

Course description

Winter & Summer Schools

GENERAL DATA

Course Unit Title	Winter Program: Basics of Embedded Systems		
Module			
Course Unit Code	IFLV6595	Type of Course Unit	ILV
Level of Course Unit	Bachelor	Year of Study	1
Semester	Fall 2025	ECTS Credits allocated	3

SPECIAL INFORMATION

Name of Lecturer	Dipl.-Ing. (FH) Mathias Gfall
Objective of the Course (Learning Outcomes)	A pre-assembled PCB (printed circuit board) includes a microcontroller (ATmega328P). This controller will be coded in C / C++. There are plenty of functions which will be used, for example: Interrupts, Timer, PWM, ADC, I2C, SPI, UART, etc. With those functions different projects can be put into practice: stopwatch, RGB LEDs, IR controller, control circuits, display, relais, students will control circuits of other students remotely and wireless, etc. ... The circuit will be explained in a way that participants are able to understand basic principals of electronic. After the lecture everybody can keep his device in order to have the ability to develop additional skills at home.
Mode of Delivery	face-to-face
Course Contents	The course is based on a practical assignment with focus on the programming of an electronic device: Students receive the opportunity to code many different applications. The skills will be taught by the lecturer and afterwards they can be used in small groups to develop own functionality. Unit 1: Toolchain (Software, Compiler, Linker, ISP), Microcontroller Function (Hardware Units, Structure, Interfaces), Hello World Program

 Unit 2: Digital I/Os, LEDs, Switches, OLED Display

 Unit 3: Timer, Interrupts, PWM (RGB LEDs)

 Unit 4: ADC, Sensor Technology, Temperature Measurement

 Unit 5: UART, IIC, ISP, Wireless Communication ZIGBEE Mesh
Recommended Reading	• Noergaard, T.: Embedded Systems Architecture, Elsevier • Britton, C., Nye, P.: IT Architectures and Middleware, Pearson • Hammerschall, U.: Verteilte Systeme und Anwendungen, Pearson Fachzeitschriften: • Embedded Design, TeDo-Verlag GmbH • Elektronik, WEKA Fachmedien GmbH
Planned Learning Activities and Teaching Methods	The course comprises an interactive mix of lectures, discussions and individual and group work.
Assessment Methods and Criteria	Collaboration and a short report.

