

**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:** | | | | | | | Department of Mining, Petroleum and Metallurgical Engineering | | | | | | | | | | |
| **Academic Level:** | | | | | | | 4th year B.Sc students | | | | | | | | | | |
| **Date** | | | | | | | 2014 | | | | | | | | | | |
| **Semester (based on final exam timing)** | | | | | | | Fall Spring | | | | | | | | | | |
| 1. **Basic Information** | | | | | | | | | | | | | | | | | |
| **1. Title:** | **Welding** | | | | | | | | | **Code:** | | | **MET 406B** | | | | |
| **2. Units/Credit hours per week:** | | Lectures | | | 3 | | | Tutorial | | | 1 | Practical | |  | | Total | 4 |
| **B- Professional Information** | | | | | | | | | | | | | | | | | |
| **1. Course description:** | | | | Theory and practice of welding processes and welding metallurgy. | | | | | | | | | | | | | |
| **2. Intended Learning Outcomes of Course (ILOs):** | | | | **a) Knowledge and Understanding** | | | | | | | | | | | | | |
| 1. Engineering principles and Basic topics related with engineering generally and metals and alloys particularly are including information and computer technology. | | | | | | | | | | | | | |
| 2. Fundamentals of materials science and physical metallurgy their relation to metallurgical and materials related topics. | | | | | | | | | | | | | |
| **b) Intellectual Skills** | | | | | | | | | | | | | |
| 3. Select and identify the appropriate welding process and filler material appropriate for a range of steels and applications, considering design aspects, economics and environmental issues. | | | | | | | | | | | | | |
| 4. Combine, exchange, and assess different ideas, views, and knowledge from a range of codes and standards of welding. | | | | | | | | | | | | | |
| 5. Assess and evaluate the characteristics, performance and failure of components, systems and processes including weldments. | | | | | | | | | | | | | |
| **c) Professional and Practical Skills** | | | | | | | | | | | | | |
| 6. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve metallurgical engineering problems. | | | | | | | | | | | | | |
| 7. Create and/or re-design a welding 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** | | | | | | | | | | | | | |
| 8. Collaborate effectively within multidisciplinary team in stressful environment and within constraints and effectively manage tasks, time, and resources. | | | | | | | | | | | | | |
| 9. Communicate and collaborate effectively within a multidisciplinary team. | | | | | | | | | | | | | |
| **3. Contents** | | | | | | | | | | | | | | | | | |
| **Topic** | | | | | | **Total hours** | | | **Lectures hours** | | | | | | **Tutorial/ Practical hours** | | |
| Introduction to welding | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Shielded metal arc welding, welding metallurgy | | | | | | 6 | | | 6 | | | | | | 6 | | |
| Flux cored arc welding, welding repair | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Flux cored arc welding, welding repair | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Gas Metal arc welding, welding repair | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Mid-Term | | | | | | 2 | | | 2 | | | | | |  | | |
| Gas Tungsten arc welding Structural changes in weld metal and heat affected zone during welding of carbon , alloy and stainless steels. | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Plasma arc welding , WPS | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Mid-Term | | | | | | 2 | | | 2 | | | | | |  | | |
| Other welding processes, WPS | | | | | | 4 | | | 3 | | | | | | 1 | | |
| Hot cracking , liquation cracking, stress corrosion cracking ,hydrogen cracking during and after welding of carbon , alloy and stainless steels. | | | | | | 8 | | | 6 | | | | | | 2 | | |
| Welding of Steels, Welding of St .St. | | | | | | 8 | | | 6 | | | | | | 2 | | |
| **4. Teaching and Learning Methods** | | | | | | Lectures 52 | | | (43 ) | | | | | | Seminar/Workshop (16 ) | | |
| Class Activity ( ) | | | Case Study | | | | | | Projects ( ) | | |
| E-learning | | | Assignments /Homework | | | | | | Other: | | |
| **5. Student Assessment Methods** | | | | | | | | | | | | | | | | | |
| * **.Assessment Schedule** | | | | | | | | | **Week** | | | | | | | | |
| -Assessment 1; Class test | | | | | | | | | To assess follow-up lecture. | | | | | | | | |
| -Assessment 2; Project Assignment | | | | | | | | | To assess ability of research and self-education. | | | | | | | | |
| -Assessment 3; Presentations | | | | | | | | | To assess understanding and the ability to present data. | | | | | | | | |
| -Assessment 3; Midterm Exam | | | | | | | | | To assess understand the course. | | | | | | | | |
| -Assessment 4; Final Exam | | | | | | | | | At the end of term | | | | | | | | |
| * **Weighting of Assessments** | | | | | | | | | | | | | | | | | |
| -Mid-Term Examination | | | | | | | | | 10% | | | | | | | | |
| -Final-term Examination | | | | | | | | | 70% | | | | | | | | |
| -Project | | | | | | | | | 5% | | | | | | | | |
| -Class Test | | | | | | | | | 10% | | | | | | | | |
| -Presentation/Oral exam | | | | | | | | | 5% | | | | | | | | |
| -Total | | | | | | | | | 100% | | | | | | | | |
| **6. List of References** | | | | | | | | | | | | | | | | | |
| **6.1- Course Notes** | | | | | | | | | | | | | | | | | |
| **6.2- Essential Books (Text Books)**  1- *Welding Brazing and Soldering,* VOL 06, *ASM HANDBOOK,* ASM INTERNATIONAL, 1993  2- *Modern Welding Technology*  3- *Welding Repair* | | | | | | | | | | | | | | | | | |
| **6.3- Recommended Books**   * ASME 9 and AWS D 1.1 | | | | | | | | | | | | | | | | | |
| **6.4- Periodical**  Several Website according to the search of students to construct the report that required in assessment 3 | | | | | | | | | | | | | | | | | |
| **7. Facilities Required for Teaching and Learning** | | | | | | | | | | | | | | | | | |
| .Board, Data show, Lap top | | | | | | | | | | | | | | | | | |
| **Course Coordinator:** | | | **Prof. Dr. M. R. El Kousy**  **Prof. Dr. Nahed A. Abdel Rahem** | | | | | | | | | | | | | | |
| **Head of Department:** | | | **Prof. Dr. El-sayed Mahmoud El-Banaa** | | | | | | | | | | | | | | |

