

1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	CHE222 FLUID MECHANICS
Course Semester	4
Catalog Description (Content) of the Course	Fluid statics and applications. Fluid dynamics. Viscosity, velocity gradient, laminar and turbulent flows, boundary layer. Mechanical energy equation, Bernoulli equation. Friction losses. Compressible fluids. Fluid flow measurements. Flow around immersed bodies. Flow in packed beds. Mixing of fluids, Valves and connections. Pumps, blowers, compressors.
Main Textbook	McCabe, J.H., Smith, C.J., Harriot, H, "Unit Operations of Chemical Engineering", McGraw Hill Book Co., 7th Edition, Boston, 2005.
Recommended Textbooks	J. C. Geankoplis, Transport Processes and Separation Process Principles (Includes Unit Operations), Prentice Hall, 4th Edition, 2003. - Wilke, O.J., "Fluid Mechanics for Chemical Engineers", Prentice Hall, New Jersey, 2001. - Uysal, B.Z., "Akışkanlar Mekaniği", 2. Baskı, Alp Yayınevi, 2006. - Hibbeler, R.C., "Akışkanlar Mekaniği", Çeviren: Mübeccel Ergun, Palme Yay., Ankara, 2016 - Foust, A.F., et al., "Principles of Unit Operations", 2nd Edition, John Wiley & Sons Book Co. New York, 1980.
Course Credit (ECTS)	5
Prerequisites of the Course (Compulsory attendance should be indicated here.)	There is no prerequisite or corequisite for this course. 70 % attendance is compulsory.
Type of the Course	Compulsory
Instruction Language of the Course	English
Object and Target of the Course	- The basic knowledge about the properties of fluids, fluid statics, fluid dynamics and flow in general. - The equipment used in flow line and the basic concepts of these equipment. - The principles of pipe flow design.
Learning Outcomes of the Course	To gain basic knowledge related with the fluids and their behavior patterns. Learning how to make material, momentum and energy balances in flow systems.
Mode of Delivery	The mode of delivery of this course is face to face.
Weekly Schedule of the Course	1st Week: Introduction. Unit systems and dimensional analysis. Basic concepts related with fluids. Fluid mechanics, state functions for gases, objectives of fluid mechanics. 2nd Week: Fluid statics. Pressure, force balance, hydrostatic equilibrium. Decanters, centrifuges, manometers. Buoyancy force applications. 3rd Week: Fluid statics. Pressure, force balance, hydrostatic equilibrium. Decanters, centrifuges, manometers. Buoyancy force applications. 4th Week: Fluid flow. Transfer in molecular level. Velocity gradient, viscosity, types of fluids. Boundary layer, boundary layer separation, Equivalent diameter. 5th Week: Fluid flow. Transfer in molecular level. Velocity gradient, viscosity, types of fluids. Boundary layer, boundary layer separation, Equivalent diameter.

	6th Week: Laminar flow, shell-momentum balance in rectangular, cylindrical and spherical coordinates. Total mass, momentum and energy balances. 7th Week: Laminar flow, shell-momentum balance in rectangular, cylindrical and spherical coordinates. Total mass, momentum and energy balances. 8th Week: Incompressible fluids. Mechanical energy balance, pressure drop, Bernoulli equation, friction losses, shaft work. Laminar and turbulent flow and design equations of pipelines. 9th Week: Incompressible fluids. Mechanical energy balance, pressure drop, friction losses, Bernoulli equation, shaft work. Laminar and turbulent flow and design equations of pipelines. 10th Week: Flow of compressible fluids. Isothermal flow, adiabatic flow and Mach number. 11th Week: Fluid flow measurement, venture meters, orifice, rotameters, weirs. 12th Week: Pumps and gas driving equipment. Pumps and NPSH, compressors (adiabatic, isothermal), fans and blowers. 13th Week: Fluid flow around immersed bodies. Drag coefficient and drag force. Flow over sphere, long cylinder and disc. Behaviors of bodies in fluids. Flow in packed beds and fluidized beds. 14th Week: Agitators, types of agitators, geometric factors. Vortex formation. Calculation of power requirement of an agitator.			
Educative Activities <i>(Credit will be determined based on the time given for these activities. Should be filled carefully.)</i>	Theoretical Study Hours of Course Per Week Reading Searching in Internet and Library Designing and Applying Materials Report preparation Midterm and Studying for Midterm Final and Studying for Final			
Assessment Criteria		Quantity	Total Contribution (%)	
	Midterm	2	40	
	Homework	3	5	
	Assignment	0	0	
	Projects	1	10	
	Practice	0	0	
	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	14	3	42
	Searching in Internet and Library	3	2	6
	Designing and Applying Materials	4	1	4
	Report preparation	2	3	6

	Preparing Presentation		0	0	0				
	Presentation		0	0	0				
	Midterm and Studying for Midterm		2	12	24				
	Final and Studying for Final		3	4	12				
	Other				0				
	Total work load				136				
	Total work load/25				5.44				
	ECTS of the course				5				
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 proper analysis and modeling methods for this purpose.				X		
		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	X					

			experiments, gather data, analyze and interpret results for investigating engineering problems.						
	6		Ability to work efficiently in intra-disciplinary teams.			X			
	7		Ability to work efficiently in multi-disciplinary teams;						
	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.						
	12		Awareness of professional and ethical responsibility.						
	13		Information about business life practices such as project management, risk management, and change management.						
	14		Information about awareness of entrepreneurship, innovation, and sustainable development.						
	15		Knowledge about contemporary	X					

[illegible]