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 build 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 1. Quality Engineering Philosophy 2. International Quality Standards and Quality systems 3. Quality, economy, ethics 4. Ability to use quality tools and techniques to reach high quality standards in every step of the production of product. 5. Statistics, Sampling and process control 6. Computer aided process quality control applications. 7. Writing report and making presentation as teams					
Textbook	1. Connie M. Borror, The Certified Quality Engineer Handbook, 2009, American Society for quality, Quality Press, ISBN 978-0-873897457 2. KS Krishnamoorthi, First Course in Quality Engineering, Publisher: Prentice Hall, 2005,ISBN: 0131472011 3. Yılmaz Taptık, Özgül Keleş, Kalite Savaşı, Kalder Kayınları No 22 , İstanbul, 1998 4. Yılmaz Taptık, Özgül Keleş, Kalite Savaş Araçları, Kalder Yayınları No 23, İstanbul, 1998					
Other References	1. Thomas Pyzdek and Paul Keller Quality Engineering Handbook, Second Edition, Revised and Expanded (Quality and Reliability), 1991, Marcel Decker, ISBN 8247 4614 7 2. William J. Kolarik, Creating Quality,Concepts, Systems, Strategies and Tools, McGraw-Hills Series in Industrial Engineering and Management Science, 1995 3. Tilo Pfeifer, Qualitaetsmanagement, 2. Auflage, Hanser Verlag, 1996 4. 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	1,2
2	Leaderships principles, communications, organizations, communication skills, ethics	1,2
3	Customer relations, supplier management, overcoming obstacles to quality improvements	1,2
4	Elements and documentations of quality systems, quality costs	2,3
5	Defining quality characteristics, quality tools, (brain storming, flow charts, pareto, cause and effect, check list, histogram, scatter diagram, run chart, control charts)	4
6	Quality Management and planning tools (affinity, interrelations, tree, process decision programs, matrix diagrams, Prioritization diagrams, process map, benchmarking, etc.)	4
7	Continuous improvement techniques (TQM, TPM, Kaizen, Reengineering, Six Sigma, DAMIC, Lean Engineering)	2,4,5
8	Continuous improvement techniques (TQM, TPM, Kaizen, Reengineering, Six Sigma, DAMIC, Lean Engineering)	2,4,5
9	Data Collection, sampling, Descriptive statistics Quality techniques (SPC),	4,5,6
10	Quality techniques (QFD, FMEA, DoE)	4,5,6
11	Quality techniques (QFD, FMEA, DoE)	4,5,6
12	Teamwork presentations	7
13	Teamwork presentations	7
14	Teamwork presentations	7

Relationship between the Course and Metallurgical and Materials Engineering Curriculum

	Student Outcomes	Level of Contribution		
		1	**2**	**3**
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering science and mathematics		**X**	
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors			**X**
3	An ability to communicate effectively with a range of audiences			**X**
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts			**X**
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			**X**
6	An ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgement to draw conclusions	**X**		
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies			**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 AND GLASS		**x**	
	POLYMER		**x**	
	COMPOSITES		**x**	
	BIOMATERIALS		**x**	

1: Little, 2: Partial, 3: Full

Prepared by	**Date**	**Revision #**	**Signature**
Prof. Dr. Özgül Keleş	September 2021		