

**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** | | | | | | | | | | | | | | | | | |
| -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** | | | | | | | | | | | | | | |

