Course Name						
QUALITY ENGINEERING						
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Course Implementation, Hours/Week**		
				Theoretical	**Tutorial**	**Laboratory**
MET 348E	6	2	3	2	-	-
Department/Program	Metallurgical and Materials Engineering					
Course Type	Required			**Course Language**	English	
Course Prerequisites	MAT 271E					
Course Category by Content, %	**Basic Sciences**		**Engineering Science**		**Engineering Design**	**General Education**
	-		30		50	20
Course Description	In the course; an introduction to quality concept in human history and in engineering and manufacturing., quality as a concept and a philosophy will be taught, the ideas behind quality management systems and tools such as TQM, TPM, Lean Manufacturing, ISO 9000, ISO 18001, ISO 14001, 6 sigma, QFD, FMEA, DoE, will be discussed to built and understand the perception of Quality Engineering. The importance of leadership, team work, constructing quality work environment for quality deployment in organizations will be emphasized.Essential Factor for Creating Quality, Quality and Value Creation, Quality Costs, Quality and Economy will be given. Quality Tools and Techniques will be taught in order for students to set full understanding in problems and analyze the problems to provide effective solutions						
Course Objectives	The main objectives of this course are; 1. to introduce the philopsophy of quality engineering 2. to offer a wide range of tools and techniques which help provide and produce quality from the begining of design, production and final process in order to have final product with high quality. 3. to provide information on Quality Concept Philospy and System, Qualıty Assurance and Qualıty Control, Quality System Structure, Quality system Strategies and Tactics, Quality System Integration and Implemantation, ISO 9000 series standards, Economics of Quality, Product, Process and Human Performance for Creating of Quality, Fundamental Strategic and Tactical Quality Tools. 4. to introduce the seven basic and management tools, process and quality techniques (Quality Function Deployment, Failure Modes and Effect Analysis, Fault Tree Analysis, Design of Experiments, Statistical Process Control, Control ChartsProcess Sampling, Process stability and SPC Chart Interpretation).						
Course Learning Outcomes	Students who pass the course will have a knowledge on I. Quality Engineering Philosophy II. International Quality Standards and Quality systems III. Quality, economy, ethics IV. Ability to use quality tools and techniques to reach high quality standards in every step of the production of product. V. Statistics, Sampling and process control VI. Computer aided process quality control applications. VII. Writing report and making presentation as teams						
Textbook	Connie M. Borror, The Certified Quality Engineer Handbook, 2009, American Society for quality, Quality Press, ISBN 978-0-873897457 KS Krishnamoorthi, First Course in Quality Engineering, Publisher: Prentice Hall, 2005,ISBN: 0131472011 Yılmaz Taptık, Özgül Keleş, Kalite Savaşı, Kalder Kayınları No 22 , İstanbul, 1998 Yılmaz Taptık, Özgül Keleş, Kalite Savaş Araçları, Kalder Yayınları No 23, İstanbul, 1998						
Other References	Thomas Pyzdek and Paul Keller Quality Engineering Handbook, Second Edition, Revised and Expanded (Quality and Reliability), 1991, Marcel Decker, ISBN 8247 4614 7 William J. Kolarik, Creating Quality,Concepts, Systems, Strategies and Tools, McGraw-Hills Series in Industrial Engineering and Management Science, 1995 Tilo Pfeifer, Qualitaetsmanagement, 2. Auflage, Hanser Verlag, 1996 H. G. Menon, TQM in New Product Manifacturing, McGraw-Hill, Inc., 1992						
Homework & Projects	Homework will be assigned throughout the semester. One team work project will be prepared as a report and they will present their projects. Final team work project will be done as a report.						
Laboratory Work							
Computer Use	-SPC,MICROSOFT OFFICE TOOLS, MINITAB						
Other Activities							
Assessment Criteria	**Activities**			**Quantity**		**Effects on Grading, %**	
	Midterm Exams			1		20	
	Quizzes						
	Homework			2		10	
	Projects			1		30	
	Term Paper/Project			1		40	
	Laboratory Work			-		-	
	Other Activities			-		-	
	Final Exam			-		-	

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Quality Philosophies and foundations, The quality management systems and standards	I, II
2	Leaderships principles, communications, organizations, communication skills, ethics	I, II
3	Customer relations, supplier management, overcoming obstacles to quality improvements	I, II
4	Elements and documentations of quality systems, quality costs	II, III
5	Defining quality characteristics, quality tools, (brain storming, flow charts, pareto, cause and effect, check list, histogram, scatter diagram, run chart, control charts)	IV
6	Quality Management and planning tools (affinity, interrelations, tree, process decision programs, matrix diagrams, Prioritization diagrams, process map, benchmarking , etc)	IV
7	Continuous improvement techniques (TQM, TPM, Kaizen, Reengineering, Six Sigma, DAMIC, Lean Engineering)	II, IV, V
8	Continuous improvement techniques (TQM, TPM, Kaizen, Reengineering, Six Sigma, DAMIC, Lean Engineering)	II, V, V
9	Data Collection, sampling, Descriptive statistics Quality techniques (SPC),	IV, V, VI
10	Quality techniques (QFD, FMEA, DoE)	IV, V, VI
11	Quality techniques (QFD, FMEA, DoE)	IV, V, VI
12	Teamwork presentations	VII
13	Teamwork presentations	VII
14	Teamwork presentations	VII

Relationship between the Course and Metallurgical and Materials Engineering Curriculum

	Program Outcomes	Level of Contribution		
		1	**2**	**3**
1	Ability to apply the knowledge of mathematics, science and engineering principles to solve problems in metallurgical and materials engineering (ABET:a)	x		
2	Ability to characterize materials using standard and/or self designed experimental methods and to evaluate the results (ABET:b)		x	
3	Ability to design a system or a process, taking into consideration of the desired specifications, quality, ethics and environment. (ABET:c)		x	
4	Ability to communicate both orally and in the written form and to take part in, and provide leadership of the teams in the elucidation of engineering problems; (ABET:d, g)			x
5	Ability to define, formulate and solve engineering problems in the development, production, processing, protection and usage of engineering materials. (ABET:e)		x	
6	An understanding of professional and ethical responsibilities(ABET:f)		x	
7	An understanding of current/contemporary issues and impact of engineering solutions in broad cultural, national and global levels;. (ABET:h, j)			x
8	A comprehension of the nature of engineering progress closely linked with the development of new materials and production processes. An ability to engage in life-long learning and a recognition of its necessity (ABET:i)		x	
9	Ability to use essential tools and techniques of modern engineering in the development, production, processing, protecting of the existing and new engineering materials. (ABET:k)		x	

1: Little, 2. Partial, 3. Full

Course relationships with major elements of the field and material classes

		Level of Contribution		
		1	**2**	**3**
MAJOR ELEMENT OF THE FIELDS	STRUCTURE		**x**	
	PROPERTIES		**x**	
	DESIGN EXPERIMENT/ANALYSE DATA			**x**
	PROCESSING			**x**
	COST/PERFORMANCE			**x**
	QUALITY/ENVIRONMENT			**x**
	DESIGN PROCESS OR PRODUCT			**x**
MATERIAL CLASSES	METAL			**x**
	CERAMICS		**x**	
	POLYMERS		**x**	
	COMPOSITES		**x**	

1: Little, 2. Partial, 3. Full

Prepared by	**Date**	**Signature**
Prof. Dr. Özgül Keleş	December 2020	