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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | | **Course title** | | | | **L** | | **T** | | | **P** | **J** | **C** |
| **MAT-1001** | | **Fundamentals of Mathematics** | | | | **3** | | **2** | | | **0** | **0** | **4** |
| **Pre-requisite** | | **None** | | | | | **Syllabus Version** | | | | | | |
|  | |  | | | | | 1.0 | | | | | | |
| **Course Objectives (CoB): 1, 2** | | | | | | | | | | | | | |
| The course is aimed at providing  [1] necessary and relevant background to understand the other important engineering mathematics courses  [2] basic knowledge for the non-mathematics students to learn further topics and apply it in solving real-world engineering problems | | | | | | | | | | | | | |
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| **Course Outcomes (CO): 1,2,3,4,5** | | | | | | | | | | | | | |
| At the end of the course the student should be able to  [1] Solve a system of linear equations by matrix method  [2] Apply the techniques of differentiation to find maxima and minima, and techniques of integration to evaluate areas and volumes of revolution  [3] Understand the concept of ordinary differential equations, and first and second order linear differential equations  [4] Have a clear understanding of analytic geometry and vector algebra  [5] Apply concepts of mathematical logic and elementary probability to real life problems | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | |
| **Student Learning Outcomes (SLO):** | | | | **1, 2, 7,9** | | | | | | | | | |
| [1] Having an ability to apply mathematics and science in engineering applications  [2] Having a clear understanding of the subject related concepts and of contemporary issues  [7] Having computational thinking (Ability to translate vast data in to abstract concepts and to understand database reasoning  [9] Having problem solving ability- solving social issues and engineering problems | | | | | | | | | | | | | |
| **Module:1** | **Matrices** | | | | **5 hours** | | | | | **CO: 1** | | | |
| Matrices - types of matrices - operations on matrices - determinants - adjoint matrix –  inverse of a matrix - solution of a system of linear equations by inversion method –  elementary transformations – rank of a matrix - consistency and inconsistency of system  of equations | | | | | | | | | | | | | |
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| **Module:2** | **Differential Calculus** | | | | **6 hours** | | | | | **CO: 2** | | | |
| Differentiation of functions of single variable – differentiation techniques physical interpretations - differentiation of implicit functions – higher order derivatives – Taylor’s, McClaurin’s series - maxima and minima of functions of a single variable | | | | | | | | | | | | | |
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| **Module:3** | **Integral Calculus** | | | | **6 hours** | | | | | **CO: 2** | | | |
| Partial fractions - Integration- integration techniques- integration by parts- definite integrals – properties- evaluation of area and volume by integration | | | | | | | | | | | | | |
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| **Module:4** | **Linear Ordinary Differential Equations** | | | | **6 hours** | | | | | | **CO: 3** | | |
| Differential equations-definition and examples- formation of differential equation- solving differential equations of first order - solving second order homogenous differential equations with constant coefficients | | | | | | | | | | | | | |
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| **Module:5** | **Analytic geometry** | | | | **5 hours** | | | | | | **CO: 4** | | |
| Analytic geometry of three dimensions - direction cosines and direction ratios - plane, straight line and sphere, distance between points, distance to a plane | | | | | | | | | | | | | |
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| **Module:6** | **Vector Algebra** | | | | **7 hours** | | | | | | **CO: 4** | | |
| Vectors–operations on vectors-angle between two vectors-projection of one vector on another vector –equations of plane, straight line and sphere in vector forms-shortest distance between two skew lines - equation of a tangent plane to a sphere | | | | | | | | | | | | | |
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| **Module:7** | **Logic and Probability** | | | | **8 hours** | | | | | | **CO: 5** | | |
| Mathematical logic – propositions – truth table – connectives– tautology – contradiction.  Permutations and combinations – probability – classical approach – addition law - conditional probability - multiplicative law - Bayes' theorem and applications | | | | | | | | | | | | | |
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| **Module:8** | **Contemporary Issues** | | | | **2 hours** | | | | | | **CO: 2, 3, 5** | | |
| Industry Expert Lecture | | | | | | | | | | | | | |
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|  | **Total Lecture hours:** | | | | **45 hours** | | | | | |  | | |
| Tutorial | * A minimum of 10 problems to be worked out by students in every Tutorial Class * Another 5 problems per Tutorial Class to be given as home work   Mode: Individual Exercises, Team Exercises, Online Quizzes, Online Discussion Forums | | | | **30 hours** | | | | | | **CO: 1, 2, 3, 4, 5** | | |
| **Text Book(s)** | | | | | | | | | | | | | |
| * Engineering Mathematics, K. A. Stroud and Dexter J. Booth, 7th Edition, Palgrave Macmillan (2013). | | | | | | | | | | | | | |
| **Reference Books** | | | | | | | | | | | | | |
| * Elementary Engineering Mathematics, B. S. Grewal, 43rd edition, Khanna Publications, (2015). * Discrete Mathematics, Seymour Lipschutz and Marc Lipson, 6th Edition, Tata McGraw -Hill (2017). * Introduction to Probability and Statistics, Seymour Lipschutz and John Schiller, 3rd Indian Edition, Tata McGraw -Hill (2017). | | | | | | | | | | | | | |
| **Mode of Evaluation** | | | | | | | | | | | | | |
| Digital Assignments (Solutions by using soft skill), Quiz, Continuous Assessments, Final Assessment Test | | | | | | | | | | | | | |
| Recommended by Board of Studies | | | 3-6-2019 | | | | | | | | | | |
| Approved by Academic Council | | | No. 55 | | | | Date | | 13-06-2019 | | | | |