

**General course information:**

<b>Course title:</b>	Partial Differential Equations & Complex Variables	<b>Course code:</b>	CE04_U01
<b>Credits:</b>	5	<b>Work load (hours):</b>	130
<b>Course level:</b>	Undergraduate <input checked="" type="checkbox"/>	Graduate	<input type="checkbox"/>
<b>Course type:</b>	Mandatory <input checked="" type="checkbox"/>	Selective	<input type="checkbox"/>
<b>Course category:</b>	Basic <input checked="" type="checkbox"/>	Orientation	<input type="checkbox"/>
<b>Semester:</b>	4 <sup>th</sup>	<b>Hours per week:</b>	4
<b>Course objectives (capabilities pursued and learning results):</b>			
<p>Partial differential equations and functions of one complex variable are examined with a focus on basic ideas and analytical solutions. Applications to classical problems of physics and engineering are discussed in the context of mathematical modeling.</p>			
<b>Prerequisites:</b>			
Ordinary Differential Equations, Calculus I – II			

**Instructor's data:**

<b>Name:</b>	Theophanes Grammenos
<b>Level:</b>	Ass. Professor
<b>Office:</b>	Civil Engineering Faculty University of Thessaly Pedion Areos, 38334 Volos, Greece
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<b>Other tutors:</b>	-

**Specific course information:**

Week No.	Course contents	Hours	
		Course attendance	Preparation
1-2	Fourier series	8	6
3	Basic concepts of partial differential equations. Equations of 1 <sup>st</sup> order. Classification of 2 <sup>nd</sup> order equations.	4	3
4-5	<u>One-dimensional problems and separation of variables</u> : wave equation, heat equation, Laplace equation, d'Alembert solution, boundary value problems, non-homogeneous problems	8	6
6-7	<u>Two-dimensional problems</u> : Laplace equation for orthogonal and circular plates, vibrating orthogonal membrane, heat equation for orthogonal plates	8	6
8	Two-point boundary value problems and Sturm-Liouville theory	4	3
9	Complex numbers	4	3
10	Functions of one complex variable	4	3
11	Cauchy-Riemann conditions, analytic functions, harmonic functions	4	3
12	Curves in the complex plane, complex line integrals, Cauchy-Goursat theorem, Cauchy integral formula	4	3
13	Theory of residues	4	3
14	Conformal mapping	4	3

Additional hours for:			
Class project	Examinations	Preparation for examinations	Educational visit
	3	20	

Suggested literature:
1. Marsden J.E., Hoffman M.J., <i>Basic Complex Analysis</i> , 3 <sup>rd</sup> ed., W.H.Freeman
2. Churchill R., Brown J., <i>Complex Variables and Applications</i> , 5 <sup>th</sup> ed., McGraw-Hill
3. Boyce W., DiPrima R., <i>Elementary Differential Equations and Boundary Value Problems</i> , 9 <sup>th</sup> ed., Wiley
4. Haberman R., <i>Applied Partial Differential Equations</i> , 5 <sup>th</sup> ed., Pearson

<b>Teaching method (select and describe if necessary - weight):</b>		
Teaching	<input checked="" type="checkbox"/>	80%
Seminars	<input type="checkbox"/>	.....%
Demonstrations	<input type="checkbox"/>	.....%
Laboratory	<input type="checkbox"/>	.....%
Exercises	<input checked="" type="checkbox"/>	20%
Visits at facilities	<input type="checkbox"/>	.....%
Other ( <i>describe</i> ): .....	<input type="checkbox"/>	.....%
<b>Total</b>		<b>100%</b>

<b>Evaluation method (select)- weight:</b>				
	<i>written</i>	<i>%</i>	<i>Oral</i>	<i>%</i>
Homework	<input checked="" type="checkbox"/>	10%	<input type="checkbox"/>	
Class project	<input type="checkbox"/>		<input type="checkbox"/>	
Interim examination	<input checked="" type="checkbox"/>	10%	<input type="checkbox"/>	
Final examinations	<input checked="" type="checkbox"/>	80%	<input type="checkbox"/>	
Other ( <i>describe</i> ): .....	<input type="checkbox"/>		<input type="checkbox"/>	
<b>Total</b>		<b>100%</b>		