Transilvania University of Brașov

Study program: Quality Management

Faculty:	**Technological Engineering and Industrial Management**
Study period:	**2 years (master)**
Academic year structure:	**2 semesters (14 weeks per semester)**
Examination sessions (two):	**winter session (January/February)**
	summer session (June/July)
Study language	**Romanian**

1st Year, 1st Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Industrial and Research Project Management	-	4	2	0	1	1

Course description (Syllabus): The course presents specific notions of industrial and research project management, with a focus on quality management. The specific objectives refer to the detailing of industrial project management processes, the identification and application of methods and techniques specific to planning and estimating costs and project resources, as well as the implementation of industrial project quality management. Also, the case studies present the establishment of objectives, the development of the project plan, justification (SWOT analysis), the target group, the detailed description of the project activities/stages, project planning (GANTT chart), and the estimation of the expected project results.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Risk management	-	5	2	0	1	1

Course description (Syllabus): The general objective of the discipline is to acquire basic knowledge regarding concepts related to the approach, assessment and control of different forms of risk manifestation. It is also intended to acquire the knowledge necessary for the application of qualitative and quantitative methods and techniques for the management of risks specific to industrial products and processes. The specific objectives of the course refer to: industrial risk management processes, identification and application of methods and techniques specific to the quantification and modeling of industrial risks applied to industrial processes, monitoring and control of industrial risks, management of risks specific to the quality and reliability of industrial products and processes (FMEA analysis). Presentation of case studies on the planning, identification, quantification and control of industrial risks based on the development of an active policy for the elimination and prevention of industrial risks.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality management system	-	5	2	0	1	1

Course description (Syllabus): The course presents aspects related to the following topics: Specific terminology according to ISO 9000:2015. The notion of product quality. The evolution of the quality concept and related industrial practices. The ISO 9000 family of standards. Principles of quality management. The process-based approach. Management by objectives and process measurement. Quality management system requirements according to ISO 9001:2015. Quality management system documentation. Integrated management systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Probability and applied statistics	-	4	2	2	0	0

Course description (Syllabus): The course presents aspects related to the following topics: Sampling space. Events. Probabilities. Conditional probabilities. Random variables. Typical values of random variables. Distribution laws. Statistical functions implemented in Excel. Fundamental statistical concepts. Graphical methods for describing qualitative data. Graphical methods for describing quantitative data. Numerical methods for describing quantitative data. Numerical methods for describing grouped quantitative data. Parameter estimation. Statistical hypothesis testing.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ethics and academic integrity	-	2	1	1	0	0

Course description (Syllabus): Introduction: The EAI concepts. Ethics. University ethics. University responsibility. Charter of the Transilvania University of Brasov (UTBv). Regulations regarding the professional activity of students in UTBv. Intellectual property. Copyright (copyright) and related rights. Industrial property. Patents. Trademarks. Lack of integrity and academic ethics. Academic fraud, corruption and attempted academic corruption. Types of plagiarism.

1st Year, 2nd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality audit and certification	-	5	2	0	1	1

Course description (Syllabus): The course presents theoretically and applicative, exhaustively, the quality system audit methodology within the organizations from the manufacturing industry field. The course is aligned with the guidelines from ISO 19011, and it is based on the ISO 9001 quality system. The requirements are presented article by article, with examples and case studies, based on the industrial reality. It is presented, also, the certification system of the quality management systems by certification accredited certification bodies, based on the ISO 17021 requirements, by the accreditation procedure agreed by the national accreditation body, EA and IAF member.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Environmental quality management	-	4	2	0	1	0

Course description (Syllabus): The general objective of the course is the advanced design, development and implementation of the environmental management system. In particular, theoretical aspects related to concepts in the field of sustainable development, terms and definitions specific to the implementation of the environmental management system in accordance with ISO 14001:2015 are presented: The basic steps related to the identification of environmental aspects, the assessment of environmental aspects and the audit of the environmental management system are detailed. Distinctive aspects of environmental management systems - ISO 14001:2015: specific requirements for the implementation of an environmental management system, as well as criteria for examining the environmental impact.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Measurement technologies and equipment	-	4	2	0	2	0

Course description (Syllabus): The course presents theoretically and explicatively, in a comprehensive manner, the regular and the advanced measurement technologies for measuring dimensional, GD&T quality characteristics and the modality of measuring process quality characteristics, for various manufacturing operations. Also, there are presented the fundamentals of measurement data management and of metrology laboratory management, according with the requirements of the accreditation standard ISO 17025.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Statistical quality control I	-	4	2	0	2	0

Course description (Syllabus): The theoretical concepts and practical applications of statistical quality control are presented over two semesters. In this first part of the course, a series of tools used to describe the process variability are studied: the Stem-and-Leaf Diagram, the Histogram and the Box Plot Diagram. Next, aspects related to the statistical bases of control charts are presented. The largest part of the course is dedicated to the study of control charts by variables: the chart for average and range, the chart for average and standard deviation, the chart for median and range and the chart for individual measurements and moving range.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Reliability	-	4	2	0	2	0

Course description (Syllabus): This course is designed to provide students with reliability concepts and principles applied in the field of industrial engineering. In the first part of the course, students will be introduced to reliability theory, reliability parameters, reliability distributions, methods for estimating reliability parameters and statistical analysis of reliability data. The second part of the course focuses on reliability testing, failure data analysis, accelerated testing, statistical models specific to experimental reliability and reliability test management.

