dissertation	
3.3* Number of hours partially assisted/ semester	,of which:	project of research		training		hours designing M.A. dissertation	
3.4 Number of hours of unassisted activities/ week	7.71 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					2.5
		Study using a manual, course materials, bibliography and lecture notes					2.5
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					2.71
3.4* Total number of hours of unasssited asctivities/ semester	108 ,of which:	Additional documentation in the library, on specialized electronic platforms, and on the field					35
		Study using a manual, course materials, bibliography and lecture notes					35
		Preparation of seminars/ laboratories, homework, assignments, portfolios, and essays					38
3.5 Total hrs./week[9]	11.71						
3.5* Total hrs./semester	150						
3.6 No. of credits	6						

4. Prerequisites (where applicable)

4.1 Curriculum	• Basic knowledge of electronics and engineering principles. Fundamental understanding of data analysis and measurement concepts. Ability to read and prepare technical documentation.
4.2 Learning outcomes	• Basic ability to apply engineering testing and validation methods. Ability to interpret experimental or process data. Ability to collaborate in technical tasks.

5. Conditions (where applicable)

5.1 of the course	• Classroom with projector and presentation system, Computer with internet access
5.2 to conduct practical activities	• Workstations with computers, with statistical analysis software, simulated data sets)

6. Learning outcomes acquired through this discipline

Knowledge	• C2. The student/graduate explains concepts and methods of research and industrial development applicable to electronics, including applied mechanics, testing methods for electrical equipment, and procedures for testing electronic components and systems. • C3. The student/graduate is familiar with regulations and legislation concerning environmental protection and the environmental risks associated with engineering processes, as well as requirements for battery management systems and sustainable technologies. • C5. The student/graduate explains the principles and technologies of automation as applied to industrial processes. • C15. The student/graduate is familiar with testing procedures and standards applicable to power electronic systems, as well as engineering solutions for performance optimization.
Skills	• A1. The student/graduate approves engineering projects, applying quality standards, technical regulations, and sustainability criteria. • A6. The student/graduate applies testing and validation procedures for electronic products, systems, and components. • A7. The student/graduate analyzes and interprets experimental data using statistical techniques and engineering methods. • A13. The student/graduate applies testing procedures for electronic products and systems, assessing their compliance and reliability.
Responsibility and autonomy	• RA1. The student/graduate assumes responsibility for coordinating and approving engineering projects, assessing the technical, economic, and environmental impact of proposed solutions. • RA3. The student/graduate ensures quality and professional ethics in the design and testing of electronic systems, in compliance with international and national regulations. • RA7. The student/graduate assumes responsibility for the quality of design and the functionality of industrial monitoring equipment. • RA9. The student/graduate coordinates multidisciplinary teams for the design, implementation, and testing of monitoring systems.

7. Objectives of the discipline (based on the grid of learning outcomes acquired)

- Develop the ability to apply automotive quality standards, testing procedures, and statistical analysis to evaluate and improve product and process performance.
- Build competence in making quality-driven engineering decisions, ensuring compliance, and coordinating multidisciplinary teams in automotive quality activities.

8. Content

8.1 Course	Number of hours	Of which online	Teaching methods
Quality Management in the Automotive Industry – Introduction	2		Lectures and structured presentations Explanation and brief demonstrations Case-based learning Interactive discussion Problem-based learning (PBL) Use of digital teaching resources
Quality Principles: Lean, Six Sigma, Kaizen, and Continuous Improvement	2		
Automotive Quality Management Systems: ISO 9001 vs. IATF 16949	2	2	
Advanced Product Quality Planning (APQP) and Product Quality Planning (PQP)	2		
Failure Mode and Effects Analysis (FMEA) – Design & Process Approaches	2		
Control Plans, Process Flow Diagrams, and Standardized Work	2		
Statistical Process Control (SPC) and Process Capability (Cp, Cpk, Pp, Ppk)	2	2	

Measurement Systems Analysis (MSA) and Gage R&R in Automotive Applications	2		
Root Cause Analysis: 8D, Ishikawa, 5 Why, and Problem-Solving in Manufacturing	2		
Production Part Approval Process (PPAP): Requirements and Industrial Application	2		
Supplier Quality Management and Auditing (VDA 6.3, IATF Auditor Expectations)	2		
Quality Tools in Electronics & Automotive Systems: Reliability, Traceability, Testing)	2		
Warranty Management, Field Failures, and Customer Complaint Handling	2		
Future Trends in Automotive Quality: Software Quality, ASPICE, Functional Safety	2	2	

Bibliography[10]

