

Electrical engineering	Electronics	Digital electronics and microcomputer technology	Building management systems	Power electronics	Communications technology	Measurement technology	Automation	Mechatronics	Automotive technology	Automotive technology	Basic equipment and accessories
DC technology CO4204-4D 1	Semiconductor components CO4204-5A 1	Gates and flip-flops SO4204-6A 1	Protective measures and power network types SO4204-4M	Self-commutated power converters CO4204-7M 2	Quadrupoles and filters SO4204-9A 1	Measurement of electric values V/I/P/cos-phi/f SO4204-8A 2	Compact automation, PLC and bus technology CO4204-8N 3	Transfer system with DC drive SO4204-8K 1	DC and AC circuits in vehicles CO4204-7A 1	LIN bus SO4204-7E 2	Basic equipment
AC technology CO4204-4F 1	Transistor multivibrators CO4204-5D 1	Sequential circuits SO4204-6C 1	Control systems / protective circuitry SO4204-4N	Line-commutated power converters, 3-phase CO4204-7N 2	Active filters with operational amplifiers SO4204-9B 1	Measurement of non-electric values Temp./pressure/force SO4204-8B 2	PLC model lift application SO4204-8T 1	Transfer system with three-phase drive SO4204-8L 1	Electronics and digital technology in vehicles O4204-7B 1	CAN bus SO4204-7K 2	UniTrain interface CO4203-2A
Three-phase technology CO4204-4H 2	Transistor and amplifier technology CO4204-5H 1	Application circuits SO4204-6E 1	LED lighting and colour detection CO4204-4P 1	Frequency converter drives CO4204-7P Requires SO4204-7M and SO4204-7T 3	Coaxial cables SO4204-9G 1	Measurement of non-electric values Displacement/angle/speed SO4204-8C 2	Sensors for automation SO4204-8U 1	Sorting sub-system SO4204-8M 1	Automotive electrical fundamentals SO4205-1D 1	Optical data buses for automotive applications SO4204-7H 1	UniTrain measurement accessories (shunts, jumpers and connection cables) CO4203-2J
Magnetism / electromagnetism CO4204-4A 1	Field-effect transistors CO4204-5K 1	Converter circuits SO4204-6B 1		Active power factor correction (PFC) CO4204-7Q 1	Signal transmission via optical fibres 650 nm / 820 nm CO4205-4E 2	RLC measurements SO4204-8D 2	Process technology: IPA 1 Compact station CO4204-3E 2	Assembly sub-system SO4204-8O 1	PWM signals in automotive engineering SO4204-7J 1	FlexRay SO4204-6Y 1	Required accessories Depending on the course one or more UniTrain experimenters are required.
Conducting measurements with the multimeter SO4204-4B 2	Operational amplifiers CO4204-5M 1	Fundamentals of computer technology SO4204-6H 1	Electrical power engineering		Signal transmission via optical fibres 1300 nm CO4205-4F 1		Process technology: IPA 2 Mixing station SO4204-3F 3	Process sub-system SO4204-8P 1	Alternator / 3-phase generator SO4204-7D 2	Comfort systems and keyless entry SO4204-6G 1 3 *	UniTrain experimenter (quantity) CO4203-2B
Electrical network analysis SO4204-4C 1	Power semiconductor devices SO4204-5P 1	Supplement to SO4204-6H Applications and programming SO4204-6J 2	Photovoltaics CO4204-3A 1	Electrical machines	4-wire lines SO4204-9F 1	Automatic control technology	Process technology: IPA 3 Filling station SO4204-3G 1	Testing sub-system SO4204-8Q 1	Sensors in motor vehicles SO4204-7F 1	Autoshop communications and RFID SO4204-7G 2	UniTrain interface CO4203-2A
Electromagnetic compatibility (EMC) CO4204-4K 1	Analog power supplies SO4204-5R 1	EloTrain 2-mm plug-in system	Transient processes in DC and AC networks SO4204-3B 1	DC machines CO4204-7S 1	Pulse modulation methods PAM/PCM/Delta SO4204-9J 3	Practical introduction to control technology CO4204-8J 1	Process technology: IPA 4 Corking station SO4204-3H 1	Handling sub-system SO4204-8R 1	Pulse generation and ignition systems SO4204-7C 1	DC-AC conversion in vehicles SO4204-6L 1	EloTrain experimenter SO4203-3B
