

**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:** | Fuels and Refractories  | **Code:** | MET 306 |
| **2. Units/Credit hours per week:**  | Lectures | 4 | Tutorial | 1 | Practical | **1** | Total | 6 |
| **B- Professional Information** |
| **1. Course description:** | • Quantitative & theoretical Study of the Properties and Structure Raw materials. • Rheology of plastic clays. • Treatment and processing. • Properties and testing of refractories. • Effect of molten metals and slags on refractories in metallurgical furnaces. • Application of binary and ternary phase equilibria. • Classification of Ceramics Materials• Classification of fuels. Combustion. Principles and technology of regeneration of thermal energy from hot gases. • Calculations of quantity of fuel and heat balance. |
| **2. Intended Learning Outcomes of Course (ILOs):** | **a) Knowledge and Understanding** |
| 1. Fundamentals of materials science and physical metallurgy their relation to metallurgical and materials related topics. |
| **b) Intellectual Skills** |
| 2. Combine, exchange, and assess different ideas, views, and knowledge from a range of sources in topics related to material processing, manufacturing, development and selection. |
| **c) Professional and Practical Skills** |
| 3. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve metallurgical engineering problems.  |
| 4. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. |
| **d) General and Transferable Skills** |
| 5. Communicate and collaborate effectively within a multidisciplinary team. |
| 6. Search for information and engage in life-long self learning discipline to learn ccurrent engineering technologies and contemporary metallurgical engineering topics related to metallurgical engineering. |
| **3. Contents** |
| **Topic** | **Total hours** | **Lectures hours** | **Tutorial/ Practical hours** |
| * Ceramic Raw materials.
 | 6 | 4 | 2 |
| * Rheology of plastic clays.
 | 6 | 4 | 2 |
| * Treatment and processing.
 | 6 | 4 | 2 |
| * Properties and testing of refractories.
 | 6 | 4 | 2 |
| * Refractories in metallurgical furnaces.
 | 6 | 4 | 2 |
| * Application of binary and ternary phase equilibria.
 | 2 | 2 |  |
| * Classification of fuels. Combustion. Principles and technology of regeneration of thermal energy from hot gases.
 | 6 | 4 | 2 |
| * Calculations of quantity of fuel and heat balance.
 | 6 | 4 | 2 |
| **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  | Weekly |
| -Assessment 2; Project Assignment  |  |
| -Assessment 3; Presentations  | 14th Week |
| -Assessment 3; Midterm Exam | 6 and 10 |
| -Assessment 4; Final Exam | 14th Week |
| * **Weighting of Assessments**
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| -Mid-Term Examination | 20 |
| -Final-term Examination  | 53 |
| -Project | 7 |
| -Class Test | 7 |
| -Presentation | 13 |
| -Total | 100% |
| **6. List of References** |
| 6.1 Course Notes  |
| 6.2- Essential Books (Text Books)• • Van Vlack, L.H., Elements of Materials Science and Engineering, 5th Ed., Addison-Wesley Publishing Co., Reading, MA, 1985• ASM Engineered Materials Handbook , Vol 4, Ceramics and Glass• Introduction to Ceramics; Kingery, Bowen, and Ulhmann• Modern Ceramic Engineering, Properties, Processing, and Use in Design; D. W. Richerson• Ceramic Fabrication Technology; Roy Rice• Ceramic Technology and Processing; A. G. King |
| **7. Facilities Required for Teaching and Learning** |
| .- Board - Screen - Data Show- Laptop. |
| **Course Coordinator:** | **Prof.Dr/ Hafez Abdel Azzem**  |
| **Head of Department:**  | **Prof.Dr/ El-Sayed Mahmoud El-Banna** |

