

Course Specifications

University: Benha University

Faculty: High Institute of Technology

Course specifications

Programme(s) on which the course is given: [Mechanical Engineering](#)

Major or minor element of programmes

Department offering the programme: [Mechanical Engineering](#)

Department offering the course :[Mechanical production Engineering](#)

Academic year / Level : [year 2 Mechanical Engineering](#)

Date of specification approval

A- Basic Information

Title: [Material Technology](#)

Code: [M262](#)

Credit Hours: -

Lecture:3

Tutorial: 1

Practical: 1

Total: 5

B- Professional Information

1 - Overall aims of course

By the end of the course the students will be able to:

- get a basic idea of materials types, their structure and their phase transition behavior,
- outline the connection of dislocation interaction and the general elastic-plastic and phase transition behavior of materials and strengthening mechanisms,
- understand and interpret basic phase diagrams and know the respective morphology of the alloy,
- understand the deterioration of metallic materials
- understand fundamentals of solidification, and heat treatment
- understand the relationship between structure of materials and alloys and their properties,
- understand fundamentals of non-metallic materials.

Student shall attain the above mentioned objectives through lectures, tutorial for problem solving and laboratory for experiments and microscopic examinations.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding:

- a.1 Understand characteristics and properties of materials relevant to mechanical engineering applications,
- a.2 Understand the structure of materials and defects of metals,
- a.3 Understand the relationship between materials structure and properties,
- a.4 Illustrate a basic idea about materials standard specifications,
- a.5 Explain alloying and constitutional diagrams,
- a.6 Describe heat treatment and selection of metals and alloys,
- a.7 Illustrate a basic idea about non metallic materials.

b. Intellectual skills

- b.1 Use the principles of materials science in developing solutions to practical engineering problems.
- b.2 Maintain a sound theoretical approach in dealing with new and advancing material technology.

3- Contents

Topic	No. of Hours	Lecture	Tutorial/ Practical
Introduction to engineering materials (Sources, Selection)	5	3	2
Structure and structural defects of metals	5	3	2
Phase transformation of metals	10	6	4
Theory of alloying and constitutional diagrams	10	6	4
Plastic deformation of metals and Strengthening mechanisms	10	6	4
Heat treatment of metals and alloys	15	9	6
Deterioration of metallic materials	5	3	2
Selection of alloys	5	3	2
Non-metallic materials.	10	6	4

4– Teaching and learning methods

4.1 - Lectures

4.2 - Problem solving sessions

4.3 - Laboratories

5- Student assessment methods

5.1 Written exam to assess ILO a1, a2, a3, a4, a5, a6,a7, b1

5.2 problem solving to assess ILO b1

5.3 labs to assess ILO b1

5.4 Oral exam to assess ILO b2

Assessment schedule

Assessment 1	Written exam	Week 5
Assessment 2	Written exam	week 10
Assessment 3	Oral exam	Week 15

Weighting of assessments

Final-term examination	60 %
Semester work	20 %
Practical work	10 %
Oral exam	10%
Total	100%

6- List of references

6.1- Course notes

Course notes of Material Technology

6.2- Essential books (text books)

M. F. Ashby and D. R. H. Jones, An Introduction to Engineering Materials II.

M. F. Ashby, Materials Selection in mechanical design, Elsevier 1999,

M. Farag, Selection of materials and manufacturing processes for engineering design, Prentice Hall, N. T., 1989.

Materials Handbook, v. 15 – casting, ASM Int., USA, 1998.

6.3- Recommended books

Mitchell, Brian S., 'An Introduction to Materials Engineering and Science',

ISBN-13: 978-0-471-43623-2 - John Wiley & Sons.

6.4- Periodicals, Web sites

http://en.wikipedia.org/wiki/Materials_science

http://en.wikibooks.org/wiki/Introduction_to_Materials_Science

7- Facilities required for teaching and learning

Lecture rooms

Classrooms for problem solving sessions

Materials laboratory

Course coordinator: Prof. Adel Omar

Head of Department: Prof. Sameh Nada

Date: / /