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| **College**  | Factual of applied math |
| **Department** | Applied math |
| **Program** | Bc Applied math program  |
| **Course Title** | Numerical analysis | **Course Number:** | 15010325 |
| **Year** | 2023\2024 | **Semester:** | Summer  |
| **Prerequisite(s)** |  |
| **Instructor** | Dr. Abdulqader Mustafa  |
| **Instructor's e-mail** | abdulqader.mustafa@ptuk.edu.ps |
| **Office Hours** | Every Wednesday by online meetings in the lecture time. |
| **Class Time** | 8:00-10:00 | **Class Room:** | F102 |
| **Course description** | The basic idea of numerical analysis is to find an approximation for the solution which could not be found analytically. This course contains the following topics: solving equations with one variables, lagrange interpolation and polynomial approximations, solving system of linear equations and IVP of ordinary differential equations. |
| **Course Intended Learning Outcomes (CILOs)** | 1. To use different techniques for solving equations in one variable.
2. To use Lagrange interpolation for approximating polynomials.
3. To use different methods for solving linear systems.
4. To solve IVP ordinary differential equations.
 |
| **Textbook(s)** | **Numerical Analysis 9th Edition (Burden & Faires)** |
| **Other required material (References):** |  |
| **Other Resources used (e.g. e-learning, field visits, periodicals, software, etc. )** |  |

**Academic Quality Assurance Department**

**Course Syllabus Form**

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| **Course Teaching Methods** |
| **Teaching Method** | **CILOs** |
| Discussion |  |
| Assignment |  |
| Lecture in Zoom program |  |
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| **Assessment Type** | **Details/Explanation of assessment in relation to CILOs** | **Weight** | **Date(s)** |
|  |  |  |   |
| **Midterm** |  |  40% |  |
|  |  |  |  |
| **Projects** |  |  |  |
| **Assignments** |  | 15% |  |
|  |  |  |  |
| **Final Exam** |  | 45% |  |
| **Total** |  | 100% |  |

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| **Course Intended Learning Outcomes (CILOs)** |
| **CILOs** | **Mapping to Program ILOs** |
| **On successful completion of the course, students will be able to:** | **a** | **B** | **c** | **d** | **E** | **f** | **g** | **h** | **I** | **j** |
| 1. To use different techniques for solving equations in one variable.

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| 1. To use Lagrange interpolation for approximating polynomials.
 |  |  |  |  |  |  |  |  |  |  |
| 1. To use different methods for solving linear systems.
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| 1. .4- To solve IVP ordinary differential equations
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| **Course Weekly Breakdown** |
| **Week** | **Date** | **Topics Covered** | **CILOs** | **Lab Activities** | **Assessment** |
| 1 | 23\7-30\7 | **1.1 Review of calculus****-1.2 Round-off Error and computer arithmetic**  |  |  |  |
| 1 | 23\7-30\7 | * **2.1 Bisection Method**
* **2.2 Fixed point –iteration**
* **2.3 Newton’s Method**
 |  |  |  |
|  2 | 30\7-7\8 | * **2.4 Error Analysis for iterative method**

**2.6 Zero’s of polynomials and Muller’s Method** |  |  |  |
| 2 | 30\7-7\8 | . **-3.1 Interpolation and the Lagrange polynomial and Nevil's Method.** |  |  |  |
| 3  | 7\8-14\8 | **- 3.2 Divided Differences** |  |  |  |
| 3 | 7\8-14\8 |  **-4.1Numerical Differentiation** |  |  |  |
| 4 | 14\8-21\8 | **4.2 Elements of Numerical integration** |  |  |  |
| 4 | 14\8-21\8 | **-4.3 Composite of Numerical integration** |  |  |  |
| 5 | 28\8-6\9 | **5.2 Euler Method****5.3 Higher order Taylor methods** |  |  |  |
| 5 | 28\8-6\9 | **5.4 Runge Kutta methods** |  |  |  |
| 6 | 6\9-13\9 | **- 7.1 Norms of vectors and matrices** |  |  |  |
| 6 | 6\9-13\9 | **7.3 Iterative techniques for solving linear system** |  |  |  |
| 7 | 13\9-20\9 | **ODEs and linear systems** |  |  |  |
| 7 | 13\9-20\9 | revision |  |  |  |

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| **Prepared by:** | **Abdulqader Mustafa** | **Signature**  | **Abdulqader**  |
| **Head of Department**  | **Dr.Rannia Wannan** | **Signature** |  |
| **Date**  | **23\7\2024** |