



# Course Specifications

<b>Course Title:</b>	<b>Reliability &amp; Maintenance Engineering</b>
<b>Course Code:</b>	<b>ME 373</b>
<b>Program:</b>	<b>Mechanical Engineering (UG)</b>
<b>Department:</b>	<b>Mechanical &amp; Industrial Engineering</b>
<b>College:</b>	<b>College of Engineering</b>
<b>Institution:</b>	<b>Majmaah University</b>

## Table of Contents

<b>A. Course Identification</b> .....	<b>3</b>
6. Mode of Instruction (mark all that apply) .....	3
<b>B. Course Objectives and Learning Outcomes</b> .....	<b>4</b>
1. Course Description .....	4
2. Course Main Objective.....	4
3. Course Learning Outcomes .....	4
<b>C. Course Content</b> .....	<b>4</b>
<b>D. Teaching and Assessment</b> .....	<b>5</b>
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods .....	5
2. Assessment Tasks for Students .....	6
<b>E. Student Academic Counseling and Support</b> .....	<b>6</b>
<b>F. Learning Resources and Facilities</b> .....	<b>6</b>
1. Learning Resources .....	6
2. Facilities Required.....	6
<b>G. Course Quality Evaluation</b> .....	<b>7</b>
<b>H. Specification Approval Data</b> .....	<b>7</b>

## A. Course Identification

<b>1. Credit hours: 02</b>
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered: 07</b>
<b>4. Pre-requisites for this course (if any): STAT 201</b>
<b>5. Co-requisites for this course (if any): None</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	80
2	Blended	05	10
3	E-learning	05	10
4	Correspondence	0	0
5	Other	0	0

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	15
4	Others (specify)	0
	<b>Total</b>	<b>45</b>
<b>Other Learning Hours*</b>		
1	Study	30
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	05
5	Others (specify)	--
	<b>Total</b>	<b>55</b>

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b>	
Maintenance systems. Maintenance operation and control. Preventive Maintenance: concepts, modeling, and analysis. Maintenance planning and scheduling. Maintenance material control. Computerized Maintenance Management Systems. Replacement studies. Case studies.	
<b>2. Course Main Objective</b>	
1.	Ability to follow a scientific methodology in using the basics and principles of mechanical engineering in handling engineering applications
2.	Experience and skills necessary to take advantage of computer in dealing with different engineering applications.
3.	The experience and skills necessary to use resource materials, technical equipment and engineering tools for engineering practice.
4.	

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.1	Recognize maintenance function and its objectives and know how to prepare report about the maintenance function	j
1.2	Record components reliability both for the independent & dependent cases as well as related characteristics	
<b>2</b>	<b>Skills :</b>	
2.1	Recall use of maintenance skills for maintenance planning, computer assisted maintenance planning, condition based maintenance etc.	h
2.2	Gain the necessary knowledge about maintenance performance measures and apply various maintenance performance techniques	
<b>3</b>	<b>Competence:</b>	
3.1	Demonstrate and share group based assignments to solve maintenance related functions and problems	k
3.2	Evaluate maintainability as well as related characteristics and design systems for better maintainability considering environmental related factors	

## C. Course Content

No	List of Topics	Contact Hours
1	Maintenance Strategies: Break down maintenance, planned maintenance, , total productive maintenance, Maintenance systems,	6
2	Maintenance operation and control, planned lubrication, Preventive Maintenance: concepts	3
3	Modeling, and analysis, introduction, operating life cycle, reliability, failures rate and failure density functions	3
4	Failure data analysis, failure rate curve, hazard models, MTBF, MTTR	6
5	Reliability analysis for elements in series, parallel, mix, logic diagrams,	6

6	Improving reliability, redundancy-element, standby, maintainability, availability, reliability	6
7	Maintenance Planning and Scheduling	3
8	Maintenance material control, Spare parts management, and inventory control	3
9	Replacement studies and replacement Analysis	6
10	Computer assisted maintenance Planning and case study	3
<b>Total</b>		45

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Recognize maintenance function and its objectives and know how to prepare report about the maintenance function	Class room teaching concepts of maintenance engineering	Mid Term 2
1.2	Record components reliability both for the independent & dependent cases as well as related characteristics	Mathematical oriented problem solving various reliability related functions	
<b>2.0</b>	<b>Skills</b>		
2.1	Recall use of maintenance skills for maintenance planning, computer assisted maintenance planning, condition based maintenance etc.	Face to face lectures how to plan and optimizing recourses	Mid Term 1
2.2	Gain the necessary knowledge about maintenance performance measures and apply various maintenance performance techniques	Class room teaching and tutorials on reliability, failure distributions, reliability characteristics, estimation of system reliability etc.	
<b>3.0</b>	<b>Competence</b>		
3.1	Demonstrate and share group based assignments to solve maintenance related functions and problems	Making the teaching learning two way communication. Getting students involved to solve problems and asking students did they understood. Is the concept clear to them if not encourage to interact.	Final Exam
3.2	Evaluate maintainability as well as related characteristics and design systems for better maintainability considering environmental related factors	Teaching and practicing problems related to achieve better maintenance systems	

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	03	05
2	Assignment/Homework	05	05
3	Mid Term 1	07	20
4	Quiz 2	10	05
5	Mid Term2	11	20
6	Assignment/Home work	12	05
7	Final Exam	15	40
			100

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

Lecture hours as given in Time Tables : Tuesday 12.0 Noon -1:50 PM  
 Tutorial Sunday 5-5:50 PM  
 (Class Rooms E 1 and E 3)

Office hours : :Every day from 10 AM -11 AM  
 (Office location 044-02-17)

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Planning & Control of Maintenance Systems, Modeling and Analysis, Duffuaa, S O, Raouf, A & Campbell, J D, John Wiley & Sons, New York, 1999
<b>Essential References Materials</b>	Strategies for Excellence in Maintenance Management, Campbell, J D, Productivity Press, Portlan, 1995
<b>Electronic Materials</b>	---
<b>Other Learning Materials</b>	Course related material is provided in Black Board

### 2. Facilities Required

Item	Resources
Accommodation	Class Rooms

Item	Resources
(Classrooms, laboratories, demonstration rooms/labs, etc.)	
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Smart board is provided
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Students have their own PCs

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students	Indirect Assessment
CLOs achievement	Faculty	Direct/Indirect Assessments
Learning Resources	Students	Indirect Assessment
Course Contents	Students	Indirect Assessment

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

### H. Specification Approval Data

Council / Committee	Department Council
Reference No.	<b>1/34/9767</b>
Date	<b>25/02/1432 H</b>