Measurements using an oscilloscope SO4204-4L 1	Switched-mode power supplies SO4204-5S 1	Introduction to digital technology SO4206-1F 1	Fuel cell technology SO4204-3C 1	Asynchronous machines CO4204-7T 1	Pulse modulation methods, PTM SO4204-9K 1	Servo motor technology SO4204-8H 1		Storage sub-system SO4204-8S 1	Common rail diesel injection system SO4204-6X 1	Hybrid drives in automobiles CO4204-6V 3	EloTrain measurement accessories (bridge connectors and connection cables) SO5146-1N
EloTrain 2-mm plug-in system	Circuit design using NI Multisim SO4204-5U 1	Sequential circuits SO4206-1G 1		Synchronous and slip-ring machines CO4204-7U 1	Modem methods ASK, FSK, PSK SO4204-9L 2		Pneumatics / hydraulics	Routing sub-system SO4204-8W 1	Traction control systems ABS/ASR/ESP SO4204-6W 1	Interlock in hybrid and electric vehicles CO4205-1H 1	Digital multimeter Max10 LM2332
DC technology SO4206-1A 1	PCB layout with NI Ultiboard SO4204-5V 1	Microcontroller PIC16F887 (Assembler programming) SO4206-9A 1	Electrical power engineering	Stepper motor CO4204-7W 1	AM/FM Modulation/Demodulation SO4204-9M 2		Pneumatics / electropneumatics SO4204-8V 1	Buffering sub-system SO4204-8X 1	Wheel Speed Sensor Technology SO4205-1F 1	Battery disconnect unit in hybrid and electric vehicles CO4205-1J 1	Recommended accessories
AC and three-phase technology SO4206-1B 1	EloTrain 2-mm plug-in system	8-bit Microcontroller, PIC 16F1937 (UML programming) CO4205-7A 1		Linear motor CO4204-7X 1	AM transmission and receiving technology SO4204-9N 3		Hydraulics / electrohydraulics SO4205-8A 1	Production line SO4204-8Z 1	Airbag, belt tensioners and crash response CO4204-6Z 2	DC-DC step-up converters in hybrid and electric vehicles CO4205-1K 1	UniTrain storage case CO4203-2Y
	Semiconductors CO4206-1C 1	8-bit Arduino UNO (UML programming) CO4205-7B 1		Three-phase transformer CO4204-7Y 1	Data acquisition using RFID SO4204-9S 2				EloTrain 2-mm plug-in system	Hybrid drives in automobiles CO4204-6V 3	Digital multimeter Multi 135 LM2330
	Basic electronic circuits SO4206-1D 1	16-Bit Microcontroller dsPIC (UML programming) CO4205-7C 1		BLDC / servo motors CO4204-7Z 1	Network technology CO4205-4Q 2				Fundamentals of electrical engineering in vehicles SO4206-1J 1	DC-DC step-down converters in hybrid and electric vehicles CO4205-1L 1	LabSoft Classroom Manager
	Optoelectronics SO4206-1E 1	32-Bit Microcontroller ARM (UML programming) CO4205-7D 1			Introduction to microwave technology SO4204-9U 1					Safe handling of HV systems CO4205-1M 1	LabSoft Classroom Manager SO2001-5A
		Programming 32-bit ARM Cortex M3 microcontrollers (C programming) SO4206-9B 1			Supplement to SO4204-9U Waveguide components SO4204-9V 1					Fuel cell technology in vehicles SO4204-6M 1	Collections of assignments (for use with classroom manager)
		DSP using microcontroller 32-bit ARM Cortex-M3 (C programming) SO4206-9C 1			Antenna technology SO4204-9T 1					Solar technology in vehicles SO4204-6N 1	Electronics engineering SO2001-6A
		FPGA - Design of circuits using VHDL SO4206-9E 1			Supplement to SO4204-9T Complex antenna systems SO4204-9Z 1						Electronics SO2001-6B
		FPGA Altera Cyclone IV (Verilog) CO4205-7E 1			Microstrip technology SO4204-9Y 1						Digital electronics SO2001-6C
											Electrical power engineering SO2001-6D
											Building management systems SO2001-6E

* 3 experimenters are required for extension with CAN bus course (SO4204-7K)

