

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

