# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

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|---|---|---|---|---|---|---|---|---|---|
| Course Title | Electronic Applications in Mechanical Engineering | | | | | | | | |
| Course Code | MME503 | | Couse Level | Second Cycle (Master's Degree) | | | | | |
| ECTS Credit | 8 | Workload | 195 *(Hours)* | Theory | 3 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | The aim of this course is to provide the student with general mathematical techniques and basic numerical methods used to solve advanced heat conduction problems | | | | | | | | |
| Course Content | The conduction general rate equation. Multidimensional heat conduction. Heat transfer from extended surfaces. Multidimensional steady state heat conduction. Numerical methods on steady state heat conduction. Finite difference methods steady state conduction. Transient heat conduction. Laplace transformation methods. Numerical methods in Transient heat conduction | | | | | | | | |
| Work Placement | N/A | | | | | | | | |
| Planned Learning Activities and Teaching Methods | Explanation (Presentation), Discussion, Project Based Study, Individual Study, Problem Solving | | | | | | | | |
| Name of Lecturer(s) | | | | | | | | | |

| Assessment Methods and Criteria | | |
|---|---|---|
| Method | Quantity | Percentage (%) |
| Midterm Examination | 1 | 15 |
| Final Examination | 1 | 60 |
| Quiz | 4 | 15 |
| Assignment | 5 | 5 |
| Term Assignment | 1 | 5 |

| Recommended or Required Reading | |
|---|---|
| 1 | Yener, Y., Kakaç S., HeatConduction, 4th edition, Taylor & Francis, 2008. |
| 2 | Özışık, M. N.,HeatConduction, 2nd edition, Wiley-Interscience, 1993. |
| 3 | Jiji, M.L.,HeatConduction, 3rd edition, Springer, 2009. |

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Foundations of heat transfer, general heat conduction equation |
| 2 | Theoretical | One-dimensional steady heat conduction |
| 3 | Theoretical | Orthogonal functions, Fourier expansions and finite Fourier transforms |
| 4 | Theoretical | Orthogonal functions, Fourier expansions and finite Fourier transforms |
| 5 | Theoretical | Steady Two-and Three dimensional heat conduction: solutions with separation of variables |
| 6 | Theoretical | Steady Two-and Three dimensional heat conduction: solutions with separation of variables |
| 7 | Theoretical | Unsteady heat conduction: solutions with separation of variables |
| 8 | Intermediate Exam | Midterm Exam |
| 9 | Theoretical | Unsteady heat conduction: solutions with separation of variables |
| 10 | Theoretical | Solutions with integral transforms |
| 11 | Theoretical | Solutions with integral transforms |
| 12 | Theoretical | Numerical solutions |
| 13 | Theoretical | Numerical solutions |
| 14 | Theoretical | Further methods of solution |
| 15 | Theoretical | Further methods of solution |
| 16 | Final Exam | Final Exam |

| Workload Calculation | | | | |
|---|---|---|---|---|
| Activity | Quantity | Preparation | Duration | Total Workload |
| Lecture - Theory | 16 | 2 | 4 | 96 |
| Assignment | 5 | 0 | 3 | 15 |
| Term Project | 1 | 15 | 10 | 25 |
| Quiz | 4 | 4 | 1 | 20 |

| | | | | |
|---|---|---|---|---|
| Midterm Examination | 1 | 15 | 2 | 17 |
| Final Examination | 1 | 20 | 2 | 22 |
| | | | Total Workload (Hours) | 195 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 8 |
| **25 hour workload is accepted as 1 ECTS* | | | | |

| **Learning Outcomes** | |
|---|---|
| 1 | Ability to compute the heat conduction |
| 2 | Ability to generate boundary conditions |
| 3 | Ability to use solution methods of heat conduction mechanisms |
| 4 | Ability to use variables separate method |
| 5 | Ability to compute numerical heat conduction |
| 6 | Ability to use 2D and 3D modeling technics |

| **Programme Outcomes** *(Mechanical Engineering (English) Master)* | |
|---|---|
| 1 | To be able to access wide and deep information with scientific researches in the field of Engineering, evaluate, interpret and implement the knowledge gained in his/her field of study |
| 2 | To be able to complete and implement “limited or incomplete data” by using the scientific methods |
| 3 | To be able to consolidate engineering problems, develop proper method(s) to solve and apply the innovative solutions to them |
| 4 | To be able to develop new and original ideas and method(s), to develop new innovative solutions at design of system, component or process |
| 5 | To be able to gain comprehensive information on modern techniques, methods and their borders which are being applied to engineering |
| 6 | To be able to design and apply analytical, modeling and experimental based research, analyze and interpret the faced complex issues during the design and apply process |
| 7 | To be able to gain high level ability to define the required information and data |
| 8 | To be able to work in multi-disciplinary teams and to take responsibility to define approaches for complex situations |
| 9 | To be able to transfer of the process and results of studies at national and international environments systematic and clear verbal or written |
| 10 | To be able to be aware of social, scientific and ethical values guarding adequacy at all professional activities and at the stage of data collection, interpretation, and announcement |
| 11 | To be able to become aware of new and developing application of profession and ability to analyze and study on those applications |
| 12 | To be able to interpret engineering application’s social and environmental dimensions and it’s compliance with the social environment |

**Contribution of Learning Outcomes to Programme Outcomes** *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

| | L1 | L2 | L3 | L4 | L5 | L6 |
|---|---|---|---|---|---|---|
| P1 | 4 | 4 | 4 | 4 | 4 | 2 |
| P2 | 3 | 3 | 4 | 4 | 4 | 2 |
| P3 | 5 | 5 | 5 | 5 | 4 | 4 |
| P4 | 3 | 3 | 5 | 3 | 3 | 3 |
| P5 | 4 | 4 | 3 | 3 | 3 | 3 |
| P6 | 4 | 4 | 4 | 5 | 4 | 4 |
| P7 | 5 | 4 | 4 | 4 | 4 | 4 |
| P8 | 4 | 4 | 3 | 4 | 3 | 4 |
| P9 | 4 | 3 | 5 | 3 | 4 | 4 |
| P10 | 3 | 4 | 5 | 4 | 4 | 5 |
| P11 | 4 | 5 | 5 | 5 | 5 | 5 |
| P12 | 3 | 4 | 5 | 5 | 3 | 3 |