1. AIAG (2024). Advanced Product Quality Planning (APQP), 3rd Edition. Automotive Industry Action Group. https://www.aiag.org/training-and-resources/manuals/details/APQP-3
2. EN-Standard.eu (2005–2024). IATF 16949:2016 & Automotive Quality Core Tools – Supplier Quality Requirements 7-Pack. Includes APQP, Control Plan, PPAP, AIAG & VDA FMEA Handbook, MSA and SPC. https://www.en-standard.eu/iatf-16949-supplier-quality-requirements-7-pack/ [ieeexplore.ieee.org]
3. Adaoudi, R. (2023). Quality Automotive Handbook: Automotive Coretools and Problem Solving: PPAP, APQP, FMEA, SPC, MSA, Reverse FMEA, 8D Problem Solving. Kindle Edition. https://www.amazon.com/Quality-Automotive-Handbook-practical-Industry-ebook/dp/B0BWFMFJ43 [automotivequal.com]
4. simpleQuE (2024). The New APQP Reference Manual – Critical Concepts for Automotive Suppliers to Know. https://www.simpleque.com/the-new-apqp-reference-manual-critical-concepts-for-automotive-suppliers-to-know/ [aiag.org]

8.2 Applied activities[11]	Number of hours	Of which online	Teaching methods
Introduction to Automotive Core Tools and IATF 16949 Requirements Based on IATF 16949 and the Core Tools bundle (APQP, PPAP, FMEA, MSA, SPC	2	2	Demonstration of procedures Guided practice Individual hands-on work Collaborative group tasks Structured analysis of results Use of supervised tools or software Feedback and improvement steps
Process Flow Diagram (PFD) and Control Plan Development Aligned with APQP and the standalone Control Plan structure	2		
Process FMEA (PFMEA) Practical Application using the AIAG & VDA FMEA Handbook methodology	2		
Measurement System Analysis (MSA): Gage R&R Study	2		
Statistical Process Control (SPC): Control Charts and Capability Studies SPC fundamentals from the Core Tools set (Cp, Cpk analysis).	2		
Production Part Approval Process (PPAP): Documentation and Submission Using the PPAP reference manual for part approval requirements	2	2	
8D Problem Solving and Corrective Action Reporting Based on widely used automotive problem-solving methods (8D)	2		

	Bibliography[12] [1] Automotive Industry Action Group (AIAG), Advanced Product Quality Planning (APQP), 3rd Edition. AIAG, 2024. [Online]. https://www.aiag.org/training-and-resources/manuals/details/APQP-3 [2] EN-Standard.eu, IATF 16949 & Core Tools Supplier Quality Requirements 7-Pack. EN-Standard.eu, 2005–2024. [Online]. https://www.en-standard.eu/iatf-16949-supplier-quality-requirements-7-pack/ [3] R. Adaoudi, Quality Automotive Handbook: Automotive Coretools and Problem Solving. Kindle Edition. Amazon Digital Services, 2023. [Online]. https://www.amazon.com/Quality-Automotive-Handbook-practical-Industry-ebook/dp/B0BWFMFJ43 [4] simpleQuE, The New APQP Reference Manual – Critical Concepts for Automotive Suppliers to Know. simpleQuE, 2024. [Online]. Available: https://www.simpleque.com/the-new-apqp-reference-manual-critical-concepts-for-automotive-suppliers-to-know/

9. Evaluation

Type of activity	**9.1** Evaluation criteria[13]	**9.2** Evaluation methods	**9.3** Share of the final grade
9.4 Course	Accuracy of theoretical knowledge of automotive quality standards and Core Tools (APQP, PPAP, FMEA, MSA, SPC). Clarity and coherence of explanations regarding quality processes and requirements. Ability to analyze and interpret quality-related concepts. Quality of reasoning and structure in written answers.	Written exam	66%
9.5 Applied activities	**S:**		
	L: Correct application of quality tools in practical tasks (FMEA, SPC, MSA, PPAP). Accuracy of calculations and interpretations in quality analyses. Contribution to group tasks and teamwork effectiveness. Completeness and clarity of lab documentation.	Lab work and Practical assignments	34%
	P:		
	Pr:		
	Tc-R[14]:		
9.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified[15]			
Theory: • Basic understanding of automotive quality standards and Core Tools (APQP, PPAP, FMEA, MSA, SPC). • Ability to explain fundamental concepts related to quality processes and regulatory requirements. • Minimum capability to analyze or interpret simple quality-related situations using taught principles. Laboratory: • Correct completion of essential laboratory tasks, applying the basic structure of automotive quality tools (e.g., simple PFMEA section, basic SPC calculation, basic MSA interpretation). [ieeexplore.ieee.org] • Submission of all required lab work, meeting minimum completeness and clarity. • Demonstration of basic teamwork and task contribution during group activities.			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
24.09.2025		

Head of Department (signature)	Date of approval in the Faculty Council [16]	Dean (signature)
	7.10.2025	