İTÜ
DERS KATALOG FORMU
(COURSE CATALOGUE FORM)

Dersin Adı	**Course Name**
Akışkanlar Mekaniği	**Fluid Mechanics**

Kodu (Code)	**Yarıyılı (Semester)**	**Kredisi (Local Credits)**	**AKTS Kredisi (ECTS Credits)**	**Ders Uygulaması, Saat/Hafta (Course Implementation, Hours/Week)**		
				Ders (Theoretical)	**Uygulama (Tutorial)**	**Laboratuar (Laboratory)**
CIE354	5	3	4.5	3	-	-

Bölüm / Program (Department/Program)	İnşaat / İnşaat (Civil Engineering / Civil Engineering)		
Dersin Türü (Course Type)	Zorunlu (Compulsory)	**Dersin Dili (Course Language)**	İngilizce (English)
Dersin Önkoşulları (Course Prerequisites)	-		

Dersin mesleki bileşene katkısı, % (Course Category by Content, %)	**Temel Bilim (Basic Sciences)**	**Temel Mühendislik (Engineering Science)**	**Mühendislik Tasarım (Engineering Design)**	**İnsan ve Toplum Bilim (General Education)**
	20	80		-

Dersin İçeriği (Course Description)	Provides an introductory treatment of the dynamics of fluids, emphasizing incompressible fluids. Develops and applies hydrostatics, thermodynamics, fluid characteristics, kinematics, and dynamics; methods of analysis including the infinitesimal and finite control volume; stress rate-of-strain relations; and basic equations for continuity, energy, motion, and force-momentum. Measurement methods.
	Provides an introductory treatment of the dynamics of fluids, emphasizing incompressible fluids. Develops and applies hydrostatics, thermodynamics, fluid characteristics, kinematics, and dynamics; methods of analysis including the infinitesimal and finite control volume; stress rate-of-strain relations; and basic equations for continuity, energy, motion, and force-momentum. Measurement methods.
Dersin Amacı (Course Objectives)	Fluid mechanics is an extension of solid mechanics, taking into account differences in the relationships between stress and strain in fluids, relative to solids, while developing the fluid equations of motion. Ideas of force and moment equilibrium, as developed in Mechanics, are extended to fluid systems for both static and dynamic systems. The main goals of this course are to provide the fundamental basis for analysis of fluid motion in further studies of fluids, hydraulics, and hydrologic engineering. Fundamental ideas of mass, momentum, and energy balances are developed to solve a variety of problems. Emphasis is on understanding concepts and applying them to solve engineering problems.
	Fluid mechanics is an extension of solid mechanics, taking into account differences in the relationships between stress and strain in fluids, relative to solids, while developing the fluid equations of motion. Ideas of force and moment equilibrium, as developed in Mechanics, are extended to fluid systems for both static and dynamic systems. The main goals of this course are to provide the fundamental basis for analysis of fluid motion in further studies of fluids, hydraulics, and hydrologic engineering. Fundamental ideas of mass, momentum, and energy balances are developed to solve a variety of problems. Emphasis is on understanding concepts and applying them to solve engineering problems.

Dersin Öğrenme Çıktıları (Course Learning Outcomes)	Bu dersi başarıyla geçen öğrenciler: 1. Understand and apply concepts of mass, linear and angular momentum, and energy balances 2. Compute forces and moments exerted by static fluid and fluid in motion 3. Master the Bernoulli equation and apply it to solve a variety of practical problems 4. Understand differential and finite volume approaches to describe problems involving fluid motion and apply those concepts in the solution of a variety of problems 5. Sketch energy and hydraulic grade lines 6. Understand principles of similitude and dimensional analysis
	Student, who passed the course satisfactorily can: 1. Understand and apply concepts of mass, linear and angular momentum, and energy balances 2. Compute forces and moments exerted by static fluid and fluid in motion 3. Master the Bernoulli equation and apply it to solve a variety of practical problems 4. Understand differential and finite volume approaches to describe problems involving fluid motion and apply those concepts in the solution of a variety of problems 5. Sketch energy and hydraulic grade lines 6. Understand principles of similitude and dimensional analysis

