AUTOMOTIVE ENGINEERING

CO4204-7A	AC and DC in automotive	2
CO4204-7B	Electronics and digital technology in automotive	1
CO4205-1G	Fundamentals of automotive electrics (Europe/South America/Africa)	
CO4204-7J	Pulse-width modulated signals in automotive	1
CO4205-1X	12V three-phase generator in motor vehicles	2
CO4204-7F	Sensors in motor vehicles	
CO4204-7C	Pulse generation and ignition systems in vehicles	
CO4204-6X	Common rail diesel injection system	
CO4204-6W	Vehicle Stabilization Systems - ABS, ESC & TCS	
CO4205-1F	Wheel Speed Sensors	
CO4204-6Z	Safety Restraint System (Airbag/Belt Tensioner)	2
CO4205-2B	Fundamentals of hydraulics and electro-hydraulics for commercial vehicles	

ELOTRAIN 2-MM-PLUG-IN SYSTEM

CO4206-1J	Basics of electrics/electronics in automotive	

DRIVER ASSISTANCE SYSTEM

CO4205-1E	LIDAR, Light Detection and Ranging	1
CO4205-1U	Gesture control and capacitive touchscreen in the motor vehicle	
CO4205-1C	Ultrasonic Park Assist with Rear View Camera	1
CO4205-1B	Traffic sign recognition with speed control	1
CO4205-1V	Radar, ACC with Emergency Brake Assist	1
CO4205-1W	Front Facing Camera, Active Lane Assist	1

BUS SYSTEM

CO4204-7E	LIN bus in automotive	2
CO4204-7K	CAN bus in automotive	2
CO4205-1S	CAN FD in motor vehicles	
CO4205-1A	Ethernet in automotive	3
CO4204-7H	Optical data buses for automotive applications (MOST bus)	1
CO4204-6Y	FlexRay in automotive	

HV SYSTEM

CO4205-1T	48V sub-systems in on-board vehicle networks	
CO4204-6L	DC/AC Conversion in Vehicles	1
CO4204-6N	Electric drive in cars, commercial vehicles and 2-wheelers	3
CO4205-1H	Interlock in HEV and EV	1
CO4205-1Z	HV Battery with Smart Relays	1
CO4205-1K	DC-DC Step-Up Converters in HEV and EV	1
CO4205-1L	DC-DC Step-Down Converters in Hybrid and all Electric Vehicles	1
CO4205-1M	Safe Handling of HV Systems	1
CO4204-6M	Fuel cells in motor vehicles	
CO4205-6N	Photovoltaics in automotive engineering	

ELECTRONICS

CO4204-5A	Semiconductor components	1
CO4204-5D	Transistor multivibrators	1
CO4204-5H	Transistor and amplifier technology	1
CO4204-5L	Field-effect transistors	1
CO4204-5M	Operational amplifiers	1
CO4204-5N	Power semiconductors for AC voltage applications	2
CO4204-5Q	Power semiconductors for DC voltage applications	2
CO4204-5R	Analog power supplies	1
CO4204-5S	Switched mode power supply circuits	1
CO4204-5U	Circuit design using NI Multisim	1
CO4204-5V	PCB layout with NI Ultiboard	1

ELOTRAIN 2-MM-PLUG-IN SYSTEM

CO4206-1C	Semiconductors	
CO4206-1D	Basic electronic circuits	
CO4206-1E	Optoelectronics	



CO4204-6N Electric drive in cars, commercial vehicles and 2-wheelers

ELECTRICAL ENGINEERING

CO4204-4D	DC technology	1
CO4204-4F	AC technology	1
CO4204-4H	Three-phase technology	1
CO4204-4A	Magnetism/electromagnetism	1
CO4204-4B	Conducting measurements with the multimeter	2
CO4204-4C	Electrical network analysis	1
CO4204-4K	Electromagnetic compatibility (EMC)	1
CO4204-4L	Measurements using an oscilloscope	1

ELOTRAIN 2-MM-PLUG-IN SYSTEM

CO4206-1A	DC technology	
CO4206-1B	AC and three-phase technology	

MEASUREMENT TECHNOLOGY

CO4204-8A	Electric values V/I/P/cos-phi/f	2
CO4204-8B	Non-electric values T/P/F	2
CO4204-8C	Non-electric values displacement/angle/speed	2
CO4204-8D	RLC measurement	2

POWER ELECTRONICS

CO4204-7M	Self-commutated power converters	2
CO4204-7N	Line-commutated power converters	2
CO4204-7P	Frequency converter drives *Requires CO4204-7M and CO4204-7T*	3
CO4204-7Q	Active power factor correction PFC	1

ELECTRIC MACHINES

CO4204-7R	DC machines	1
CO4204-7T	Asynchronous machines	1
CO4204-7V	Synchronous and slip-ring machines	1
CO4204-7W	Stepper motors	1
CO4204-7X	Linear motors	
CO4204-7Y	Single- and Three-phase transformers	1
CO4204-7Z	BLDC/servo motors	1

