Model No.12
Course Specifications: Material 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: MDP354 **Course Title:** Material Design
Specialization: Mechanical Production Engineering **Course Type:** Elective **Study Year:** Third Year

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

2- Course Aim

For students undertaking this course, the aims are to:

1. Understand the factors affecting the performance of machine components.
2. Apply a technology process to select & design the proper materials.
3. Identify the working condition to select & design proper material.

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- classifications of engineering materials. (A.5).
a- 2 – selecting proper material for gears and bearing (A.8).
a- 3 - Concepts, principles and theories relevant to Mechanical Engineering tribology (A.13).
a- 4- Engineering design principles and techniques of enhancement of properties. (A.19).

b- Intellectual Skills

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

b- 1- Select appropriate solutions for engineering problems based on tribology. (B.2).
b- 2 – calculate stresses and strains of components and select the appropriate materials. (B.7).
b- 3 - Select appropriate bearing according to application. (B.18).

c- Professional Skills

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

c- 1-Professionally merge the engineering knowledge, understanding, and feedback to improve design and product. (C.2).
c- 2 - Use tables and catalogue to select the proper bearing. (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	develop the available materials for design gear
4	Design of gears
5	Tribological design
6	Enhance the chemical properties of materials
7	Enhance the mechanical properties of materials
8	Surface treatment
9	Bearing design
10	Types of bearing
11	Bearing selection
12	Lubricating and greasing

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	Final exam	15

c- Weighting of Assessments

Assessment	Weight (%)
Midterm Examination	20
Final Term Examination	67
Oral Examination	-
Practical 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. Materials Selection in Mechanical Design, Third Edition, Michael Ashby, Butterworth-Heinemann
2. Materials for Design 2 by Victoria Ballard Bell, Patrick Rand – 2013
3. Materials and design: the art and science of material by M. F. Ashby, Kara Johnson - 2002

Course Coordinator: Dr. Mohamed Hany Mahmoud Abd El-Maksoud

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Model No.11A
Course Specifications: Material 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	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Introduction to materials properties	a 1	b.2	c.1	
2	Materials selection charts	a 1	b.1		d.1
3	Develop the available materials for design gear	a 2	b.1	c.1	
4	Design of gears	a 2		c.1	
5	Tribological design		b.1		d.2
6	Enhance the chemical properties of materials	a 2	b.2	c.1	
7	Enhance the mechanical properties of materials		b.2	c.1	
8	Surface treatment	a 3	b.3		
9	Bearing design	a 3	b.3	c.2	
10	Types of bearing			c.2	
11	Bearing selection	a 3			d.2
12	Lubricating and greasing	a 4	b.3	c.2	

Course Coordinator: Dr. Mohamed Hany Mahmoud Abd El-Maksoud

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Matrix of Course Aims and ILO's

Course Title: Material Design

Course Code: MDP354

Teaching Hours: Lecture: 4 Tutorial/Practical: 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. Understand the factors affecting the performance of machine components.	a1, a3	b1	c1	d1, d3
2. Apply a technology process to select & design the proper materials.	a1, a2, a4	b2	c1, c2	d2
3. Identify the working condition to select & design proper material.	a2	b2	c1	

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