

**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:** | 4th year B.Sc students |
| **Date**  | 2014 |
| **Semester (based on final exam timing)** |  Fall Spring |
| **A- Basic Information** |
| **1. Title:** | Extraction of Non-ferrous Metals | **Code:** | Met 407 |
| **2. Units/Credit hours per week:**  | Lectures | 3 | Tutorial | 1 | Practical |  | Total | 4 |
| **B- Professional Information** |
| **1. Course description:** | The aim of this course is to deepen the principal information (knowledge, methodologies and rules) of the students about the metallurgy of metal extraction of 10 non-ferrous metals; these metals are copper, silicon, lead, tin, zinc, gold, aluminum, magnesium, titanium and uranium; to realize this aim, the metallurgy of extraction of each metal might include the followings:* sources of each metal,
* mineral processing of the ores of each metal,
* metals production and purification (flow sheets),
* physical and chemical basis for metal production and purification,
* the factors affecting the choice of processing steps,
* mass and energy balance of steps used in metal production, and
* applications of each metal and its alloys
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| **2. Intended Learning Outcomes of Course (ILOs):** | **a) Knowledge and Understanding** |
| 1. Physical and electrochemistry and their relation to corrosion and extraction, purification and processing of metals and alloys. |
| 2. Metallurgical thermodynamics and relation to metallurgical processes. |
| **b) Intellectual Skills** |
| 3. Think in a creative and innovative way in problem solving and design considering quality assurance systems, codes of practice and standards, health and safety requirements, professional ethics and impacts of engineering solutions on society and environment. |
| **c) Professional and Practical Skills** |
| 4. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve metallurgical engineering problems. |
| 5. Create and/or re-design a process, component or system, and carry out specialized engineering designs considering safety, Quality assurance procedures, management skills and environmental aspects. |
| **d) General and Transferable Skills** |
| 6. Collaborate effectively within multidisciplinary team in stressful environment and within constraints and effectively manage tasks, time, and resources. |
| 7. Communicate and collaborate effectively within a multidisciplinary team. |
| 8. 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** |
| Course Specifications and Introduction  | 2 | 2 |  |
| Metallurgy of Copper | 6 | 4 | 2 |
| Metallurgy of Silicon | 4 | 3 | 1 |
| Metallurgy of Lead | 4 | 3 | 1 |
| Metallurgy of Tin | 4 | 3 | 1 |
| Metallurgy of Zinc | 4 | 3 | 1 |
| Metallurgy of Gold | 5 | 4 | 1 |
| Metallurgy of Aluminum | 6 | 4 | 2 |
| Metallurgy of Magnesium | 6 | 5 | 1 |
| Metallurgy of Titanium | 3 | 2 | 1 |
| Metallurgy of Uranium  | 4 | 3 | 1 |
| **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  | Weekly  |
| -Assessment 3; Midterm Exam | Week 9 |
| -Assessment 4; Final Exam | At the end of term |
| * **Weighting of Assessments**
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| -Mid-Term Examination | 5% |
| -Final-term Examination  | 70% |
| -sheets | 15% |
| -Class Test |  |
| -Presentation | 10% |
| -Total | 100% |
| **6. List of References** |
| 6.1- Course Notes |
| 6.2- Essential book (Textbook) “General Metallurgy”, by N. Sevryukov, B. Kuzmin, and Y. Chelishchev; translated from Russiam by R.Kuznetsev; peace publishers, Moscow (1995). |
| 6.3- Recommended books “Process Selection in Extractive Metallurgy”, by Peter Hays Publishing Company (1985). “Principles of Extractive Metallurgy”, by Terkel Rosenqvist; published by Tapir Academic Press (2004).“Introduction to Metallurgical thermodynamics” by David R. Gaskell; published by Scripta Publishing Company (1973).  “Mass and Energy Balance in Materials Engineering” by Mark E.5chlesinger; published by Prentic – Hall, Inc. (1996).  |
| 6.4- Periodicals, Web Sites,…etc |
| **7. Facilities Required for Teaching and Learning** |
| - Board – Chalk - Screen - Data Show- Laptop. |
| **Course Coordinator:** | **Prof. Dr. Fawzi A. A. Elrefaie** |
| **Head of Department:**  | **Prof. Dr. El said El banna** |

