Model No.12

Course Specifications: Material & Process Selection for Mechanical Design

University: Benha University
Faculty: Faculty of Engineering at Shoubra
Department offering the program: Mechanical Engineering Department
Department offering the course: Mechanical Engineering Department

1- Course Data

Course Code: MDP345

Course Title: Material & Process Selection for Mechanical Design

Specialization: Mechanical Production Engineering

Course Type: Elective

Study Year: Third Year

Teaching Hours: Lecture: 4 Tutorial:2 Practical: 0 Total: 6

2- Course Aim

For students undertaking this course, the aims are to:

1. Define the concept of materials selection.
2. Identify the concept of materials selection charts.
3. Define the concepts of tribology
4. Define the concepts of fracture and fracture mechanics.
5. Identify the concepts of chemical corrosion.

3- Intended Learning Outcomes of Course (ILOS)

a- Knowledge and Understanding

On completing this course, students will be able to demonstrate the knowledge and understanding of :

a- 1 Materials properties and explain the Materials selection charts.(A5)
a- 2 The fracture in materials ,fracture mechanics .(A- 8)
a- 3 The corrosion of materials and types of corrosion. (A- 13)
a- 4 The tribology basics: Wear, Lubrication and Friction. (A- 19)

b- Intellectual Skills

At the end of this course, the students will be able to:

b- 1 assess the stress in front of the crack tip in any direction and strain to fracture.(B- 2)
b- 2 Solve engineering problems on wear, friction and Corrosion of materials. (B- 7)
b- 3 Analysis of friction torque due to differential sliding and friction losses. (B-18)

c- Professional Skills

On completing this course, the students are expected to be able to:

c-1 Select the materials suitable of design products. (C-2)
c-2 Predict for area friction and wear and solve this problem. (C- 5)

d- General Skills

At the end of this course, the students will be able to:

d- 1 Work in stressful environment and within constraints. (D-2)
d- 2 Communicate effectively (D-3)
d- 3 Lead and motivate individuals (D- 5)

4- Course Contents

No.	Topics
1	Introduction to materials properties
2	Materials selection charts
3	Materials selection charts
4	fracture in materials
5	Introduction to fracture mechanics
6	Tribology basics.
7	Wear
8	Lubrication.
9	Friction
10	Corrosion of materials
11	Types of corrosion
12	Cases studies in materials selection.
13	Cases studies in materials selection.

5- Teaching and Learning Methods

5.1 Lectures
5.2 Tutorial
5.3 Class activity
5.4 Case study

6- Teaching and Learning Methods of Disables

- Nothing.

7- Student Assessment

a- Student Assessment Methods

1. Five Assignments to assess knowledge and intellectual skills.
2. Two quizzes to assess knowledge, intellectual and professional skills.
3. Midterm exam to assess knowledge, intellectual, professional and general skills.
4. Final exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	3, 5 , 7 ,10, 11
2	Quiz	4, 9
3	Midterm exam	8
4	Oral exam	-
5	Final exam	15

c- Weighting of Assessments

Assessment	Weight (%)
Midterm Examination	20
Final Term Examination	67
Oral Examination	-
Semester Work	8
Other Types of Assessment	5
Total	**100**

8- List of References

a- Course Notes: Course notes prepared by instructor.

b- Recommended Books

1. Michael F. Ashby, Hugh Shercliff, David Cebon, "Materials: engineering, science, processing and design", Elsevier, 2009.
2. Ever J. Barbero, "Introduction to Composite Materials Design, Second Edition", CRC Press, 2010.
3. Materials Selection in Mechanical Design, Third Edition, Michael Ashby, Butterworth-Heinemann
4. Handbook of Materials Selection for Engineering Applications (Mechanical Engineering (Marcell Dekker)), George Murray, CRC press, 1997.

Course Coordinator: Prof. Dr. Mohamed Salah Aldeen Abass Hamed

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Model No.11A

Course Specifications: Material & Process Selection for Mechanical Design

University: Benha University
Faculty: Faculty of Engineering at Shoubra
Department offering the program: Mechanical Engineering Department
Department offering the course: Mechanical Engineering Department

Matrix of Knowledge and Skills of the course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Introduction to materials properties	1	a1	b.2		
2	Materials selection charts	2	a1	b.1		d.1
3	Materials selection charts	3	a1		c.1	
4	fracture in materials	4		b.1		
5	Introduction to fracture mechanics	5		b.2		d.1
6	Tribology basics.	6	a2		c.1	
7	Wear	7				
8	Lubrication.	9	a2	b.2		d.2
9	Friction	10	a3	b.2	c.2	
10	Corrosion of materials	11	a3	b.3	c.2	
11	Types of corrosion	12				d.2
12	Cases studies in materials selection	13	a4	b.3	c.2	
13	Cases studies in materials selection	14	a4			d.3

Course Coordinator: Prof. Dr. Mohamed Salah Aldeen Abass Hamed

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Matrix of Course Aims and ILO's

Course Title: Material & Process Selection for Mechanical Design

Course Code: MDP345

Teaching Hours: Lecture: 4 Tutorial: 2 Total: 6

Major or minor element of program: Major

Program on which the course is given: B.Sc. Mechanical Production Engineering

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Academic year / level: 2014-2015 Third Year / Second semester

Date of specifications approval: 2014

Course aims	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1. Define the concept of materials selection.	a1, a3	b1		d1
2. Identify the concept of materials selection charts.	a2 , a4	b2	c1, c2	d1, d2
3. Define the concepts of tribology	a1, a4		c2	d3
4. Define the concepts of fracture and fracture mechanics.	a2	b1, b3	c1	d2
5. Identify the concepts of chemical corrosion.	a1, a4	b2	c2	d1, d3

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