CONTROL ENGINEERING

CO4204-8K	Practical introduction to control technology	
CO4204-8H	Servo motor technology	

BUILDING SYSTEMS ENGINEERING

CO4204-4M	Protective measures and power network types	
CO4204-4N	Control systems/protective circuitry	
CO4204-4Q	LED lighting	1

ELECTRICAL POWER ENGINEERING

CO4204-3D	Photovoltaics	
CO4204-3B	Transient processes in AC and DC networks	1
CO4204-3C	Fuel cell technology	



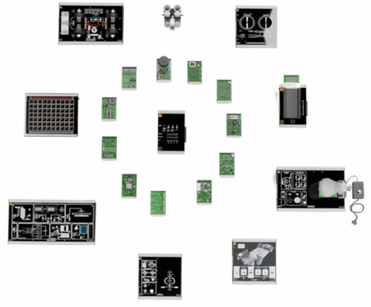
CO4204-3D Photovoltaics

AUTOMATION TECHNOLOGY

CO4204-8M	Fundamentals of PLC technology
CO4204-8T	Elevator plant model
CO4204-8U	Sensors for automation

PNEUMATICS/HYDRAULICS

CO4205-5E	Pneumatics
CO4205-5G	Electropneumatics
CO4205-8A	Fundamentals of Hydraulics and Electro-Hydraulics



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COMMUNICATION TECHNOLOGY

CO4204-9A	Quadripoles and filters	1
CO4204-9B	Active filter with operational amplifiers	1
CO4204-9G	Coaxial cables	1
CO4204-9F	Four-wire lines	1
CO4205-4E	Optical fibres for wavelengths 650 nm/820 nm	2
CO4205-4F	Optical fibres for wavelength 1300 nm	1
CO4204-9J	Pulse modulation methods PAM, PCM, Delta	3
CO4204-9K	Pulse modulation methods PWM, PPM	1
CO4204-9L	Digital modulation methods ASK, FSK, (Q)PSK	2
CO4204-9M	AM/FM modulation/demodulation	2
CO4204-9N	AM transmission and receiving technology	3
CO4205-4S	Data acquisition using RFID and NFC	2
CO4205-4Q	Networking and Cyber Security	2
CO4204-9T	Antenna Technology	1
CO4204-9Y	Microstrip line technology	1

DIGITAL AND MICROCOMPUTER TECHNOLOGY

CO4204-6A	Gates and flip-flops	1
CO4204-6C	Sequential circuits	1
CO4204-6E	Application circuits	1
CO4204-6B	Converter circuits	1
CO4204-6H	Fundamentals of computer technology	1
CO4204-6J	Applications and programming *Addendum to CO4204-6H*	2

ELOTRAIN 2-MM-PLUG-IN SYSTEM

SO4206-1F	Introduction to digital technology	
SO4206-1G	Sequential circuits	
CO4205-7F	8-bit microcontroller PIC 16F18877	
CO4205-7G	8-bit microcontroller Arduino UNO	
CO4205-7C	16-bit dsPIC microcontroller	
CO4205-7D	32-bit microcontroller ARM	
CO4206-9A	Microcontroller PIC16F887	
SO4206-9B	Programming 32-bit ARM Cortex M3 micro-controllers	
SO4206-9C	Digital Signal Processing using microcontroller 32-Bit Arm Cortex-M3 *Addendum to SO4206-9B*	
SO4206-9G	Serial data transmission with RS485 and RGB LED control with DMX512 *Addendum to SO4206-9B*	
SO4206-9E	FPGA Design of circuits using VHDL	
CO4205-7H	FPGA Altera Cyclone IV (Verilog)	

BASIC EQUIPMENT SETS

UNITRAIN

CO4203-2A
UniTrain interface

CO4203-2B
UniTrain experimenter



CO4203-4J
UniTrain measurement accessories (Shunts, plugs, connection cables)

ADDITIONALLY RECOMMENDED/ACCESSORIES

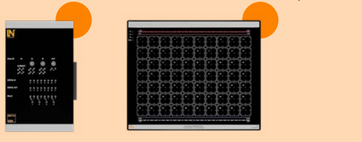
CO4203-2Y
UniTrain storage case

LM2330
Digital multimeter

ELOTRAIN 2-MM-PLUG-IN SYSTEM

CO4203-2A
UniTrain interface

CO4203-3B
EloTrain experimenter



SO5146-1N
EloTrain measurement accessories (Jumpers and connection cables)

SOFTWARE



SO2001-5A *LabSoft Classroom Manager*

ADDITION TO CLASSROOM MANAGER

ASSIGNMENT COLLECTIONS FOR CREATING TESTS

SO2001-6A	Electrical Engineering
SO2001-6B	Electronics
SO2001-6C	Digital Electronics
SO2001-6D	Power Engineering / Renewable Energies
SO2001-6E	Building Management Systems
SO2001-6F	Automotive
SO2001-6P	Exam preparation (part 1) Electrical Engineering

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Course and Equipment Overview



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