1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	KM306 Mathematical Modelling
Course Semester	6
Catalog Description (Content) of the Course	Mathematical modeling of physical and chemical processes. Applications of ordinary and partial differential equations in chemical engineering problems. Analytical and computer techniques. Regression and experimental modeling.
Main Textbook	Ingham, J., Dunn, I.J., Heinzle, E., Prenosil, J.E., "Chemical Engineering Dynamics: An Introduction to Modelling and Computer Simulation", 3rd Ed., Wiley-India, 2013.
Supporting Textbooks	• Bird R.B.., Warren E.S., Edwin N. L., "Transport Phenomena", Wiley International Edition, 2002. • Rice, R. C., Do, D., "Applied Mathematics and Modelling for Chemical Engineers", 2nd Edition, John Wiley, NY,2012. • Hangos, K., Cameron, I., "Process Modelling and Model Analysis'', Acedemic Press, 2001. • Luyben, W. L., "Process Modelling , Simulation and Control for Chemical Engineering", Mc Graw Hill, 1991.
Course Credit (ECTS)	6
Prerequisites of the Course (Compulsory attendance should be indicated here.)	There is no prerequisite for this course. There is 70% attendance requirement.
Type of the Course	Compulsory
Instruction Language of the Course	Turkish
Object and Target of the Course	• To be able to establish and solve the necessary matter and energy balances for mathematical identification of basic chemical and physical systems • Demonstrate the necessity of numerical and analytical analysis techniques • To solve the application of ordinary and partial differential equations to chemical engineering problems by using package programs (polymath, matlab etc.) • Experimental planning, development of data analysis skills
Learning Outcomes of the Course	1. Ability to apply the knowledge of mathematics, science and engineering 2. To gain the ability to define a system, component or process in mathematical form, and to identify, formulate, and solve engineering problems
Mode of Delivery	Face to face education
Weekly Schedule of the Course	**1. Week:** Definitions, use of mathematical models and applications **2-7. Week:** Macroscopic modelling of chemical engineering systems: Material and energy equations in steady-state and unsteady-state systems **8-12. Week:** Microscopic modeling: Development and applications of shell momentum balances, shell mass balances and shell energy balances **13. Week:** Experimental modeling: Experimental planning, data analysis **14. Week:** Application of partial differantial equations to the chemical engineering problems

Educative Activities
(Credit will be determined based on the time given for these activities. Should be filled carefully.)

Theoretical Study Hours of Course Per Week
Reading
Searching in Internet and Library
Preparing Homeworks
Mid-Term and Studying for Mid-Term
Final and Studying for Final

Assessment Criteria

	Quantity	**Total Contribution (%)**
Midterm	2	50
Homework	2	5
Assignment		
Projects		
Practice		
Quiz	1	5
Contribution of In-term Studies to Overall Grade		60
Contribution of Final Examination to Overall Grade		40
Attendance		

Workload of the Course

Activity	**Total Week Count**	**Weekly Duration (in hour)**	**Total Workload in Semester**
Theoretical Study Hours of Course Per Week	14	3	42
Practicing Hours of Course Per Week	0	0	0
Reading	8	4	32
Searching in Internet and Library	8	4	32
Designing and Applying Materials	0	0	0
Preparing Reports	0	0	0
Preparing Presentation	0	0	0
Presentation	0	0	0
Preparing Homeworks	2	6	12
Mid-Term and Studying for Mid-Term	2	7	14
Final and Studying for Final	1	8	8
Other	0	0	0
Total work load			140
Total work load/25			5.6
ECTS of the course			6

Course's Contribution To Program

No	Program Learning Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.				X	
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply					X

	proper analysis and modeling methods for this purpose.						
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X			
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.		X				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.			X			
6	Ability to work efficiently in intra-disciplinary teams.	X					
7	Ability to work efficiently in multi-disciplinary teams;	X					
8	Ability to work individually.			X			
9	Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations,	X					
10	prepare design and production reports, give and receive clear and intelligible instructions.	X					
11	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	X					
12	Awareness of professional and ethical responsibility.	X					
13	Information about business life practices such as project management, risk management, and change management.	X					
14	Information about awareness of entrepreneurship, innovation, and sustainable development.	X					
15	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.	X					
16	Knowledge about awareness of the legal consequences of engineering solutions.	X					
17	Knowledge on standards used in engineering practice.	X					

Name of Lecturer(s) and Contact Iınformation

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