

**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:** | Theory of Metallurgical Engineering | | | | | | | | | **Code:** | | | MET 307 | | | | |
| **2. Units/Credit hours per week:** | | Lectures | | | 4 | | | Tutorial | | | 2 | Practical | | **0** | | Total | 6 |
| **B- Professional Information** | | | | | | | | | | | | | | | | | |
| **1. Course description:** | | | | The aims of this course are to provide an understanding of :   * thermodynamic and kinetic basis of electro-, Pyro-, and hydrometallurgical processes, | | | | | | | | | | | | | |
| * the types of physical and chemical processes which may be aimed to separation, compound formulation, metal production and metal purification, | | | | | | | | | | | | | |
| * how and why these processes are carried out? | | | | | | | | | | | | | |
| * how possible process routes can be designed or developed, | | | | | | | | | | | | | |
| * the factors affecting the choice of processing routes, and mass and energy balance of metallurgical systems | | | | | | | | | | | | | |
| **2. Intended Learning Outcomes of Course (ILOs):** | | | | **a) Knowledge and Understanding** | | | | | | | | | | | | | |
| 1. The role of information technology in providing support for metallurgical engineers. | | | | | | | | | | | | | |
| 2. Processing of metals and alloys. | | | | | | | | | | | | | |
| 3. Current engineering technologies related to metallurgical engineering. | | | | | | | | | | | | | |
| 4. Technical language and report writing | | | | | | | | | | | | | |
| **b) Intellectual Skills** | | | | | | | | | | | | | |
| 5. Assess and evaluate the characteristics and performance of components, systems and processes. | | | | | | | | | | | | | |
| 6. Propose and assess options for the improvement of operations. | | | | | | | | | | | | | |
| 7. Explain experimental results in terms of theoretical mechanisms and concepts. | | | | | | | | | | | | | |
| **c) Professional and Practical Skills** | | | | | | | | | | | | | |
| 8. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems. | | | | | | | | | | | | | |
| 9. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. | | | | | | | | | | | | | |
| 10. Create and/or re-design a process, component or system, and carry out specialized engineering designs. | | | | | | | | | | | | | |
| 11. Exchange knowledge and skills with engineering community and industry. | | | | | | | | | | | | | |
| 12. Prepare and present technical reports. | | | | | | | | | | | | | |
| 13. Apply of modern science and engineering in the discovery, development, exploitation, and use of natural mineral deposits. | | | | | | | | | | | | | |
| **d) General and Transferable Skills** | | | | | | | | | | | | | |
| 14. Collaborate effectively within multidisciplinary team. | | | | | | | | | | | | | |
| 15. Communicate effectively. | | | | | | | | | | | | | |
| 16. Refer to relevant literatures. | | | | | | | | | | | | | |
| **3. Contents** | | | | | | | | | | | | | | | | | |
| **Topic** | | | | | | **Total hours** | | | **Lectures hours** | | | | | | **Tutorial/ Practical hours** | | |
| Course Specification | | | | | | 2 | | | 2 | | | | | | 0 | | |
| Introduction | | | | | | 2 | | | 2 | | | | | | 0 | | |
| Electrometallurgy | | | | | | 9 | | | 6 | | | | | | 3 | | |
| Pyrometallurgy | | | | | | 24 | | | 16 | | | | | | 8 | | |
| Hydrometallurgy | | | | | | 21 | | | 14 | | | | | | 7 | | |
| Material Balance | | | | | | 7 | | | 4 | | | | | | 3 | | |
| Energy Balance | | | | | | 7 | | | 4 | | | | | | 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 | | | | | | | | | weekly | | | | | | | | |
| -Assessment 2; Project Assignment | | | | | | | | | weekly | | | | | | | | |
| -Assessment 3; Presentations | | | | | | | | | weekly | | | | | | | | |
| -Assessment 3; Midterm Exam | | | | | | | | | 9th week | | | | | | | | |
| -Assessment 4; Final Exam | | | | | | | | | End of Term | | | | | | | | |
| * **Weighting of Assessments** | | | | | | | | | | | | | | | | | |
| -Mid-Term Examination | | | | | | | | | 10 | | | | | | | | |
| -Final-term Examination | | | | | | | | | 66 | | | | | | | | |
| -Project | | | | | | | | |  | | | | | | | | |
| -Class Test | | | | | | | | | 12 | | | | | | | | |
| -Presentation | | | | | | | | | 12 | | | | | | | | |
| -Total | | | | | | | | | 100% | | | | | | | | |
| **6. List of References** | | | | | | | | | | | | | | | | | |
| 1. Course Notes | | | | | | | | | | | | | | | | | |
| 1. Essential book (Textbook) “Process Selection in Extractive Metallurgy”, by Peter Hayes; published by Hayes publishing Co. (1985). | | | | | | | | | | | | | | | | | |
| * + Recommended books  1. “Principles of Extractive Metallurgy”, by Terkel Rosenqvist; published by Tapir Academic Press (2004) | | | | | | | | | | | | | | | | | |
| 1. Introduction to Metallurgical thermodynamics” by David R. Gaskell; published by Scripta Publishing Company (1973). | | | | | | | | | | | | | | | | | |
| 1. “Mass and Energy Balance in Materials Engineering” by Mark E.5chlesinger; published by Prentic – Hall, Inc. (1996). | | | | | | | | | | | | | | | | | |
| 1. Periodicals, Web Sites,…etc | | | | | | | | | | | | | | | | | |
| **7. Facilities Required for Teaching and Learning** | | | | | | | | | | | | | | | | | |
| .- Board – Chalk - Screen - Data Show- Laptop. | | | | | | | | | | | | | | | | | |
| **Course Coordinator:** | | | **Prof.Dr/ Fawzi A. A. El- refaie** | | | | | | | | | | | | | | |
| **Head of Department:** | | | **Prof.Dr/ El-Sayed Mahmoud El-Banna** | | | | | | | | | | | | | | |

