

## COURSE CATALOG

<b>Course Code:</b> CE 321				<b>Course Name:</b> Fluid Mechanics and Hydraulics			
<b>Semester</b>	<b>T + P + L</b>	<b>Credits</b>	<b>ECTS</b>	<b>Language of Instruction</b>	<b>Course Type</b>	<b>Instruction Methods</b>	<b>Prerequisite(s)</b>
5	3 + 0 + 0	3	5	English	Required (D1)	Lecture	CE 204 Dynamics
<b>Course Objectives</b>			To introduce students a fundamental knowledge of fluid mechanics and hydraulics and engineering behaviors of fluids.				
<b>Topics Covered</b>			Introduction to fluid mechanics and hydraulics. Fluid statics. Kinematics of fluid flow. Continuity equation. Stream function. Potential flow. Viscous flow. Navier-Stokes equations. Dimensional analysis. Pipe flows and pipe networks. Open channel hydraulics.				
<b>Learning Outcomes of the Course</b>			<p>The students who pass this course should:</p> <p>1- gain basic knowledge of fluid mechanics and hydraulics and develop analytical and mathematical skills to identify the fluid mechanics and hydraulics problems [1, 2, 3, 12]</p> <p>2- be able to analyze, assess and manipulate laboratory and field data obtained by lab- and insitu – experiments for use in hydraulic systems analysis [4]</p> <p>3- develop skills for computer usage of packages such as word, excel, matlab [4, 6, 14]</p> <p>4- understand the practical applications of fluid mechanics concepts used in designs of engineering structures [12, 13, 14]</p> <p>5- gain a basic knowledge about various case studies of hydraulic designs and state-of-the-art analysis techniques [8,11, 12, 13,14]</p> <p>6- develop skills of conveying technical material through oral presentations and written papers/reports [6, 16]</p> <p>[Note that the numbers in brackets refer to the bullet numbers in the program outcomes list.]</p>				
<b>ISCED Category of the Course</b>			52 Engineering				
<b>Textbook</b>			<p>1- B.R. Munson, D. F. Young and T. H. Okiishi. <i>Fundamentals of Fluid Mechanics</i>, John Wiley and Sons, 5th edition, 2006.</p> <p>2- N. C. H Hwang and C. E. Houghtalen. <i>Hydraulic Engineering Systems</i>. Prentice-Hall, 3rd edition, 1996.</p>				
<b>Recommended Sources</b>			<p>1- Y. Yüksel. <i>Akışkanlar Mekaniği ve Hidrolik</i>. Beta Yayınevi, 2012.</p> <p>2-P. K. Kundu and I. M. Cohen. <i>Fluid Mechanics</i>. Elsevier, 2004.</p>				

## WEEKLY SCHEDULE

Week	Theoretical Topic	Applied / Laboratory Topics
1	Introduction. Fluid properties and statics.	
2	Bernoulli equation. Fluid kinematics.	
3	Reynolds transport theorem and conservation of mass.	
4	Conservation of momentum.	
5	Conservation of energy.	
6	Potential flow.	
7	Potential flow. Viscous flow.	
8	Viscous flow and Navier-Stokes equations.	
9	Navier-Stokes equations.	
10	Dimensional analysis and modelling.	
11	Viscous flows in pipes.	
12	Pipe flows and pipe networks.	
13	Open channel hydraulics.	
14	Open channel hydraulics.	

### COURSE ASSESSMENT POLICY

	Activities	Number	Contribution (%)
<b>Studies throughout the term</b>	Quizes	-	-
	Term Homework/ Project	-	-
	Reports	-	-
	Graduation Thesis/ Project	-	-
	Seminar	-	-
	Homeworks	7	30
	Presentations	-	-
	Midterm Exams	2	35
	Project	-	-
	Laboratory	-	-
	Other (field work)	-	-
<b>FINAL EXAM</b>		1	35
<b>Total</b>			100

### CONTRIBUTION OF THE COURSE TO CIVIL ENGINEERING PROGRAM OUTCOMES

	Program Outcomes	1	2	3
1	The ability to apply knowledge of mathematics, science, and engineering			X
2	The ability to identify, formulate, and solve engineering problems			X
3	The ability to design a system or component to meet desired needs with realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability		X	
4	The ability to analyze and interpret data		X	
5	The ability to design and conduct experiments and apply experimental results to improve processes	X		
6	The ability to convey technical material through oral presentations and written papers/reports			X
7	The ability to function within multidisciplinary teams	X		
8	The understanding of professional and ethical responsibilities		X	
9	The understanding of the impact of engineering on society	X		
10	The understanding of the necessity to engage in life-long learning	X		
11	The understanding of management and leadership principles and techniques		X	
12	The appreciation of the role of research in civil engineering problems		X	
13	A knowledge of contemporary issues in civil engineering		X	
14	The ability to use modern engineering techniques, skills, and tools			X
15	The ability to understand and explain basic concepts in management, business, and leadership	X		
16	A commitment to quality, punctuality and continuous improvement		X	

Contribution Level: 1 low, 2 medium, 3 high

### ECTS-WORKLOAD TABLE

ACTIVITIES	Number	Duration (Hour)	Workload(Hour)
Lecture Time	14	3	42
Final Exam (Including Preperation Time)	1	24	24
Quizes	-	-	-
Term Homework / Project	-	-	-
Reports	-	-	-
Graduation Thesis/Project	-	-	-
Seminar	-	-	-
Study Time Outside the Class	14	1	14
Homeworks	7	3	21
Presentations	-	-	-
Midterm Exams (Including Preperation Time)	2	12	24
Project	-	-	-
Laboratory	-	-	-

<b>Total Workload</b>			125
<b>ECTS Credits of the Course (Total Workload / 25)</b>			5

<b>Last update on 24.11.2013</b>	<b>Coordinator / PREPARED BY Cihan BAYINDIR</b>	<b>APPROVED BY Esin Inan</b>
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