

7.5.2 Electronics and Devices Laboratory

The Electronics and Devices Laboratory houses equipment, electronic development kits and to support analog and digital circuit design. In the Electronics and Devices Laboratory, there some electronic equipment such as analog, digital and mixed-signal oscilloscopes, function generators, multimeters, power supplies, electronic circuit boards, electronic breadboards, active and passive electronic components as well as PCB manufacture equipment set, which are utilized to complete laboratory assignments. All the facilities in the Electronics and Devices Laboratory are used for the following BE assessment courses.

- 233D4102–Basic Electronics
- 209D4112–Basic Electronics Laboratory
- 106D4122–Digital Systems
- 109D4121–Digital Systems Laboratory
- 214D4122–Integrated Electronics
- 218D4121–Integrated Electronics Laboratory
- 335D4113–Digital Systems Design
- 380D4123–Embedded Systems Design

In the Electronics and Devices Laboratory, there are also some software tools used to support teaching methodology and to improve student’s capabilities to comprehend the teaching materials. The available software tools and development kits in the Electronics and Devices Laboratory, their functionality and related courses that use them are summarized in Table 7.1.

TABLE 7.1: SOFTWARE TOOLS AND DEVELOPMENT KITS AVAILABLE IN THE ELECTRONICS AND DEVICES LABORATORY

No.	Software tools / Development kits	Function	Course Related
1	Altera Quartus II software & Altera FPGA Cyclone development kits	for rapid prototyping of digital circuits on FPGA devices	106D4122–Digital Systems, 335D4113–Digital Systems Design, 380D4123–Embedded Systems Design
2	MentorGraphics Modelsim	for digital circuit simulation based on HDL (VHDL/SystemVerilog) circuit modeling	106D4122–Digital Systems, 335D4113–Digital Systems Design, 380D4123–Embedded Systems Design
3	Altium Designer	for circuit schematic and layout design of PCB manufacture	209D4112–Basic Electronics Laboratory
4	OrCAD PSpice	for electric and electronic circuit simulation	233D4102–Basic Electronics, 209D4112–Basic Electronics Laboratory
5	Microwind and DSch CAD software	for integrated circuit topography design	214D4122–Integrated Electronics, 218D4121–Integrated Electronics Laboratory

Electronic circuit boards, electronic breadboards, active and passive electronic components and devices are used in 209D4112–Basic Electronics Laboratory course. In the course, the students are divided into some groups to analyze some simple electronic

circuit in practice. The students in 209D4112 are given a final project to design and implement a simple example of electronic circuit applications such as audio/speaker amplifier, LED driver and/or USB voltage regulator. The students use PSpice Software for circuit modeling and simulation and use Altium Designer to design the printed circuit board (PCB) of the electronic circuit.

Altera FPGA (Field Programmable Gate Array) Kits together with the Altera Quartus II IDE (Integrated Development Environment) software are used in 106D4122–Digital Systems, 335D4113–Digital Systems Design, 380D4123–Embedded Systems Design courses. The students use Modelsim software for circuit design and simulation of digital circuits in the 335D4113–Digital Systems Design and 380D4123–Embedded Systems Design courses. The analog/digital/mixed-signal oscilloscopes are used to test the circuit performance or circuit behaviors of the designed digital circuit.

The Microwind and DSch CAD software are used in the 214D4122–Integrated Electronics, 218D4121–Integrated Electronics Laboratory courses. The students design integrated circuit topology and do physical-level simulation of the integrated circuit using Microwind CAD, and do gate-level simulation of digital integrated circuits using DSch CAD.

7.5.3 Electrical Installation Laboratory

7.5.4 Relay and Measurement Laboratory

7.5.5 Power System Laboratory

7.5.6 Basic Electric Laboratory

7.5.7 Control and Instrumentation System Laboratory

7.5.8 High Voltage Laboratory

7.5.9 Power Electronics Laboratory

7.5.10 Computer Hardware, Networking and Software Engineering Laboratory

7.5.11 Telematics Laboratory

7.5.12 Antenna and Propagation Laboratory

7.5.13 Telecommunication, Radio, and Microwave Laboratory

7.6 Workshop