

**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,
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| * the types of physical and chemical processes which may be aimed to separation, compound formulation, metal production and metal purification,
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| * how and why these processes are carried out?
 |
| * how possible process routes can be designed or developed,
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| * the factors affecting the choice of processing routes, and mass and energy balance of metallurgical systems
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| **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**
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| -Mid-Term Examination | 10 |
| -Final-term Examination  | 66 |
| -Project |  |
| -Class Test | 12 |
| -Presentation | 12 |
| -Total | 100% |
| **6. List of References** |
| 1. Course Notes
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| 1. Essential book (Textbook) “Process Selection in Extractive Metallurgy”, by Peter Hayes; published by Hayes publishing Co. (1985).
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| * + 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).
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| 1. Periodicals, Web Sites,…etc
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| **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** |

