

**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**
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| -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
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| 1. Steel and its heat treatment, Thelning, Butterworths;
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| 1. The Science and Design of Engineering Materials, Schaffer, Saxena, Antolovich, Sanders and warner, Irwin
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| 1. Physical Metallurgy of Steels, William C.Leslie, McGraw- Hill
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| 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** |

