UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria		
ACADEMIC YEAR	2016/2017		
BACHELOR'S DEGREE (BSC)	ELECTRONIC ENGINEERING		
INTEGRATED COURSE	COMPUTER FUNDAMENTALS - INTEGRATED COURSE		
CODE	18073		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	ING-INF/05		
HEAD PROFESSOR(S)	SORBELLO FILIPPO	Professore a contratto in quiescenza	Univ. di PALERMO
OTHER PROFESSOR(S)	SORBELLO FILIPPO	Professore a contratto in quiescenza	Univ. di PALERMO
	VELLA FILIPPO	Cultore della Materia	Univ. di PALERMO
CREDITS	12		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**VELLA FILIPPO** Wednesday 13:00 14:00 MS Teams (inviare una email)		

DOCENTE: Prof. FILIPPO SORBELLO

PREREQUISITES	Knowledge of the contents of math and science needed for the upper secondary school degree
LEARNING OUTCOMES	Knowledge and comprehension capabilities At the end of the course, the student will have a good knowledge of the techniques of information representation and its processing through combinatorial and sequential circuits. He will know the technique for the optimization of these systems. He will know the syntax and the technique for the programming with C language. He will be able to employ data structures and the fundamental algorithms. Comprehension and capability to apply knowledge At the end of the course, the student will be able to apply the studied techniques to analyze and design, at a functional logic level, combinatorial and sequential circuits. The student will be able to use tools and environments for the programming with the C language. He will also be able to find software solutions for solving specific problems. Autonomy of Judgement The student will be able to analyze a problem and design, starting from a verbal description, a suitable software solution. He will have the capability to evaluate the quality of a software solution according efficiency, readability, simplicity and reusability. He will be able to understand the working principles of computers. Communication capabilities The student will acquire the capability to understand and express problems involving the contents of the course. He will be able to describe with proper terms a logic circuit and, using with a clear language, to describe the processes of writing and analysis of software solutions. Learning capabilities The student will acquire capabilities for the application of the studied methodologies in different contexts and to learn processes of analysis and design of both software solutions and logic circuits.
ASSESSMENT METHODS	The learning process is evaluated through two tests one for each module of the course. During the test about the Digital Circuits module the student must carry out a written test containing exercises regarding number systems, Boolean algebra, the design and analysis of combinatorial networks, the design and analysis of synchronous and asynchronous sequential circuits. Each exercise proposed has a weight related to its complexity and the time required to solve it properly.The written test lasts three hours. The maximum score is obtained if the student demonstrates knowledge of the principles at the basis of digital circuits. The test dealing with fundamentals of computer science module is held in the computer room. The students have to prepare programs, written in C language, according the requirements of the questions. The minimum number of question is four and the time for the trial is two hours. The questions of the test are aimed at verifying a) the knowledge of the programming language; b) the capability to find simple solution to typical problems; c) the capability to create working programs The maximum score is obtained if it is verified the full competence in three aspects: the use of correct syntactic forms of the programming language, the capability to compose language structures to solve problem dealing with the acquisition, processing and storage of information; the creation of programs that can be executed without presenting errors or malfunctionings. The final grade will take into account the results obtained during the tests about logical networks and programming. Halfway through the course, it is possible to carry out tests on the part of the course already taken place and face at the end of the course reduced testing .
TEACHING METHODS	Lessons and labs

MODULE
LOGIC CIRCUITS

Prof. FILIPPO SORBELLO

SUGGESTED BIBLIOGRAPHY	
- M. Morris Mano, Charles R. Kime, Reti Logiche, Edizione italiana, Pearson Education Italia, ISBN: 88-7192-142-9	
AMBIT	50289-Ingegneria informatica
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
EDUCATIONAL OBJECTIVES OF THE MODULE	
The student will be able to apply studied methods in different contexts and learning processes of analysis and synthesis of logic gate .	

SYLLABUS

Hrs	Frontal teaching
10	Course introduction, concept of information,Representation of integer number with a generic base, binary numbers. Number conversion from one base to another. Representation of floating point numbers. Representation of negative numbers. ASCII Code. Introduction to Boole Algebra, Logic gates, boolean functions, theorems and properties, canonical forms. Karnaugh Maps, optimization of boolean functions. Combinatorial Circuit Sythesis. Full adder, multiplexer, decoders.
18	Sequential Circuits, Mealy and Moore machines; Latch SR, Latch D, Flip Flop JK, T, D, SR ; Master slave; edge triggered flip flop; Concepr of State; State diagram, Analysis of sequential circuits. Flip Flop Characteristic Equations; Design of sequential circuits with Flip Flop D, T, JK, SR; Coding of states; Simulation of Sequential circuits. Registers, Counter. ROM, Programmable logic circuits, PAL, PLA.
10	Components of a Computer, Von Neumann Machine. Introduction to Programming. Computer Processor Unit, RISC and Cisc systems. Operating Systems. Introduction to Linux operating system

Hrs	Practice
3	Information representation. Boole Algebra
5	Analysis and Synthesis of combinatorial circuits, Boole Function optimization with Karnaugh maps; Canonical Forms
8	Analysis and Synthesis of sequential circuits, circuits for sequence detection

MODULE
PRINCIPLES OF COMPUTER SCIENCE

Prof. FILIPPO VELLA

SUGGESTED BIBLIOGRAPHY

- Paul J. Deitel, Harvey M. Deitel, Il linguaggio C, Pearson
- Kernighan Brian W., Ritchie Dennis M., Il linguaggio C Principi di programmazione e manuale di riferimento, Pearson Education Italia
- Al Kelley, Ira Pohl, C didattica e programmazione, Pearson

AMBIT	50289-Ingegneria informatica
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54

EDUCATIONAL OBJECTIVES OF THE MODULE

The student will be able to apply studied methods in different contexts and learning processes of analysis and synthesis relating to software programs in structured programming

SYLLABUS

Hrs	Frontal teaching
18	The compilers, gcc. Introduction to the C language. Variables, Identifiers, data types. Initialization, precompilation. Functions, printf, getchar, scanf. Do-while, for, If-else, switch, logic operators. Input and output redirection, algorithm for the detection of prime numbers. Function for string management strlen, strcmp, isalpha, isnum, isalnum, isgraph, strlen, strcpy, reverse. Function for the generation of pseudocasual values rand, srand. Local and global variables, scope, storage classes, program compiling from multiple source files. Macro. Pointer, pointers arithmetic, parameter passing by value, parameter passing by reference. Function pointer. Argc and argc for program parameter. Files, functions fclose, fopen, fseek, ftell, fwrite, fread
20	Dynamic memory allocation, vector allocation, matrix allocation, structures, initialization of structures, Recursion. Sorting algorithms. Asymptotic complexity of algorithms: insertion sort, quicksort, selection sort, bubble sort, merge sort. Data stuctures

Hrs	Practice
10	Implementation of algorithms C language
6	Implementation of data structures in C language