# Model No.12
# Course Specifications (2014-2015)
# Strength & Testing of Materials

**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:** MDP113
**Course Title:** Strength and Testing of Materials
**Specialization:** Mechanical Production Engineering
**Course Type:** Compulsory
**Study Year:** first year
**Teaching Hours:** Lecture: 3
Tutorial/ Practical: 2
Total: 5

## *2*- Course Aims

For students undertaking this course, the aims are to:

1. Understand concept of stress and strain.
2. Know the basics of several destructive and non-destructive testing techniques.
3. Help student to understand the behavior of metals under tensile, compressive, bending, shear loading, impact, fatigue, creep and Non-destructive testing.

## 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) The mechanical characteristics of engineering materials (A3)
a.2) The methods of performing several destructive and non-destructive tests (A1)
a.3) Interpreting and analyzing the data obtained from mechanical tests. (A14)

### b- Intellectual Skills

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

b.1) Evaluate the mechanical properties of materials. (B6)
b.2) Assess the differences between the different type of stress and strain. (B11)
b.3) Compare between the different types of tests according to material, specimen, machine and fracture. (B11)

### c- Professional Skills

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

c.1) Sketch the stress-stain diagrams. (C1)
c.2) Sketch the behavior of metals under tensile, compressive, and bending loading. (C9)
c.3) Merge engineering knowledge and understanding of fatigue, creep and impact characteristics to improve design, products and/or services. (C4)
c.4) perform several mechanical tests in laboratory. (C2)
c.5) Prepare and present reports about several mechanical tests. (C11)

### d- General Skills

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

d.1) Collaborate effectively within multidisciplinary team. (D1)
d.2) Effectively manage tasks, time, and resources. (D1)
d.3) Demonstrate efficient IT capabilities. (D3)

## 4- Course Contents:

| Week no. | Topics |
|---|---|
| 1 | Introduction to strength of materials (simple stress) |
| 2 | Mechanical properties of materials |
| 3 | Tension and compression tests |
| 4 | Torsion stress |
| 5 | Torsion test |
| 6 | Bending stress |
| 7 | Bending test |
| 8 | Compound stress |
| 9 | Hardness tests |
| 10 | Fatigue test |
| 11 | Impact test |

## 5- Teaching and Learning Methods

5.1- Lectures.
5.2- Practical training/laboratory.
5.3- Class activity.
5.4- Assignments/homework.

## 6- Teaching and Learning Methods of Disables

- No thing

## 7- Student Assessment

### a- Student Assessment Methods

1 Assignments to assess knowledge and intellectual skills.
2 Quizzes to assess knowledge, intellectual and professional skills.
3 Mid-term exam to assess knowledge, intellectual, professional and general skills.
4 Oral/Practical exams to assess knowledge, practical and intellectual skills.
5 Final exams to assess knowledge, intellectual, professional and general skills.

### b- Assessment Schedule

| No. | Assessment | Week |
|---|---|---|
| 1 | Assignments | 4, 5, 9, 10, and 11 |
| 2 | Quizzes | 3, 6, 11 |
| 3 | Mid-term exam | 8 |
| 4 | Oral/Practical exam | 14 |
| 5 | Final exam | 15 |

### c- Weighting of Assessments

| Assessment | Weight % |
|---|---|
| Mid-Term Examination | 20 |
| Final-Term Examination | 60 |
| Oral/Practical Examination | 10 |
| Semester work | 10 |
| Other types of assessment | 00 |
| Total | 100 % |

## 8- List of References

### a- Course Notes

1- Course notes prepared by instructor.

### b- Recommended Books

1. Mechanics of Materials, Andrew Pytel, Jaan Kiusalaas, 2nd Edition, Cengage Learning, 2012.
2. Mechanics of Materials, Roy R. Craig, Jr., 3rd Edition, John Wiley & Sons, 2011.
3. Materials Science and Engineering (An Introduction), William D. Callister, 9th edition, 2014.

**Course Coordinator**: Dr. / Hamdi El-Sayed Ebaied

**Head of Department**: Prof. Dr./ Osama Ezzat Abdullatif

# Model No.11A
# Course Specifications: Strength & Testing of Materials

**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 strength of materials (simple stress) | 1 | a1, a2 | b1, b2 | | |
| 2 | Tension and compression tests | 2 | a2 | b1, b2 | c2 | d1 |
| 3 | Torsion stress | 5 | a4, a5 | b1, b2 | c2, c3 | |
| 4 | Torsion test | 6 | a5 | b2 | c2, c3 | d3 |
| 5 | Bending stress | 7 | a4, a5 | b1, b2 | c2, c3 | |
| 6 | Bending test | 9 | a5 | b2 | c3 | d1 |
| 7 | Compound stress | 10 | a1,a4 | b2 | c1,c2 | |
| 8 | Hardness tests and fatigue | 11 | | b2 | c3,c4 | d2 |
| 9 | Fatigue test | 12 | a5 | b2, b3 | c3,c4 | |
| 10 | Impact test | 13 | a5, | b2, b3 | c2 | |
| 11 | Mechanical properties of materials | 14 | | b1, b3 | c3 | d3 |

**Course Coordinator**: Dr. / Hamdy El-said Ebaid

**Head of Department:** Prof. Dr. Osama Ezzat Abdelatif

# Matrix of Course Aims and ILO's

**Course Title:** strength of materials and Testing

**Course Code:** MDP113

**Teaching Hours:** Lecture: 3 Tutorial: 2 Total: 5

**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 First Year / first semester

**Date of specifications approval:** 2014

| Course aims | Basic Knowledge | Intellectual Skills | Professional Skills | General Skills |
|---|---|---|---|---|
| Concept of stress and strain through the body. | a1 | b1 | | d1 |
| Know the basics of several destructive and non-destructive testing techniques. | a1 | b2 | c1, c2 | d1, d2 |
| Help student to understand the behavior of metals under tensile, compressive, bending, shear loading, impact, fatigue, creep and Non-destructive testing. | a1 | b2 | c1, c2 | d1, d2 |

**Course Coordinator**: Dr. / Hamdy Elsaid Ebaid

**Head of Department:** Prof. Dr. Osama Ezzat Abdelatif