Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	**Erbil Technology collage**	
Department	**Department EAIT**	
Module Name	**Microcontroller Programing**	
Module Code	**MIP601**	
Semester	**6**	
Credits	**6**	
Module type	**Core**	
Weekly hours	**2**	**2**
Weekly hours (Theory)	**(2)hr Class**	**(87)hr Workload**
Weekly hours (Practical)	**(2)hr Class**	**(58)hr Workload**
Lecturer (Theory)	**Rezan Ahmad Ali** **Faysal tele shoro**	
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Lecturer (Practical)	**Amina Hamad** **Muna shawkat**	
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Course Book

Course Description	The course is designed to convey basic information about a programming platform involving both hardware and software, as well as defining terms and training students how to handle components. All the subsequent experiments will use the terminology of the programming environment without further explanation. Trainees will become familiar with the design of the microcontroller and its peripherals, as well as learning structured programming from initial considerations to final solution by means of simple examples.
Course objectives	**Objectives**: 1.To allow students in Embedded System sectors to learn programming / Interfacing peripherals to ARM Cortex based Microcontroller 2. To understand need and application of ARM Microcontroller in embedded system. 3. To understand architecture and features of typical ARM Processors. 4. To learn interfacing of real-world input and output devices 5. To learn embedded communication systems.
Student's obligation	**Respect** A student has an obligation to exhibit honesty and to respect the ethical standards of the profession in carrying out his/her academic assignments. Without limiting the application of this principle. **Attendance**

	The student's absence must not exceed 10%. In the event that this percentage is exceeded, the student is considered to have failed in this module. **Questions** Asking questions about unclear material is an important part of the classroom experience. It is not uncommon for students to have similar difficulties, so speaking up will help everyone understand the discussed information. Teachers can also benefit from a student's questions. By finding out what subjects are hard to understand, instructors can adjust their lectures to clear up confusing topics. **Assignment** A student must submit the assignment every week and also write a report about what he/she was studied in the laboratory
Assessment scheme	16% Mid Term (Theory and practical) 4% Quiz 40% Assignment (report, paper, homework, seminar...) 25% final practical 15% final theory
Specific learning outcome:	After successful completion of the course student will be able to: 1. Interface the advanced peripherals to ARM based microcontroller 2. program a microcontroller using C, including hardware configuration and interrupt service routines, 3. manage parallel processes with different priority and real time constraints without the aid of an operating system, 4. Get knowledge about the basic functions of embedded systems. 5. give a detailed description of limitations of the chosen system design, 6. debug a microcontroller application using different tools. 7. Design embedded system with available resources.

Course References:	**Text Books:** 1. Shibu K V, —Introduction to Embedded Systems‖, Tata McGraw Hill Education Private Limited, 2nd Edition 2. Noviello, Carmine. "Mastering STM32." Obtenido de http://www2. keil. com/mdk5/uvision,2017. 3. Norris, Donald. Programming with STM32: Getting Started with the Nucleo Board and C/C++. McGraw Hill Professional, 2018. **Reference Books:** 1. STM32F10xx User Manual 2. https://www.udemy.com/course/stm32cubemx-complete-training/learn/lecture/9606338#overview

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction and basic concepts to Microcontroller and its features, advantages & suitability in embedded application, the difference between microcontroller and microprocessor	1,2	1 &7
Things to be known Inside the Microcontroller	3	1
Types of microcontrollers	4	1&6
Analog to digital converter Digital to analog converter	5	1&3&4

Embedded C programming, C++ Introduction, Why Use C++, Difference between C and C++	6	2&4
C++ Compilers, Arithmetic Operators	7	2
Midterm exam	8	
Basic Data Types in C++	9	2
Learning C++ Loops	10	2
GPIO Configuration, Driving De-initialization	11	5
Declaration of variables	12	3&5
Practical Topics	**Week**	**Learning Outcome**
Describe the architectural features and instructions of 32-bit ARM Cortex M3 microcontroller.	1	1
Ports and port pins	2	3&5
External interrupts	3	3&5
I²C LCD display	4	3&5

Digital to analog converter	5	5
Analog to digital converter	6	2
Examples of C++ Loops	7	2
Midterm exam	8	
Arithmetic Example	9	2
Write an Embedded C program to interface LEDs	10	2&4
Write an Embedded C program to interface Switch	11	2&4
Write an Embedded C program to interface LCDs	12	2&7
Questions Example Design		

External Evaluator