

Program	59EC – Communications Electronic Engineering B. Eng. 59SC – Telecommunications Systems Engineering B. Eng. 59SO – Sound and Image Engineering B.Eng. 59TL – Telematics Engineering B. Eng.
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Course number and name	
Number	595000027, 595021027, 595023027, 595022027
Name	Digital Design I
Semester	S5 [(September-January)]

Credits and contact hours	
ECTS Credits	4,5
Contact hours	45

Coordinator's name	Garrido González, Matías Javier [matias.garrido@upm.es]
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Specific course information	
Description of course content	
Basic notions of VHDL (modeling oriented to automatic synthesis), CAD environments (with methodology based on HDLs), design and prototyping of combinational and sequential systems with VHDL and technology (basic concepts of PLDs).	
List of topics to be covered	
<ol style="list-style-type: none"> 1. CAD+VHDL+Technology <ol style="list-style-type: none"> 1.1. Modeling of combinational systems with VHDL 1.2. Modeling of sequential systems with VHDL 1.3. Series and carry-lookahead adders 1.4. Adders/Subtractors 1.5. Carry design and overflow 1.6. Comparators of magnitude 1.7. Automata 1.8. Quartus II and ModelSim tutorials 1.9. Use of PLD datasheets 2. Subsystems <ol style="list-style-type: none"> 2.1. Structural modeling 2.2. Modeling, simulation, synthesis and digital subsystems design. 	
Prerequisites or co-requisites	
- Electronics II	

Specific goals for the course	
Specific outcomes of instruction	

- RA646 – To search, select and use the relevant information provided by the manufacturers of configurable integrated circuits of average complexity.
- RA254 – To apply CAD tools to capture, simulate and make digital systems.
- RA642 – To perform the analysis, design, test and prototyping of simple combinational and sequential systems using VHDL.
- RA644 – To perform the hierarchical descriptions of digital circuits using structural VHDL modeling.
- RA645 – To know and use the configurable integrated circuits of different complexity for wired digital systems.
- RA904 – To work in pairs with another student, planning weekly working hours and resolving small conflicts which may arise during the course.
- RA903 – To use the oscilloscope to carry out and correctly interpret digital signal measures (logic levels, frequencies, indirect measures of current) in simple digital circuits.
- RA643 – To analyze, design, test and prototype simple digital subsystems (single-shot records, accumulators, frequency dividers, benches, counters BCD of several digits, counters programmable module, adding BCD and combinations of them) using VHDL.

Further reading and supplementary materials

- Moodle.
- MAX1000 card.