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,"UnitOperations ofChemical Engineering", McGrawHill BookCo., 7th Edition,Boston, 2005.
Recommended Textbooks	• J. C.Geankoplis, TransportProcessesand Separation ProcessPrinciples(IncludesUnitOperations), Prentice Hall,4th Edition,2003. • Wilke,O.J., "Fluid Mechanicsfor ChemicalEngineers",Prentice Hall,New Jersey,2001. • Uysal, B.Z., "AkışkanlarMekaniği",2. Baskı,Alp Yayınevi, 2006. • Hibbeler, R.C., "AkışkanlarMekaniği", Çeviren: Mübeccel Ergun, Palme Yay., Ankara, 2016 • Foust, A.F., etal., "Principles of UnitOperations",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 *(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 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					

			issues and the global and societal effects of engineering practices on health, environment, and safety.						
		16	Knowledge about awareness of the legal consequences of engineering solutions.						
		17	Knowledge on standards used in engineering practice.	X					
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