Ders Kitabı (Textbook)	- A Brief Introduction to Fluid Mechanics (5th ed.), by D.F. Young, B.R. Munson, T.H. Okiishi, and W.W. Huebsch, John Wiley and Sons, 2011, ISBN 978-0-470-59679-1. - Narasimhan, N., A First Course in Fluid Mechanics, Universities Press, 2007		
Diğer Kaynaklar (Other References)	Duranyildiz, İ., Lecture notes and slides @ course Web Site at ITU_NINOVA		
Ödevler ve Projeler (Homework & Projects	Takım ödevleri ve raporları		
	Team assignments and reports		
Laboratuar Uygulamaları (Laboratory Work)	-		
	-		
Bilgisayar Kullanımı (Computer Use)	Uygun yazılım kullanımı ödevlerde		
	Use of appropriate software for assignments		
Diğer Uygulamalar (Other Activities)			
Başarı Değerlendirme Sistemi (Assessment Criteria)	**Faaliyetler (Activities)**	**Adedi (Quantity)**	**Değerlendirmede Katkısı, % (Effects on Grading, %)**
	Yıl İçi Sınavları (Midterm Exams)	2	28
	Kısa Sınavlar (Quizzes)	10	12
	Ödevler (Homeworks)	10	20
	Projeler (Projects)		
	Dönem Ödevi (Term Paper)	-	
	Laboratuvar Uygulaması (Laboratory Work)	-	
	Diğer Uygulamalar (Other Activities)		
	Final Sınavı (Final Exam)	1	40

DERS PLANI

Hafta	Konular	Ders Çıktısı
1	Introduction. Unit systems. Homogeneity of unit.	1
2	Basic concepts. Physical properties of fluids.	1
3	Behaviour against stress	1
4	Statics of fluids	1
5	Statics of fluids cont'd	1 2
6	Kinematics of fluids	2
7	Kinematics of fluids cont'd	2 3
8	Fluid dynamics. Basic equations of 1D flows	3
9	1D flow of ideal fluid Practical Applications	3
10	1D flow of ideal fluid Impul Momentum	3 4
11	1D flow of real fluid	4
12	Laminar and turbulent flows	4
13	Concepts of energy and hydraulic grade lines	5
14	Similitude	6

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Introduction. Unit systems. Homogeneity of unit.	1
2	Basic concepts. Physical properties of fluids.	1
3	Behaviour against stress	1
4	Statics of fluids	1
5	Statics of fluids cont'd	1 2
6	Kinematics of fluids	2
7	Kinematics of fluids cont'd	2 3
8	Fluid dynamics. Basic equations of 1D flows	3
9	1D flow of ideal fluid Practical Applications	3
10	1D flow of ideal fluid Impul Momentum	3 4
11	1D flow of real fluid	4
12	Laminar and turbulent flows	4
13	Concepts of energy and hydraulic grade lines	5
14	Similitude	6

Dersin İnşaat Mühendisliği Programıyla İlişkisi

	Programın mezuna kazandıracağı bilgi ve beceriler (programa ait çıktılar)	Katkı Seviyesi		
		1	2	3
a	Matematik, fen bilimleri ve mühendislik bilgilerini uygulayabilme becerisi.			X
b	Deney tasarlama, deney yapma, veri toplama, sonuçları analiz etme ve yorumlama becerisi.			
c	Bir sistemi, ürünü veya süreci ekonomik, çevre, sosyal, politik, etik, sağlık ve güvenlik, yapılabilirlik ve surdürebilirlik gibi gerçekçi kısıtlar ve koşullar altında, belirli gereksinimleri karşılayacak şekilde tasarlama becerisi.		X	
d	Farklı disiplinli takımlarda çalışabilme becerisi.		X	
e	Mühendislik problemini belirleme, formüle etme ve çözme becerisi			X
f	Mesleki ve etik sorumluluklara sahip olma bilinci.			
g	Etkin sözlü ve yazılı iletişim kurabilme becerisi.			
h	Mühendislik çözümlerinin küresel ve toplumsal boyutlarda etkisini kavramak için geniş kapsamlı bir eğitime sahip olma özelliği.			
i	Yaşam boyu öğrenmenin gerekliliği bilinci ve bunu yapabilme becerisi.			
j	Güncel/çağdaş konulara ilişkin bilgi sahibi olma özelliği.			
k	Mühendislik uygulamaları için gerekli teknikleri, çağdaş mühendislik ve hesaplama donanımlarını kullanabilme becerisi.		X	

1: Az Katkı, 2. Kısmi Katkı, 3. Tam Katkı

Relationship between the Course and the Civil Engineering Curriculum

	Program Outcomes	Level of Contribution		
		1	2	3
a	An ability to apply knowledge of mathematics, science and engineering			X
b	An ability to design and conduct experiments, as well as to analyze and interpret data			
c	An ability to design a system , component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		X	
d	An ability to function on multidisciplinary teams		X	
e	An ability to identify, formulate and solve engineering problems			X
f	An understanding of professional and ethical responsibility			
g	An ability to communicate effectively			
h	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context			
i	A recognition of the need for and an ability to engage in life-long learning			
j	A knowledge of contemporary issues			
k	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice		X	

1: Little Contribution, 2. Partial Contribution, 3. Full Contribution

Düzenleyen (Prepared by)	***Tarih (Date)*** 15.06.2016	