

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

**Cairo University  
Faculty of Engineering**

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| **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 Books  1- 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- Periodicals  Websites 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** | | | | | | | | | | | | | | |

