**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| **DIFFERENTIAL EQUATIONS** | **152413001** |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| X |  |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| English | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The main of the course is to introduce the basic terminology of differential equations and to examine, how differential equations are derived in an attempt to formulate, or describe, physical phenomena in terms of mathematics. |
| **Short Course Content** | Differential equations and solutions, first-order differential equations and solution methods, applications of first-order differential equations, higher order differential equations and solution methods, Laplace transform and applications, linear differential equation systems. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods. | 1, 2 | 1, 11 | A |
| **2** |  |  |  |  |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
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| **Main Textbook** | Özer, N. ve, Eser, D. “Diferensiyel Denklemler”, Eskişehir. |
| **Supporting References** | A Palm, W.J., A Yunus A. Cengel, D., “Differential Equations for Engineers and Scientists”, McGraw-Hill Education. |
| **Necessary Course Material** | Blackboard, computer and projection |

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| **Course Schedule** | |
| **1** | Definition and classification of differential equations, first-order differential equations, separable equations, homogeneous equations and solution methods |
| **2** | Exact differential equations and solution methods, integrating factors |
| **3** | Linear and nonlinear differential equation and solution methods |
| **4** | Higher-degree differential equations, substitutions. |
| **5** | Applications of first-order differential equations |
| **6** | Higher-order differential equations and solution methods, differential equations with the dependent and independent variables, |
| **7** | Linear differential equations, linear dependence and linear independence, homogeneous linear equations and solution methods |
| **8** | Midterm Exam |
| **9** | Midterm Exam |
| **10** | Solutions of non- homogeneous linear equations and linear differential equations with constant coefficients, Cauchy-Euler and Lagrange equations and solution methods |
| **11** | Laplace transform and applications |
| **12** | Inverse Laplace transform and applications |
| **13** | Linear differential equation systems |
| **14** | Solution methods of the linear differential equation systems |
| **15** |  |
| **16,17** | Final Exam |

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| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Time (Hour)** | **Total Workload (Hour)** |
| Course Time (number of course hours per week) | 14 | 3 | 42 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 2 | 3 | 6 |
| Homework |  |  |  |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
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|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 50 | 50 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 50 | 50 |
|  | **Toplam iş yükü** | | **152** |
|  | **Toplam iş yükü / 30** | | **5.06** |
|  | **Dersin AKTS Kredisi** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 60 |
| **Total** | 100 |

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| **RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems. | 3 |
| **2** | Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods. | 3 |
| **3** | Ability to design a complex system, a component and/or an engineering process under real life constrains or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods. | 3 |
| **4** | Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies. | 2 |
| **5** | In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results. | 1 |
| **6** | Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence. | 1 |
| **7** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language. | 1 |
| **8** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement. | 3 |
| **9** | Understanding of professional and ethical issues and taking responsibility | 3 |
| **10** | Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development. | 1 |
| **11** | Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions. | 1 |
| **12** |  |  |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024