University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: Mechanical Engineering

Form no. (12)
Course Specification

1- Course Data

Course Code:	Course Title:	Academic Year/Level:
EE 416	**Microprocessor Based Process Control**	4
Specialization: Mechanical Engineering	**No. of Instructional Units:** 3	**Lecture** 2 **Practical** 2

2- Course Aim	▪ Understand the basic principles of Microcontrollers, ▪ Provide a review of C-language programming, ▪ Provide a description of microcontroller peripherals and applications
3- Intended Learning Outcome	
a- Knowledge and Understanding	▪ Define the various types of microcontroller and their relation to PC and Microprocessor. ▪ Summarize and understand the advanced programming techniques of C-language.. ▪ Describe the AVR Microcontroller structure and features ▪ Understand the main ports of AVR microcontroller digital and analog and their configuration ▪ Understand the advanced programming of AVR microcontroller and their applications

	▪ Explain the main required signal conditioning to interface analog signal with AVR microcontrollers. ▪ Know the principle of serial communications such as RS 232 standard and the serial interface of AVR and how to configure a microcontroller network ▪ Examine the AVR performance on different real applications

b- Intellectual Skills	▪ Discriminate between the application of microcontroller, microprocessor and PC ▪ Apply advanced C-Programming ▪ Distinguish between AVR microcontroller family and their structure ▪ Examine how to configure digital and analog I/O ports ▪ Design a program that use most feature of AVR Microcontroller ▪ Design different analog signal conditioning to interface with AVR Microcontrollers ▪ Distinguish between serial and parallel communication ▪ Construct and develop a program that examine the serial interface port application. ▪ Construct a digital control system using microcontroller. ▪ Develop applications for process control using microcontroller
c- Professional Skills	▪ Perform advanced program using C-programming ▪ Design a program uses digital and analog I/O ports and their connection ▪ Perform and examine a real program practically on AVR microcontroller and its components such as timers, counters and PWM ▪ Perform an experiments that interface analog signal

	with different types and feature with microcontrollers ▪ Apply an experiment examine serial interface of microcontroller with deferent devices ▪ Prepare and perform laboratory experimental tests to build and complete digital control system.
d- General Skills	▪ Communicate effectively with colleagues and others to interchange knowledge and information about the application of AVR microcontroller and digital control system desgn. ▪ Practice individually and in a small group a laboratory experiments and tutorial exercises in C-Programming, digital and analog ports applications, AVR Programming, and communication. ▪ -Verify and qualify the results of applying microprocessor and micro-controller in effective and informative technical reports.

4- Course Content	Week1: Introduction to Microcontrollers and Architectures with a review of various types available in the market Week2: C-language programming overview – 1. Week3: C-language programming overview – 2. Week4: AVR Microcontroller basic structure. Week5: AVR Microcontroller basic programming principles – 1 (Basic IO design). Week6: AVR Microcontroller basic programming principles – 2 (Basic IO design). Wwek7: AVR microcontroller Programming. Week8: Timers and Counters, PWM. Week9: Analogue interfacing of AVR Microcontrollers. Week10: Serial interfacing standards using RS-232 principles of the PC. Week11: Serial Interfacing of the AVR Microcontroller Week12: Serial Interfacing of the AVR Microcontroller Week 13: Applications. Week 14: Applications. Week 15: Applications.
5- Teaching and Learning Methods	- Lectures - Tutorials - Discussion papers - Designing codes
6- Teaching and Learning Methods for Students with Special Needs	- Lectures - Tutorials - Discussion papers - Designing codes

7- Student Assessment:	
a- Procedures used:	**Quiz to asses part of the 7th week evaluation** **Report to asses the 7th week practical evaluation** **Written exam to asses the 7th week evaluation** **Written exam to asses part of the 12th week evaluation**
b- Schedule:	**Assesssment 1** — **5th Week** **Assesssment 2** — **6th Week** **Assesssment 3** — **7th Week** **Assesssment 4** — **10th Week** **Assesssment 5** — **12th Week**
c- Weighing of Assessment:	**7th Week Examination** — **30%** **12th Week Examination** — **20%** **Final-term Examination** — **40%** **Oral Examination** — **0%** **Practical Examination** — **5%** **Semester Work** — **5%** **Total** — **100%**
8- List of References:	▪ D. V. Gadre "Programming and Customizing the AVR Microcontroller", 2001, Mc Graw Hill
a- Course Notes	
b- Required Books (Textbooks)	S. F. Barrett, D. J. Pack, "Atmel AVR Microcontroller Primer: Programming and Interfacing", 2008, Morgan and Claypool Publishers

c- Recommended Books	
d- Periodicals, Web Sites, ..., etc.	

Course Instructor

Name: **Prof. Alaa Khalil**

Signature:

Head of Department

Name: **Prof. Yasser Gaber**

Signature:

Dean of College of Engineering and Technology of AASTMT

Name: **Prof. Moustafa Hussein Aly**

Signature:

Executive Manager of Quality Assurance Center of AASTMT

Name: **Prof. Aziz Ezzat**

Signature: