

**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**
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| -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
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| **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**  |

