



## AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title	Dynamical System Modelling and Simulation								
Course Code	MME539	Course Level			Second Cycle (Master's Degree)				
ECTS Credit	8	Workload	198 (Hours)	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	To introduce fundamentals on modelling and simulation of dynamical systems, and to provide simulation tools to obtain response of dynamical systems								
Course Content	Modeling dynamical systems, numerical tools to simulate behavior of dynamical systems.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation)								
Name of Lecturer(s)	Lec. Turgay ERAY								

### Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	50
Assignment	1	30

### Recommended or Required Reading

1	Modelling and Simulation of Dynamic Systems", Robert L. Woods, Lent L. Lawrence
2	Modelling, Analysis & Control of Dynamic Systems. William J. Palm, III

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to Modeling and Simulation
2	Theoretical	Formulation of Engineering Systems: Differential Equations
3	Theoretical	Mechanical Systems: Translational and Rotational
4	Theoretical	D'Alembert's Principle and Lagrange Mechanics
5	Theoretical	Electrical Systems
6	Theoretical	Mixed Discipline Systems: Electromechanical system example
7	Theoretical	Modeling examples: Problem solutions
8	Intermediate Exam	Midterm Exam
9	Theoretical	Thermal and Fluid Systems
10	Theoretical	Nonlinear systems: Linearization
11	Theoretical	Stability analysis: Lyapunov stability criterion
12	Theoretical	Frequency response analysis
13	Theoretical	Time response analysis of linear systems: Analytical solutions
14	Theoretical	Time response analysis of linear systems: Simulation tools
15	Theoretical	Time response analysis: Simulation examples
16	Final Exam	Final

### Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	5	4	126
Assignment	3	1	3	12
Term Project	1	10	5	15
Quiz	4	3	1	16
Midterm Examination	1	15	2	17
Final Examination	1	10	2	12
Total Workload (Hours)				198
[Total Workload (Hours) / 25*] = ECTS				8

\*25 hour workload is accepted as 1 ECTS



**Learning Outcomes**

1	To learn modeling and simulation of dynamical systems
2	To be able to solve differential equations by using numerical tools
3	To enrich programming and simulation skills for real-life problems.
4	Ability to set dynamic system
5	To be able to solve dynamic system problems

**Programme Outcomes** (*Mechanical Engineering Master's Without Thesis*)

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 become 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 gain ability 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
P1	3	5	5	4	5
P2	4	4	5	4	3
P3	4	3	4	5	5
P4	5	2	4	5	2
P5	5	4	4	3	4
P6	5	5	3	4	4
P7	3	5	5	5	4
P8	4	2	4	3	2
P9	4	4	3	3	5
P10	3	4	4	4	3
P11	5	5	4	5	5
P12	4	3	5	4	5

