AEEE192 – Digital Systems Design

Course Title	Digital Systems Design				
Course Code	AEEE192				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	2nd (Fall)				
Teacher's Name	Dr. Haris Haralambous				
ECTS	5	Lectures / week	3	Laboratories/week	1
Course Purpose	The aim of the course is to familiarize students with various concepts and principles of Digital Systems.				
Learning Outcomes	By the end of the course, students must be able to: 1. Analyse latches and flip flops and describe their characteristic and excitation tables. 2. Analyse synchronous sequential circuit operation using different flip-flop types. 3. Design, synchronous sequential circuits (FSM) using different flip-flop types. 4. Identify and convert FSM to different implementations (Mealy-Moore). 5. Analyse and design different register and counter implementations 6. Describe the concept of ASM and interpret ASM charts and their basic building blocks.				
Prerequisites	ACOE161	Corequisites	None		
Course Content	Course contents: • **Synchronous sequential circuits.** Flip-Flops, flip-flop triggering, state diagrams and equations, excitation tables, state reduction and assignment. Design of circuits such as synchronous counters, sequence detectors, parity generators etc. • **Algorithmic State Machines.** ASM charts and timing considerations. Data processors. Control implementation using decoders, multiplexers and PLAs. Design of circuits to perform arithmetic operations. • **Asynchronous sequential circuits .** Analysis of asynchronous circuits, transition tables, flow tables. Design procedure of asynchronous circuits • **Hardware description languages (VHDL).** Levels of description: Behavioral, register transfer, and gate level. Signals, variables, processes and control structures. Simulation and examples using VHDL.				

	• **Laboratory work:** Individual and small group experiments performed with the use of Electronic boards, components, measuring instruments and simulation packages. Experiments include the design, construction on breadboards and analysis of the circuits and devices taught in theory. Testing is performed using signal measuring equipment such as digital meters and oscilloscopes. The performance of the designed circuits is also simulated and the results are evaluated and compared with the experimental analysis.
Teaching Methodology	Students are taught the course through lectures (3 hours per week) in classrooms or lectures theatres, by means of traditional tools or using computer demonstration and on 1 hour per week laboratory experiments. Auditory exercises, where examples regarding matter represented at the lectures, are solved and further, questions related to particular open-ended topic issues are compiled by the students and answered, during the lecture or assigned as homework. Laboratory experiments are carried out in small groups and lab reports are required two weeks after the laboratory class resulting in a cumulative mark. Topic notes are compiled by students, during the lecture which serve to cover the main issues under consideration. Students are also advised to use the subject's textbook or reference books for further reading and practice in solving related exercises. Tutorial problems are also submitted as homework and these are solved during lectures or privately during lecturer's office hours. Students are prepared for final exam, by revision on the matter taught, problem solving and concept testing and are also trained to be able to deal with time constraints and revision timetable. The final assessment of the students is formative and is assured to comply with the subject's expected learning outcomes and the quality of the course.
Bibliography	**Textbooks:** • Morris Mano, *Digital Design*, Prentice Hall, 2002 **References:** • Thomas Floyd, *Digital Fundamentals with VHDL*, Prentice Hall, 2003
Assessment	The Students are assessed via continuous assessment throughout the duration of the Semester, which forms the Coursework grade and the final written exam. The coursework and the final exam grades are weighted 40% and 60%, respectively, and compose the final grade of the course. An indicative weighted continuous assessment of the course is shown below: • Mid-Term written exams 67% • Laboratory Work 33% Students are prepared for final exam, by revision on the matter taught, problem solving and concept testing and are also trained to be able to deal with time constrains and revision timetable. The final assessment of the students is formative and summative and is assured to comply with the subject's expected learning outcomes and the quality of the course.
Language	**English**