**NEAR EAST UNIVERSITY – COMMON COURSES COORDINATION UNIT**

Department of Mathematics
Course Information Sheet & Course Outline

| Course Code | Course Name | Credit | ECTS |
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| MTH 201 | DIFFERENTIAL EQUATION | 4 | 6 |

**Pre-requisite: MTH102**

| Language: English | Course Type: Compulsory | Year: 2019/2020 | Semester:Spring |
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| Weekly Hours | Class Hours | Laboratory | Practicum | Learning Sessions | | | |
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| **Learning Outcomes** | By the end of this course, the student should be able to do the following:<br>1. Understand the most common numerical methods used in engineering analysis, when to use each method, and how to implement basic methods using EXCEL.<br>2. Estimate the amount of error inherent in different numerical methods.<br>3. Assess the efficiency of a selected numerical method when more than one option is available to solve a certain class of problem.<br>4. Understand the convergence properties and limitations of different numerical methods. |
| **Course Description** | Methods for numerical solution of mathematical problems. Roots, optimization, linear algebraic equations, matrices, curve fitting, differentiation, integration, ordinary differential equations. |
| **Course Objectives** | The goal of this course is to teach students how to apply computational methodologies to solve engineering problems when no closed-form, analytical solution exists. Because mathematical judgment and approximations are involved, the material in this course will be somewhat more open-ended than the material covered in other courses. Emphasis will be placed on understanding the basic concepts behind the various numerical methods studied, implementing basic numerical methods using the programming environment. |
| | 1 Emel Yavuz Duman. (2012).Nümerik Analiz Ders Notları |
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| **Course Content** | |
| **Methods and Techniques Used in the Course** | |
| **Ders İçeriği / Course Content** | 1. Approximations and Error Analysis Solution of Differential Equations<br>2. Taylor Series Approximation Exact Differential Equations and Integrating Factors<br>3. Numerical Differentiation, Propagation of Error Linear Equations and Bernoulli<br>4. Roots of Equations. Graphical Method, Bisection Method<br>5. The False Position Method, Simple One Point Iteration<br>6. Newton-Raphson Method, Secant Method<br>7. Newton-Raphson Method for Systems of Nonlinear Equations, One Point Iteration<br>8. Solution of Linear Systems, LU Crout Decomposition<br>9. Gauss-Seidel Method<br>10. Optimization, Newton's Method, Steepest Ascent Method<br>11. Curve Fitting, Linear Regression, Least Squares<br>12. Newton's Interpolating Polynomials, Lagrange Interpolating Polynomials<br>13. Numerical Integration, Newton Cotes Integration Formula, Simpson's 1/3 and 3/8 Rules<br>14. Differential Equations, Euler's Method, Heun's Method |