

**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:** | | | | | | | Materials and Metallurgical Engineering | | | | | | | | | | |
| **Department offering the program:** | | | | | | | Department of Mining, Petroleum and Metallurgical Engineering | | | | | | | | | | |
| **Department offering the course:** | | | | | | | Department of Mining, Petroleum and Metallurgical Engineering | | | | | | | | | | |
| **Academic Level:** | | | | | | | Fifth year | | | | | | | | | | |
| **Date** | | | | | | | 2014 | | | | | | | | | | |
| **Semester (based on final exam timing)** | | | | | | | Fall Spring | | | | | | | | | | |
| **A- Basic Information** | | | | | | | | | | | | | | | | | |
| **1. Title:** | Structure and Design of Alloys | | | | | | | | | **Code:** | | | **MET 401(A)** | | | | |
| **2. Units/Credit hours per week:** | | Lectures | | | 4 | | | Tutorial | | | 2 | Practical | | 0 | | Total | 6 |
| **B- Professional Information** | | | | | | | | | | | | | | | | | |
| **1. Course description:** | | | |  | | | | | | | | | | | | | |
| **2. Intended Learning Outcomes of Course (ILOs):** | | | | **a) Knowledge and Understanding** | | | | | | | | | | | | | |
| 1. Concepts and theories of mathematics and sciences, appropriate to the discipline. | | | | | | | | | | | | | |
| 2. Engineering principles and Basic topics related with metals and alloys. | | | | | | | | | | | | | |
| 3. Current engineering technologies and contemporary metallurgical engineering topics related to metallurgical engineering. | | | | | | | | | | | | | |
| **b) Intellectual Skills** | | | | | | | | | | | | | |
| 4. Select and identify the appropriate material and manufacturing aspects of design of a component. | | | | | | | | | | | | | |
| 5. Assess and evaluate the characteristics, performance and failure of components, systems and processes. | | | | | | | | | | | | | |
| **c) Professional and Practical Skills** | | | | | | | | | | | | | |
| 6. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. | | | | | | | | | | | | | |
| **d) General and Transferable Skills** | | | | | | | | | | | | | |
| 7. Communicate effectively. | | | | | | | | | | | | | |
| 8. Search for information and engage in life-long self learning discipline. | | | | | | | | | | | | | |
| **3. Contents** | | | | | | | | | | | | | | | | | |
| **Topic** | | | | | | **Total hours** | | | **Lectures hours** | | | | | | **Tutorial/ Practical hours** | | |
| Diffusion equations and solutions for metallurgical applications | | | | | | 14 | | | 10 | | | | | | 4 | | |
| Physical metallurgy and heat treatment of steels. | | | | | | 16 | | | 12 | | | | | | 4 | | |
| Structural Steels | | | | | | 12 | | | 8 | | | | | | 4 | | |
| Tool Steels | | | | | | 8 | | | 5 | | | | | | 3 | | |
| Stainless Steels | | | | | | 8 | | | 5 | | | | | | 3 | | |
| Non metallic inclusions | | | | | | 4 | | |  | | | | | |  | | |
| Cast irons | | | | | | 6 | | |  | | | | | |  | | |
| Overview | | | | | | 4 | | |  | | | | | |  | | |
| **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 | | | | | | | | |  | | | | | | | | |
| -Assessment 3; Midterm Exam | | | | | | | | |  | | | | | | | | |
| -Assessment 4; Final Exam | | | | | | | | |  | | | | | | | | |
| * **Weighting of Assessments** | | | | | | | | | | | | | | | | | |
| -Mid-Term Examination | | | | | | | | |  | | | | | | | | |
| -Final-term Examination | | | | | | | | |  | | | | | | | | |
| -Project | | | | | | | | |  | | | | | | | | |
| -Class Test | | | | | | | | |  | | | | | | | | |
| -Presentation | | | | | | | | |  | | | | | | | | |
| -Total | | | | | | | | |  | | | | | | | | |
| **6. List of References** | | | | | | | | | | | | | | | | | |
| 1. Structure and properties of Engineering alloys, Smith, Pense and Gordon, McGraw Hill | | | | | | | | | | | | | | | | | |
| 1. Steel and its heat treatment, Thelning, Butterworths; | | | | | | | | | | | | | | | | | |
| 1. The Science and Design of Engineering Materials, Schaffer, Saxena, Antolovich, Sanders and warner, Irwin | | | | | | | | | | | | | | | | | |
| 1. Physical Metallurgy of Steels, William C.Leslie, McGraw- Hill | | | | | | | | | | | | | | | | | |
| Course Notes | | | | | | | | | | | | | | | | | |
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| **7. Facilities Required for Teaching and Learning** | | | | | | | | | | | | | | | | | |
| - Small group of students. | | | | | | | | | | | | | | | | | |
| - Up-to-date references in library. | | | | | | | | | | | | | | | | | |
| **Course Coordinator:** | | | **Dr. Abdel-Hamid Ahmed Hussein** | | | | | | | | | | | | | | |
| **Head of Department:** | | | **Dr. Said El-Banna** | | | | | | | | | | | | | | |

