

**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**
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| -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.
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| **Course Coordinator:** | **Dr. Mahmoud Mohamed Talaat** |
| **Head of Department:**  | **Prof. Dr. El-Sayed M. El-Banna** |