**COURSE STRUCTURE**

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| **Course Code** | **UMA1002A** | | | |
| **Course Category** | **Basic Sciences** | | | |
| **Course Title** | **Integral Calculus** | | | |
| **Teaching Scheme and Credits**  **Weekly load hrs** | **L** | **T** | **Laboratory** | **Credits** |
| 03 hours | 1hour | --- | 2+1+0=3 |
| **Pre-requisites**: HSC (Mathematics), Linear Algebra and Differential Calculus | | | | |
| **Course Objectives:**   1. To learn Basic Concepts of Mathematics useful for Engineering. 2. To apply mathematical tools in various Engineering problems. | | | | |
| **Course Outcomes:** After completion of this course, students will be able to  1. solve the differential equations which occur as models in Electrical circuits andheat transfer .(CL-II) 2. apply the knowledge of Geometry to draw the curves in Cartesian , polar and parametric form (CL-I) 3. apply methods of integration to compute area and volumes of two dimensional and three dimensional objects respectively(CL-I) 4. identify periodic wave forms in series of sines and cosines of multiple angles and carry out practical analysis(CL-I) | | | | |
| **Course Contents:**  **Ordinary Differential Equations and Applications**  Introduction to first order differential equations, modelling and solution of exact and linear differential equation.  **Group Activity: Applications of Differential Equations to Orthogonal Trajectories, Electrical Circuits, 1-Dimensional Heat Conduction Problemsetc.**  **Introduction to tracing of curves and 3-dimensional coordinate system:**  Standard and important curves in Cartesian, Parametric and Polar coordinates. Examples based on 3- dimensional Cartesian, spherical polar and cylindrical coordinate system.  **Tools for Integration, Multiple Integrals and their Applications**  Problems on Reduction formulae, Beta, Gamma functions, Differentiation under integral sign, Error functions.Double and Triple integrations.  **Group activity: Applications of double and triple integrals incalculating Area and Volume.**  **Fourier series**  Introduction to Fourier series,Dirichlet’s conditions, Harmonic Analysis.  **Tutorial Exercises:**   1. Linear and Exact DifferentialEquations. 2. Applications of DifferentialEquations. 3. Tracing of Curves (Cartesian and Parametric) 4. Tracing of Curves (Polar) and 3-dim coordinate system. 5. Reduction Formulae and Gamma functions. 6. Beta Functions. 7. DUIS & error function. 8. Double Integral. 9. Triple Integral. 10. Area and Volume. 11. Fourier series 12. Fourier Series of Odd and Even Functions and Harmonic Analysis   Three tutorials will be conducted using Mathematical Software. | | | | |
| **Learning Resources:**  **Reference Books**   * 1. Kreyszig Erwin, “Advanced Engineering Mathematics”, 10thedition, Wiley Eastern Limited2015.   2. Greenberg Michael D., “Advanced Engineering Mathematics”, 2ndedition, Pearson 2009.   3. Grewal B.S. “Higher Engineering Mathematics”, 44th edition, Khanna Publishers 2017.   **Supplementary Reading:**  Weber H.J. and  Arfken G.B. "Mathematical Methods For Physicists" ,6th edition, Academic Press 2011.  **Web Resources:**  *Differential Equations:*  *1.* [*http://nptel.ac.in/courses/111106100/1*](http://nptel.ac.in/courses/111106100/1)   1. *http://nptel.ac.in/courses/111106100/4*   *Fourier Series:*  [*http://*](http://nptel.ac.in/courses/111106100/1)*mathworld.wolfram.com/FourierSeries.html*  **MOOCs (Coursera)**  *https://www.edx.org/course/differential-equations-linear-algebra-and-nxn-systems-of-differential-equations*  **MIT Opencourseware** | | | | |
| **Pedagogy:**   1. Team teaching 2. Group activity 3. Audio- video techniques 4. Tutorials and class tests | | | | |
| **Assessment Scheme:**  **Class Continuous Assessment (CCA): 100 marks**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Assignment/ short term Question answers Tests | Tutorial | Mid Term Test | Group Activity | Case study | MCQ | Oral | Attendance | Total | | 20 Marks | 50 Marks | 15 Marks | 15 Marks | Nil | Nil | Nil |  | 100 Marks |   **Laboratory Continuous Assessment (LCA)**: **NA**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Regularity and punctuality** | **Understanding of objective** | **Understanding of procedure** | **Experimental skills** | **Ethics** | |  |  |  |  |  |   **Term End Examination : 50 marks** | | | | |

**Syllabus:**

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| **Module**  **No.** | **Contents** | **Workload in Hrs** | | |
| ***Theory*** | ***Tutorial*** | ***Assess*** |
| 1 | **Ordinary Differential Equations and Applications** | 8 | 2 | -- |
| 2 | **Introduction to Tracing of Curves and 3 dimensional coordinate system** | 4 | 2 | -- |
| 3 | **Tools for Integration, Multiple Integrals and their Applications** | 13 | 6 | -- |
| 4 | **Fourier Series and Harmonic Analysis** | 5 | 2 | --- |

Sign

( < Name >

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