

**Department of Mining, Petroleum and Metallurgical Engineering**

**Cairo University
Faculty of Engineering**

|  |
| --- |
| **Course Specifications** |
| **Program(s) on which this course is given:** | Metallurgical Engineering |
| **Department offering the program:** | Department of Mining, Petroleum and Metallurgical Engineering |
| **Department offering the course:** | Metallurgical Engineering |
| **Academic Level:** | Third year |
| **Date**  | 2014 |
| **Semester (based on final exam timing)** |  Fall Spring |
| **A- Basic Information** |
| **1. Title:** | Physical Metallurgy 2 | **Code:** | MET 301(B) |
| **2. Units/Credit hours per week:**  | Lectures | 4 | Tutorial | 2 | Practical | **0** | Total | 6 |
| **B- Professional Information** |
| **1. Course description:** | Understanding annealing processes, strengthing mechanisms, composite materials, and the electronic properties of metals and alloys. |
| **2. Intended Learning Outcomes of Course (ILOs):** | **a) Knowledge and Understanding** |
| 1. Engineering principles and Basic topics related with metals and alloys. |
| 2. Current engineering technologies and contemporary metallurgical engineering topics related to metallurgical engineering. |
| **b) Intellectual Skills** |
| 3. Select and identify the appropriate material and manufacturing aspects of design of a component. |
| 4. Assess and evaluate the characteristics, performance and failure of components, systems and processes. |
| **c) Professional and Practical Skills** |
| 5. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. |
| 6. Prepare and present technical reports observing ethical aspects, using proper referencing, and citation. |
| **d) General and Transferable Skills** |
| 7. Collaborate effectively within multidisciplinary team in stressful environment and within constraints and effectively manage tasks, time, and resources. |
| 8. Communicate effectively. |
| **3. Contents** |
| **Topic** | **Total hours** | **Lectures hours** | **Tutorial/ Practical hours** |
|  Annealing | 6 | 4 | 2 |
| Recrystallization, and grain growth | 6 | 4 | 2 |
| Irradiation effects, and texture | 6 | 4 | 2 |
| Strengthening mechanisms | 12 | 8 | 4 |
| Wear | 6 | 4 | 2 |
| Composite materials | 6 | 4 | 2 |
| Mid-Term Exam | 3 | 3 |  |
| Zone theory, thermal properties | 6 | 4 | 2 |
| Conduction and semiconduction, semiconductors | 6 | 4 | 2 |
| Devices and materials | 6 | 4 | 2 |
| Magnetism and magnetic materials | 6 | 4 | 2 |
| Superconductivity, thermoelectricity, dielectrics  | 6 | 4 | 2 |
| Optical properties | 6 | 4 | 2 |
| Oral Exam | 3 | 3 |  |
| **4. Teaching and Learning Methods** | Lectures (\* )  | Practical Training/ Laboratory ( )  | Seminar/Workshop (\* )  |
| Class Activity ( \*)  | Case Study ( )  | Projects ( )  |
| E-learning ( )  | Assignments /Homework ( \*)  | Other:  |
| **5. Student Assessment Methods** |
| * **.Assessment Schedule**
 | **Week** |
| -Assessment 1; Class test  |  |
| -Assessment 2; Project Assignment  |  |
| -Assessment 3; Presentations  | 12thWeek |
| -Assessment 3; Midterm Exam | 8thWeek  |
| -Assessment 4; Final Exam | 14th Week |
| * **Weighting of Assessments**
 |
| -Mid-Term Examination | 15 |
| -Final-term Examination  | 60 |
| -Project |  |
| -Class Test | 10 |
| -Presentation | 15 |
| -Total | 100% |
| **6. List of References** |
| 6.1 Course Notes  |
| 6.2- Essential Books (Text Books)1- R. E. Reed – Hill, Physical Metallurgy Principle, Von Nostrand Co. |
| 2- G. E. Dieter, Mechanical Metallurgy, McGraw Hill Co. |
| 6.3- Recommended Books1- A.G.Guy, Elements of Physical Metallurgy, Addison-Weseley Co. |
| 2- H. W. Hayden - W. G. Mattatt- and John Wullf, The Structure and Properties of Materials, John Will and Sons |
| 6.4- PeriodicalsWebsites according to the reports constructed by students |
| **7. Facilities Required for Teaching and Learning** |
| .- Board - Screen - Data Show- Laptop. |
| **Course Coordinator:** | **Prof.Dr/ Mohamed Mamdouh Ibrahem** **Prof.Dr/ Salah Saeed Ezz** |
| **Head of Department:**  | **Prof.Dr/ El-Sayed Mahmoud El-Banna** |

