

**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:** | Materials and Metallurgical Engineering |
| **Department offering the program:** | Department of Mining, Petroleum and Metallurgical Engineering |
| **Department offering the course:** | Engineering Mathematics and Physics |
| **Academic Level:** | 2nd Year |
| **Date**  | 2014 |
| **Semester (based on final exam timing)** |  Fall Spring |
| **A- Basic Information** |
| **1. Title:** | Mathematics | **Code:** | MTH 222 |
| **2. Units/Credit hours per week:**  | Lectures | 4 | Tutorial | 2 | Practical | **----** | Total | 5 |
| **B- Professional Information** |
| **1. Course description:** | At the end of this course, the student should be able to:* Understand the algebraic structure of Vector Spaces.
* Solve a System of Linear Equations exactly, iteratively, or approximately.
* Solve the Eigenvalue Problem of a Square Matrix.
* Solve partial differential equations of different types.
* Use different types of special functions.
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| **2. Intended Learning Outcomes of Course (ILOs):** | **a) Knowledge and Understanding** |
| 1. Concepts and theories of mathematics and sciences, appropriate to the discipline |
| **b) Intellectual Skills** |
| **2.**  Select appropriate mathematical and computer-based methods for modeling and analyzing metallurgical problems problems |
| **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 |
| **d) General and Transferable Skills** |
| 4. Communicate effectively |
| **3. Contents** |
| **Topic** | **Total hours** | **Lectures hours** | **Tutorial/ Practical hours** |
| **Vector Spaces** | 10 | 6 | 4 |
| **Systems of Linear Equations**  | 16 | 10 | 6 |
| **The Eigenvalue Problem** | 16 | 10 | 6 |
| **Matrix Functions and Diagonalization.** | 12 | 8 | 4 |
| **Special Functions: Gamma, Beta and Bessel** | 10 | 6 | 2 |
| **Classification of Second Order Partial Differential Equations** | 6 | 4 | 2 |
| **Exact solutions of Partial Differential Equations** | 14 | 6 | 2 |
| **Numerical Solutions of Partial Differential Equations** | 14 | 10 | 4 |
| **Total** | 90 | 60 | 30 |
| **4. Teaching and Learning Methods** | Lectures ( )  | Practical Training/ Laboratory ( )  | Seminar/Workshop ( )  |
| Class Activity ( )  | Case Study ( )  | Projects ( )  |
| E-learning ( )  | Assignments /Homework ( )  | Other:  |
| **5. Student Assessment Methods** |
| * **Assessment Schedule**
 | **Week** |
| -Assessment 1; Class test  | 12th Week |
| -Assessment 2; Project Assignment  |  |
| -Assessment 3; Presentations  |  |
| -Assessment 3; Midterm Exam | 9th Week |
| -Assessment 4; Final Exam | 15th Week |
| * **Weighting of Assessments**
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| -Mid-Term Examination | 20% |
| -Final-term Examination  | 66.67% |
| -Project |  |
| -Class Test | 13.33% |
| -Presentation |  |
| -Total | 100% |
| **6. List of References** |
| * **Course Notes**
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| * “Mathematics, Second Year for Engineering Students”, Department of Engineering Math. & Physics - Faculty of Engineering – Cairo university.
 |
| * Advanced Engineering Maths. by Erwin Kreyszig 8th ed., 2000 Chapters 5-7 and 12-15 (45/MA)
* Elementary Linear Algebra 7th ed. 1994 by Howard Anton (ALG 18)
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| **7. Facilities Required for Teaching and Learning** |
| * White board, projector
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| **Course Coordinator:** | Dr. Eman El-Maghraby |
| **Head of Department:**  | **Dr. E. Elbanna**  |