Optional direction 1: QUALITY MANAGEMENT IN INDUSTRIAL ENGINEERING

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Measurement systems analysis	-	3	1	0	2	0

Course description (Syllabus): The course presents theoretically and applicative, in an exhaustive manner, methods and procedures specific to the manufacturing industry for the measurement system analysis with categorical signal data. The methods presented are aligned with requirements from the sectorial industrial fields of the manufacturing industry and are based on AIAG and VDA directives that are applicable in the field. The course practical applications are based on digital measurements, computed with dedicated software dedicated to the industrial applied statistical control, e.g. Measurlink, Minitab and Q-DAS.

Optional direction 2: QUALITY ENGINEERING AND MANAGEMENT

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Using the computer for research in quality engineering	-	3	1	0	2	0

Course description (Syllabus): The course presents aspects related to the use of computers in research activities in Quality Engineering. In the first part, the main probability distributions and the most used tools for describing variability are studied. Next, aspects related to parameter estimation and statistical hypothesis testing are presented. The following topics are studied: statistical inference for the mean of a population, statistical inference for the means of two normal distributions for the case when the dispersion is unknown but equal for both distributions, statistical inference for the dispersions of two normal distributions, normality testing and Box-Cox transformation.

2nd Year, 3rd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Statistical quality control II	-	5	2	0	2	1

Course description (Syllabus): The second part of the statistical quality control course begins with the study of control charts by attributes: the chart for the proportion of nonconforming products, the chart for the number of nonconforming products, the chart for the number of nonconformities and the chart for the number of nonconformities per unit. Next,

the charts used in the second phase of applying statistical process control are studied: the Cusum chart, the EWMA chart and the moving average chart. Next, the xbar and R chart for short production run, the control chart with modified limits, the acceptance control chart and the chart for multiple stream processes are presented. In the last part of the course, the acceptance sampling plans of product lots are presented.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Analysis of system reliability and security	-	5	2	0	2	0

Course description (Syllabus): This course covers theoretical and practical aspects of reliability engineering, focusing on reliability and security of industrial systems. Topics of course include the fundamental understanding of how engineered systems fail, system reliability evaluation (reliability block diagrams, series systems, parallel systems, mixed systems, redundant systems). The course provides information on methods for analysing the reliability of complex systems, including fault tree analysis, event tree analysis, and cutting set method.

Optional direction 1: QUALITY MANAGEMENT IN INDUSTRIAL ENGINEERING

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Maintenance processes, methods and systems	-	5	2	0	0	1

Course description (Syllabus): The course presents aspects related to the following topics: Characteristic elements regarding the operating life of a mechanical technical equipment (reliability, maintainability, availability) and classification of defects, Tribology concepts, Measures for reducing friction and wear in a friction coupling, Reconditioning methods and processes, Maintenance systems, Planning and organization of maintenance activities and Methods in the management of maintenance activities.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Occupational health and safety management	-	5	2	0	1	0

Course description (Syllabus): The general objective of the discipline is to familiarize students with the terminology and specific requirements for implementing an occupational health and safety management system, assessing and controlling risk factors, and determining actions to prevent/manage occupational injury and illness risks. The specific objectives refer to the development of occupational health and safety management system documentation in accordance with ISO 45001:2018; aspects of hazard identification, assessing occupational injury and illness risks, establishing specific controls, and identifying opportunities for improvement.

Optional direction 2: QUALITY ENGINEERING AND MANAGEMENT

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality management of testing laboratories	-	5	2	0	0	1

Course description (Syllabus): The course aims to familiarize students with the modern meaning of the basic concepts used in quality assurance and management. The content and requirements of the international standard SR EN ISO 17025 series and the method of documenting the quality management system in testing and calibration laboratories are presented. The theoretical and practical concepts regarding statistical techniques and tools used in testing and calibration laboratories are also studied.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Testing of industrial products	-	5	2	0	1	0

Course description (Syllabus): This course helps students to gain comprehensive knowledge on the design and verification of industrial products, specific product testing standards and technical specification, design of experiments

for different industrial products, data acquisition and statistical processing of experimental data. Also, the course offers theoretical and experimental aspects regarding the most modern techniques for testing industrial products, made of composite, metallic and polymeric materials, using test equipment and experimental data processing software systems.

2nd Year, 4th Semester

Optional direction 1: QUALITY MANAGEMENT IN INDUSTRIAL ENGINEERING

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Creativity in engineering	-	4	1	0	2	0

Course description (Syllabus): The course presents basic knowledge on techniques and methods for producing innovative ideas. There are studied practical ways of applying techniques and methods for producing innovative ideas with industrial applicability, techniques for selecting ideas that can be implemented in practice, as well as the practical production, on given topics, of new ideas and the application of selection techniques.

Optional direction 2: QUALITY ENGINEERING AND MANAGEMENT

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Six sigma	-	4	1	0	2	0

Course description (Syllabus): The course, through the topics addressed, aims to present basic and general initial theoretical knowledge, as well as general and specific skills related to: discovering and understanding the principles, objectives and main tools of the Lean Six Sigma methodology and solving problems, as well as how to communicate the information necessary to improve processes.