**Course description form**

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| 1. **Course Name** | | | | | | | | |
| Applied Mathematics II | | | | | | | | |
| 1. **Course Code** | | | | | | | | |
| (E202) | | | | | | | | |
| 1. **Semester/Year** | | | | | | | | |
| 2n’d Semester/Second Year | | | | | | | | |
| 1. **The date this description was prepared** | | | | | | | | |
| / 9 / 202325 | | | | | | | | |
| 1. **Available forms of attendance** | | | | | | | | |
| Face-to-Face theoretical lectures | | | | | | | | |
| 1. **Number of study hours (total) / number of units (total)** | | | | | | | | |
| 60/4 | | | | | | | | |
| 1. **Name of the course administrator** | | | | | | | | |
| Name: Assist. Lect. Mounir Thamer Ismaiel  Email:[moneerthameer\_enge@uodiyala.edu.iq](mailto:moneerthameer_enge@uodiyala.edu.iq) | | | | | | | | |
| 1. **Course objectives** | | | | | | | | |
| To study sequence, series and infinity series.  Application of power series.  Matrices, Eigen values and Eigen vectors.  Vectors  Fourier Series.  A1- acquiring the essential knowledge in calculus and ability to use this knowledge in other engineering courses in electrical engineering.  A2- The ability to solve different mathematical problems and gain the ability to analyze them.  B1 - Teaching students the skills, to elaborate their mathematical tools to solve different engineering problems. | | | | **Objectives of the study subject** | | | | |
| 1. Solution of non-linear equations and root findings. | | | | | | | | |
| solve different mathematical problems and gain the ability to analyze them | | | **The Strategy** | | | | | |
| 1. Numerical integration and differentiation. | | | | | | | | |
| Interpolation and solving differential equations. | **Learning method** | **Required learning outcomes** | | | | **Name of the unit or topic** | **Hours** | **Week** |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the basic concepts of different tests such as simple sequence test, ratio test, and root test.  The ability to determine when a sequence converges and when it diverges. | | | | Sequence and Series: Convergence and Divergence Test, Geometric Series and Partial Sum | 4 | 1 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Determine the convergence of a given series using function integration. If the function is positive, decreasing, volatile (decreasing variable), and convergent, then the sequence is convergent. | | | | Integral, Comparison, Ratio and Root Tests, Alternating series | 4 | 2 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of strong series and its mathematical representation. Ability to analyze robust series properties such as convergence point and convergence range. | | | | Power Series, Taylor and Maclaurin Series | 4 | 3 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | The ability to understand how functions are represented using power series. Identify the famous functions that can be represented using power series, such as algebraic, | | | | Applications of Power Series | 4 | 4 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of cross-section between two triangular spaces. Ability to calculate the cross-section between two triangular spaces and interpret its meaning | | | | Vectors: Dot and Cross Product, Equations of Lines and Planes | 4 | 5 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of speed and acceleration as physical quantities. The ability to calculate speed and acceleration using vector functions and interpret their meaning. | | | | Vector Function, Velocity and Acceleration | 4 | 6 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of curvature as a measure of the change in direction of a curve at a specific point on the curve. Ability to calculate curvature using the first and second derivatives of the representative function of the curve. | | | | Curvature and the Unit Normal Vectors | 4 | 7 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of eigenvalues and eigenvectors of a matrix. Learn about the importance of eigenvalues and eigenvectors in linear algebra and their applications.. | | | | Matrices: Eigen Values and Eigen Vectors | 4 | 8 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | The ability to calculate the eigenvalues and eigenvectors of a given matrix. Using different methods, such as solving the linear equation for eigenvalues and eigenvectors. | | | | Gauss Elimination | 4 | 9 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of the method and its importance in solving systems of linear equations. The ability to implement an algorithm to solve a system of linear equations. | | | | Rank of Matrix | 4 | 10 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Find the rank of the matrix | | | | Applications of Matrices in Electric Circuits | 4 | 11 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of multiple integration and its importance in calculating area and volume in space. | | | | Multiple Integral: Double and Triple Integral, Area and Volume | 4 | 12 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understanding double integration in polar form: Understanding the concept of double integration and how to apply it in polar form. | | | | Double Integral in Polar Form | 4 | 13 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of triple integration and its importance in mathematics and physics. | | | | Triple Integrals in Rectangular Coordinates | 4 | 14 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Understand the concept of integrals and their role in mathematics and physics. And learn about the types of integrals, such as surface integrals on defined surfaces and general surfaces. | | | | Surface Integrals | 4 | 15 |
| 1. **Course Evaluation** | | | | | | | | |
| Distribution of the grade out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written exams, reports, etc. | | | | | | | | |
| 1. **Learning and teaching resources** | | | | | | | | |
| Calculus and Analytic Geometry by Thomas. | | | | | Required textbooks (methodology, if any) | | | |
| Advanced Engineering Mathematics, Erwin Kryszig. | | | | | Main references (sources) | | | |
| Calculus, Early Transcendentals by Stewart | | | | | Recommended supporting books and references (scientific journals, reports....) | | | |
|  | | | | | Electronic references, Internet sites | | | |