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| Shoubra Faculty of Engineering |  | Course Specifications : **Structure and Description of Materials(MED 511)** |   |
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**University**: Benha University

**Faculty**: Shoubra Faculty of Engineering

**Department**: Mechanical Engineering Department

**Program(s) on which the course is given:** Post Graduate **Diploma.** In Production& Design (Material Engineering)

**Compulsory or Elective element of program:** Compulsory

**Department offering the program:**  Mechanical Engineering/ Production

**Academic year / Level:** year/ 2014/2015

**Date of specification approval:** 2012

1. **Basic Information**

**Title: Structure and Description of Materials Code:** MED 511

**Credit Hours: 3 Lecture: 3**

**Tutorial: - Practical: - Total: 3**

1. **Professional Information**
2. **Course Aims:**

This course introduces students to:

1- Promote new trends in engineering materials and their enhanced mechanical properties.

2- Recognize the main features of Materials Engineering.

3- Provide study which will be informed by the forefront of both the academic and professional elements of the Material Engineering discipline.

1. **Intended Learning Outcomes of Course (ILOs)**

By completion of the course, the student would able to promote:

**2.1. Knowledge and Understanding:**

2.1.1 Identify theories, fundamentals in structure of materials.

2.1.3 Describe principles and fundamentals of atomic structure determination methods.

**2.2. Intellectual Skill**

2.2.1 Describe and analyze the problems in the area of calorimetric methods.

2.2.4 Assess the risks and hazards in professional practices.

**2.3. Professional and Practical Skills:**

2.3.1 Apply professional skills in the area of material engineering.

2.3.2 Prepare professional reports.

2.3.3 Plan and implement experiment design and evaluate testing.

**2.4. General and Transferable Skills:**

2.4.2 Use information technology in order to serve the development of professional practice.

2.4.5 Work in a group and manage time effectively.

2.4.6 Lead a team in familiar professional contexts.

**3- Course Contents:**

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| **No of week** | **Topic** | **No. of hours** | **Program ILOs** |
| 1 | Microstructure of material. | 3 | (2.1.1), (2.1.2), (2.1.3) |
| 2 | Microscopes and their types. | 3 |
| 3 | Optical Microscopes | 3 |
| 4, 5 | Electronic Microscopes | 6 |
| 6, 7 | Optical analysis methods | 6 | (2.2.1), (2.2.4) |
| 8 | Mid-term exam | 3 |  - |
| 9, 10 | Atomic Structure determination methods. | 6 | (2.2.1), (2.2.4) |
| 11 | Calorimetric methods | 3 | (2.3.1) |
| 12 | Non- Ferrous metals Microstructure | 3 | (2.3.2) |
| 13 | Case Studies | 3 | (2.4.2), (2.4.6) |
| 14 | Oral exam | 3 |  (2.4.5), (2.4.6) |
| 15 | Final-term exam | 3 |  - |
| Total  | 45 |  |

**4- Course Matrix:**

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| **ILO’s code number** | **Teaching/learning methods and strategies** | **Assessment methods and strategies** |
| 2.1.12.1.22.1.3 | Formal lectures. | Individual coursework assignments, quizzes, oral discussions and reports. Mid-year and /or final written examination is given.  |
| 2.2.12.2.4 | Analysis and problem-solving skills are developed through tutorial/problem sheets and small group exercises. | Analysis and problem-solving skills are assessed through oral and written examinations. |
| 2.3.12.3.2 | Experiments demonstrations, practical work,  | Coursework exercises and reports, project reports and presentations. |
| 2.4.22.4.52.4.6 | Those skills are not explicitly taught; however, along the course of study the student will acquire those skills to be able to perform his obligations.  | Project presentation. |

**5-Assessment Schedule:**

Assessment 1 Assignments on weeks 2,3,4,5,7,9,11,13

Assessment 2 Quizzes on weeks 6, 12

Assessment 3 Mid-term exam on weeks 8

Assessment 4 Oral exam on week 14

Assessment 5 Final exam on week 15

**6- Weighting of Assessments:**

* 20% (60 points) Home assignments, Quizzes, and reports
* 20% (60 points) Mid-term examination and Oral examination
* 60% (180 points) Final-term examination
* 100% (300 points) Total

**7- List of References:**

 7.**1 Essential Books (Text books):**

* Course notes prepared by instructor (Power Point & Case Studies)
* Gregory S. Rohrer, “Structure and Bonding in Crystalline Materials”, Cambridge University.
* Marc De Graef, Michael E. McHenry, “Structure of Materials”, Cambridge University.

 **7.2 Recommended Books&Websites.**

* www.google.com
* www.sciencedirect.com

**8- Facilities Required for Teaching and Learning:**

* Lecture room equipped with overhead projector
* Presentation board, computer and data show

**Course coordinator:**

**Course instructor:**

**Head of department:** Prof. Dr.Osama Ezzat