

**Mining, Petroleum and Metallurgical Engineering Department**

**Cairo University  
Faculty of Engineering**

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| **Course Specifications** | | | | | | | | | | | | | | | | |
| **Program(s) on which this course is given:** | | | | | B.Sc. in Metallurgical Engineering | | | | | | | | | | | |
| **Department offering the program:** | | | | | Mining, Petroleum and Metallurgical Engineering Department | | | | | | | | | | | |
| **Department offering the course:** | | | | | Mining, Petroleum and Metallurgical Engineering Department | | | | | | | | | | | |
| **Academic Level:** | | | | | Undergraduate Level, 4th Year Metallurgical Engineering | | | | | | | | | | | |
| **Date** | | | | | December 1st, 2014 | | | | | | | | | | | |
| **Semester (based on final exam timing)** | | | | | 🗹 Fall or 🗹 Spring | | | | | | | | | | | |
| **A- Basic Information** | | | | | | | | | | | | | | | | |
| **1. Title:** | | | | Elective Course, Composite Materials | | | | | | | | **Code:** | | MET 443 | | |
| **2. Units/Credit hours per week:** | | | | Lectures | | 3 | | | Tutorial | | 1 | Practical | | 0 | Total | 4 |
| **B- Professional Information** | | | | | | | | | | | | | | | | |
| **1. Course description:** | | | | | | | | | | | | | | | | |
| **2. Intended Learning Outcomes of Course (ILOs):** | | **Knowledge and Understanding** | | | | | | | | | | | | | | |
| 1 | Concepts and theories of mathematics and sciences, appropriate to the discipline. | | | | | | | | | | | | | |
| 2 | Shaping and manufacturing methods. | | | | | | | | | | | | | |
| 3 | Current engineering technologies and contemporary metallurgical engineering topics related to metallurgical engineering. | | | | | | | | | | | | | |
| **Intellectual Skills** | | | | | | | | | | | | | | |
| 4 | Select and identify the appropriate material and manufacturing aspects of design of a component. | | | | | | | | | | | | | |
| 5 | Combine, exchange, and assess different ideas, views, and knowledge from a range of sources in topics related to material processing, manufacturing, development and selection. | | | | | | | | | | | | | |
| 6 | Assess and evaluate the characteristics, performance and failure of components, systems and processes. | | | | | | | | | | | | | |
| **Professional and Practical Skills** | | | | | | | | | | | | | | |
| 7 | Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve metallurgical engineering problems. | | | | | | | | | | | | | |
| 8 | Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. | | | | | | | | | | | | | |
| **General and Transferable Skills** | | | | | | | | | | | | | | |
| 9 | Collaborate effectively within multidisciplinary team in stressful environment and within constraints and effectively manage tasks, time, and resources. | | | | | | | | | | | | | |
| 10 | Communicate effectively. | | | | | | | | | | | | | |
| 11 | Search for information and engage in life-long self-learning discipline. | | | | | | | | | | | | | |
| **3. Contents** | | | | | | | | | | | | | | | | |
| **Topic** | | | | | | | **Total hours** | | | **Lectures hours** | | | **Tutorial/ Practical hours** | | | |
| Introduction about composite materials | | | | | | | 2 | | | 1 | | |  | | | |
| Reinforcements type, forms, fabrication techniques, properties | | | | | | | 3 | | | 1.5 | | |  | | | |
| Matrices types, properties, limitations, suitability of selection for successful fabrication of composites | | | | | | | 3 | | | 1.5 | | |  | | | |
| Fiber architecture | | | | | | | 4 | | | 2 | | |  | | | |
| Routes of fabrication of PMCs | | | | | | | 3 | | | 2 | | |  | | | |
| Routes of fabrication of MMCs | | | | | | | 3 | | | 1.5 | | |  | | | |
| Routes of fabrication of CMCs | | | | | | | 3 | | | 1.5 | | |  | | | |
| Selected applications of composite materials | | | | | | | 4 | | | 2 | | |  | | | |
| Aspects on the mechanical and physical properties of composite materials | | | | | | | 4 | | | 2 | | |  | | | |
| **4. Teaching and Learning Methods** | | | | | | | Lectures (✓) | | | Practical Training/ Laboratory ( ) | | | Seminar/Workshop ( ) | | | |
| Class Activity (✓) | | | Case Study (✓) | | | Projects (✓) | | | |
| E-learning () | | | Assignments /Homework (✓) | | | Other: Oral presentation (✓) | | | |
| **5. Student Assessment Methods** | | | | | | | | | | | | | | | | |
| * **Assessment Schedule** | | | | | | | | **Week** | | | | | | | | |
| -Assessment 1; Derivation of maximum Vf and h/r formula for square and hexagonal fiber arrangements and using Excel to plot variation of h/r vs. Vf of fibers. | | | | | | | | 5 | | | | | | | | |
| -Assessment 3; Presentations | | | | | | | | 8 | | | | | | | | |
| -Assessment 2; Midterm Exam | | | | | | | | 7 | | | | | | | | |
| -Assessment 4; Final Exam | | | | | | | | 15 or 16 | | | | | | | | |
| * **Weighting of Assessments** | | | | | | | | | | | | | | | | |
| -Mid-Term Examination | | | | | | | | 10% | | | | | | | | |
| -Final-term Examination | | | | | | | | 70% | | | | | | | | |
| - Term Project | | | | | | | | 10% | | | | | | | | |
| - Class Test | | | | | | | | 0% | | | | | | | | |
| -Presentation | | | | | | | | 10% | | | | | | | | |
| -Total | | | | | | | | 100% | | | | | | | | |
| **6. List of References** | | | | | | | | | | | | | | | | |
| [1] D. Hull, T.W. Clyne, An Introduction to Composite Materials, 2nd Ed, Cambridge University Press, 1996. | | | | | | | | | | | | | | | | |
| [2] W.D. Callister, Materials Sceince and Engineering: An Introduction, 7th Ed., John Wiley & Sons, Inc., 2007. | | | | | | | | | | | | | | | | |
| **7. Facilities Required for Teaching and Learning** | | | | | | | | | | | | | | | | |
| * Lecture hall equipped with microphone, computer, beamer and white board. * Means of file sharing and remote communications with the students. * Teaching Assistant support. | | | | | | | | | | | | | | | | |
| **Course Coordinator:** | **Dr. Mahmoud Mohamed Talaat** | | | | | | | | | | | | | | | |
| **Head of Department:** | **Prof. Dr. El-Sayed M. El-Banna** | | | | | | | | | | | | | | | |