

### Course information in English

**General course information:**

<b>Course title:</b>	Information Technology and Computers	<b>Course code:</b>	CE01_U06
<b>Credits:</b>	4	<b>Work load (hours):</b>	120
<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>	1	<b>Hours per week:</b>	5
<b>Course objectives (capabilities pursued and learning results):</b>			
Introduction to Information Technology, operation of computers and use of Internet, programming with FORTRAN 77/90/95 or in C-programming Language for solving engineering problems			
<b>Prerequisites:</b>			

**Instructor's data:**

<b>Name:</b>	Dr. Konstantinos Kokkinos
<b>Level:</b>	Visiting Professor
<b>Office:</b>	
<b>Tel. – email:</b>	<a href="mailto:kokkinos@uth.gr">kokkinos@uth.gr</a>
<b>Other tutors:</b>	

**Specific course information:**

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	<p>Introduction: The parts of a computer. Information representation in computer. Main frames, workstations and personal computers.</p> <p>Stages of creation and implementation of programs - Translators, Compilers and Editors.</p> <p>Analysis of structure of program.</p> <p>Interrelations of Input /Output, Arithmetic Operators, Commands of entrusting, Numerical</p>	5	3

	representations, Representation of numbers in the memory, Binary system, Representations of integers, reals, characters, method of Two's Complement.		
2	<p>Operating systems. Files and directories. Basic commands in MS-Dos, MS-Windows and UNIX.</p> <p>Commands of data I/O, descriptors, format of data, variables and addresses of memory, Structures of control and algorithm concepts, Logical Operators, Arithmetic Operators, Branching structures</p> <p>Descriptions of algorithms, Diagrams and flow charts, [pseydo]-language and concretisations in source code.</p> <p>Structures of iteration, repetitions under-treaty, the significance of counters and adders in relevance with Mathematics and Physics.</p>	5	3
3	<p>The significance of functions, Internal functions and libraries of functions, Creation of functions, Passing of parameters in subprograms. Management of characters and strings.</p> <p>Data arrays and advanced data structures, Operations in arrays, Use of tables for the solution of problems from the Linear Algebra, Multidimensional arrays, Classifications of data with arrays, Algorithms sorting data (bubble, insertion, selection, quick), Searching of data in tables/arrays (Sequential, Binary, Fibonacci). Special subjects in arrays (triangular, thin tables, compaction of data).</p>	5	3
4	<p>Scope of variables, recursive functions and solution of problems with recursion.</p> <p>Dynamic management of memory, dynamic arrays, pointers, dynamic management of memory with pointers.</p>	5	3
5	<p>Data Structures, arrays of structures, definition of new data types, Files of records, management of files, files of text and binary files.</p> <p>Header Files, Data preprocessing, Libraies, Program portability</p>	5	3

6	Special problems in relation to the Civil Engineering and their solutions with programming  Semester Project for practice in programming	5	3
7	Internal Functions in MATLAB, General Observations, Deletion of Parameters, Compact commands, M-Files, Echo-command, Cellular structure of files, Rounding of values, Management commands	5	3
8	Introduction, Basic operations in MATLAB, Arithmetic Operations, Comparison operations, Logical Operations, Mathematical Constants and parameters, insertion of new parameters, assignment commands	5	3
9	Internal Functions in MATLAB, General Observations, Deletion of Parameters, Compact commands, M-Files, Echo-command, Cellular structure of files, Rounding of values, Management commands	5	3
10	Strings, generation of Strings, Programming, Control Commands (if), Loops, Iterations, Commands (For, While, continue, break), Logical Commands  M-Functions, No Name Functions, I/O Parameters, Function Drivers, Applications (Calculation of integrals, Statistical Data, concepts on statistics)	5	3
11	2D-Graphics, Graphical Representation and illustration of data (plotting), Formatting of plots (scatter, stem). Multiple plots, multiple pictures. Graphical representation of functions, Illustration of errors, Histograms, Semi-Logarithmic and Logarithmic scaling, Parametized plots, Complicate Functions Graphical Representation	5	3
12	MATALAB Management, Command Window, Workspace window, History Window, Formatting of data outcome illustration to ASCII files, Control Commands	5	3
13	3D-Graphics, Graphical representation of curves, Graphical Representation of Surfaces, 3D- Contour Plots, Chromatic Representations, Graphical Representations of Lists, Graphical Representation	5	3

	of Vector Fields  Linear Algebra issues with MATLAB, Arrays, Operations with vectors in the Cartesian System, Solutions of linear systems with MATLAB		
14	Analysis with MATLAB, Polynomials, Representations of Polynomials, Roots, Derivatives and integrals, Data fitting with polynomials, Function root finding, Max and Min, Integration.  Calculation of a function integral, Interpolation, Segmented polys for interpolation, Derivative and integral calculations, Discrete Fourier transformations, Arithmetic solutions of systems	5	3

<b>Additional hours for:</b>			
<b>Class project</b>	<b>Examinations</b>	<b>Preparation for examinations</b>	<b>Educational visit</b>
	3	5	

<b>Suggested literature:</b>
<ol style="list-style-type: none"> <li>1. Εισαγωγή στην FORTRAN 90/95, Ν. Καραμπετάκης, Εκδόσεις Ζήτη, 2002.</li> <li>2. Προγραμματισμός FORTRAN 90/95 για Επιστήμονες &amp; Μηχανικούς, Δ. Σ. Ματαράς και Φ. Α. Κουτελιέρης, Εκδόσεις Τζιόλα, 2001.</li> <li>3. Fortran 90/95 for Scientists and Engineers, S. J. Chapman, McGraw-Hill, 1998.</li> <li>4. Η γλώσσα προγραμματισμού C - Δεύτερη βελτιωμένη έκδοση - KERNIGHAN – RITCHIE, ISBN : 978-960-461-132-4</li> <li>5. Η γλώσσα C σε βάθος- Πλήρης οδηγός εκμάθησης της γλώσσας C με εκτενή αναφορά στις δομές δεδομένων, Νίκος Χατζηγιαννάκης, ISBN: 960-209-966-6, ΕΚΔΟΣΕΙΣ "ΚΛΕΙΔΑΡΙΘΜΟΣ", 2006</li> <li>6. Matlab 7 για μηχανικούς, Χατζίκος Ευάγγελος, Εκδόσεις Τζιόλα, 2009</li> </ol>