

**Department 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:** | Mining, Petroleum and Metallurgical engineering |
| **Department offering the course:** | Mining, Petroleum and Metallurgical Engineering |
| **Academic Level:** | 3 rd year |
| **Date**  | 2014 |
| **Semester (based on final exam timing)** |  Fall Spring |
| **A- Basic Information** |
| **1. Title:** | Theory of Elasticity and Plasticity  | **Code:** | MET 303  |
| **2. Units/Credit hours per week:**  | Lectures | 4 | Tutorial | 1 | Practical |  | Total | 5 |
| **B- Professional Information** |
| **1. Course description:** | To compute stress and strain analysis, yielding criteria, equations of equilibrium, compatibility and Air's functions. |
| **2. Intended Learning Outcomes of Course (ILOs):** | **a) Knowledge and Understanding** |
| 1. Stress analysis in engineering applications and mechanical properties and their relationship to shaping and manufacturing methods and failure of systems. |
| **b) Intellectual Skills** |
| 2. Assess and evaluate the characteristics, performance and failure of components, systems and processes. |
| **c) Professional and Practical Skills** |
| 3. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve metallurgical engineering problems. |
| 4. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. |
| **d) General and Transferable Skills** |
| 5. 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** |
| Stress analysis | 15 | 12 | 3 |
| Strain analysis | 10 | 8 | 2 |
| Stress- strain relationship | 10 | 8 | 2 |
| Elements of theory of plasticity | 15 | 12 | 3 |
| Cartasian coordinates, Equations of equilibrium, Equations of compatibility and Airy stress function | 15 | 12 | 3 |
| Applications for metals and polymers  | 5 | 4 | 1 |
| **4. Teaching and Learning Methods** | Lectures (🗸)  | Practical Training/ Laboratory ( )  | Seminar/Workshop ( )  |
| Class Activity (🗸)  | Case Study (🗸)  | Projects ( )  |
| E-learning ( )  | Assignments /Homework ( 🗸)  | Other: Information collection |
| **5. Student Assessment Methods** |
| * **.Assessment Schedule**
 | **Week** |
| -Assessment 1; Class test  | 2,4,6,10,12 and 14 regularly 6 assignments |
| -Assessment 2; Project Assignment  | 5th |
| -Assessment 3; Presentations  | 12th |
| -Assessment 3; Midterm Exam | 8th |
| -Assessment 4; Final Exam | End of the term |
| * **Weighting of Assessments**
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| -Mid-Term Examination | 15 % |
| -Final-term Examination  | 65 % |
| -Project | 5% |
| -Class Test | 10 |
| -Presentation | 5% |
| -Total | 100 % |
| **6. List of References** |
| 6.1- Course Notes |
| 6.2- Essential Books (Text Books) |
| 1- Mechanical Metallurgy; G.E. Dieter, Mc. Grow- Hill Book Company, 1988. ( Part  1,Ch 2-3 )  |
| 2- Mechanics of Materials, F.P. Beer and E.R. Johnston,jr. |
| 3- Introduction to mechanics of Materials, W.F.Riley, and L.W. Zachary. |
| 4- Solution of Problems in Strength of Mechanics of Solids, S.A. Urry and P.J.  Turner. |
| 5- Engineering Solid Mechanics Fundamentals and Application, A.R. Ragab, and S.E.  Bayoumi.  |
| 6.3- Recommended Books |
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| 6.4- Periodicals, Web Sites, … etc |
| ------------------------------------ |
| **7. Facilities Required for Teaching and Learning** |
| Board  |
| over head projector |
| **Course Coordinator:** | **Prof. Dr. El-sayed Mahmoud El-Banna** |
| **Head of Department:**  | **Prof. Dr. El-sayed Mahmoud El-Banna** |

