

# ECTS

## EUROPEAN CREDIT TRANSFER SYSTEM

### Course information in english

#### General course information:

<b>Course title:</b>	Unsteady Flows	<b>Course code:</b>	CE09_H10
<b>Credits:</b>	6	<b>Work load (hours):</b>	126
<b>Course level:</b>	Undergraduate <input checked="" type="checkbox"/>	Graduate	<input type="checkbox"/>
<b>Course type:</b>	Mandatory <input type="checkbox"/>	Selective	<input checked="" type="checkbox"/>
<b>Course category:</b>	Basic <input type="checkbox"/>	Orientation	<input checked="" type="checkbox"/>
<b>Semester:</b>	9 <sup>o</sup>	<b>Hours per week:</b>	4 hours
<b>Course objectives (capabilities pursued and learning results):</b>			
The objective of this course is to introduce the students to the water-hammer phenomena (both in theoretical and applied level). In addition, the study of the unsteady flow in open channels will help the students to understand better the meaning of slowly or rapidly varied flow.			
<b>Prerequisites:</b>			
Fluid Mechanics Hydraulics			

#### Instructor's data:

<b>Name:</b>	Evangelos Keramaris
<b>Level:</b>	Assistant Professor
<b>Office:</b>	Civil Engineering Faculty University of Thessaly Pedion Areos, 38334 Volos, Greece Tel. 24210-74140
<b>Tel. – email:</b>	ekeramaris@civ.uth.gr
<b>Other tutors:</b>	-

**Specific course information:**

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	Introduction	4	2
2	Unsteady flow in closed conduits	4	2
3	Equations of motion-Continuity equation	4	2
4	Hydraulic water-hammer	4	2
5	Sudden-slow-partial flow interruption	4	2
6	Flow interrupts in non-uniform channel	4	4
7	Kinematic waves. Flood waves	4	2
8	Bergeron's method	4	2
9	Method of characteristics	4	2
10	Wave propagation on flows with a free surface	4	2
11	Unsteady flow in open channels	4	4
12	Slowly-rapidly varied flow	4	4
13	Applications-Exercises	4	4
14	Special topics	4	4

Additional hours for:			
Class project	Examinations	Preparation for examinations	Educational visit
20	2	10	

**Suggested literature:**

1. Tolikas, D., "Hydraulic Water-Hammer", Paratiritis Publications, Thessaloniki, 2000
2. Wylie, E. B. and Streeter, V. L. "Fluid Transients", McGraw - Hill Book Co., New York, 1978

3. Watters G. Z. "Modern Analysis and Control of Unsteady Flow in Pipelines", Ann Arbor Science Publishers Inc., 1979

4. Parmakian, J. "Water - Hammer analysis", Dover Publications, Inc., New York, 1963

5. Bergeron, L. "Waterhammer in Hydraulics and Wave Surges in Electricity", John Wiley & Sons, Inc., New York, 1961

<b>Teaching method (select and describe if necessary - weight):</b>		
Teaching	<input checked="" type="checkbox"/>	.....50%
Seminars	<input type="checkbox"/>	.....%
Demonstrations	<input type="checkbox"/>	.....%
Laboratory	<input type="checkbox"/>	.....%
Exercises	<input checked="" type="checkbox"/>	.....50%
Visits at facilities	<input type="checkbox"/>	.....%
Other (describe): .....	<input type="checkbox"/>	.....%
Total		100%

<b>Evaluation method (select)- weight:</b>				
	<u>written</u>	<u>%</u>	<u>Oral</u>	<u>%</u>
Homework	<input type="checkbox"/>		<input type="checkbox"/>	
Class project	<input checked="" type="checkbox"/>	25	<input checked="" type="checkbox"/>	25
Interim examination	<input type="checkbox"/>		<input type="checkbox"/>	
Final examinations	<input checked="" type="checkbox"/>	50	<input type="checkbox"/>	
Other (describe): .....	<input type="checkbox"/>		<input type="checkbox"/>	