University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Computing and Information Technology
Program: Computer Science / software Engineering

Form No. (12)
Course Specification

1- Course Data

Course Code:	Course Title:	Academic Year/Level:
CS427	Embedded systems	Year 3 / Semester 5
Specialization: Computer Science	**No. of Instructional Units:** 2 hrs lecture 2 hrs lab	**Lecture:**

2- Course Aim	This course provides an introduction to the world of embedded applications from the point of view of programming techniques and software environment; as well as their dependency on real time operating systems (RTOS) and their specific software programming tools. Topics of interest include the application of microcontrollers and multi-code processors and networking in the implementation of real time systems with their different characteristics and aspects such as multi-tasking, inter-networking, high level software issues, etc…
3- Intended Learning Outcome:	
a- Knowledge and Understanding	**Students will be able to demonstrate knowledge of:** **K13.** Use high-level programming languages. **K16.** Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, natural language processing, data mining, databases and computer graphics. **K19.** Select advanced topics to provide a deeper understanding of some aspects of the subject, such as hardware systems design, object-oriented analysis and design, and artificial intelligence, and parallel and concurrent computing. • Define embedded systems. • Understand the purpose and categories of embedded systems • Understand the embedded system hardware and software. • Define Real-time systems and study some speeding up technologies (OpenMP and MPI). • Differentiate between Hard, Firm, and Soft real-time embedded systems

b- Intellectual Skills	**By the end of the course, the student acquires high skills and an ability to understand:** **I10.** Define traditional and nontraditional problems, set goals towards solving them, and. observe results. **I13.** Identify attributes, components, relationships, patterns, main ideas, and errors. **I17.** Identify a range of solutions and critically evaluate and justify proposed design solutions. **I19**. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. • Test and compare different implementations on different platform. • Compare between different systems • Demonstrate the expected outcomes of the project • Compare different models architectures

c- Professional Skills	**By the end of the course the student will have the ability to:** **P14.** Specify, design, and implement computer-based systems. **P18.** Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context. **P19.** Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.
d- General Skills	**Students will be able to:** **G1.** Demonstrate the ability to make use of a range of learning resources and to manage one's own learning. **G2.** Demonstrate skills in group working, team management, time management and organizational skills. **G7.** Show the use of general computing facilities. • Verify theory with practice • Improve presentation skills • Improve team work skills
4- Course Content	

1	Identify and appreciate the meaning of embedded systems applications.
2	Differentiate between Hard, Soft, and Firm real-time systems
3	Use high level programming to develop task oriented applications in real time.
4	Use real time operating system functions and tools for multi-tasking, inter-networking, memory limitations, hardware resource allocation, etc…
5	Define the basic hardware components needed to implement Embedded systems.

5- Teaching and Learning Methods	Lectures, Labs, Projects, Individual study & self-learning.
6- Teaching and Learning Methods for Students with Special Needs	• Students with special needs are requested to contact the college representative for special needs (currently Dr Hoda Mamdouh in room C504) • Consulting with lecturer during office hours. • Consulting with teaching assistant during office hours. • Private Sessions for redelivering the lecture contents. • For handicapped accessibility, please refer to program specification.
7- Student Assessment:	
a- Procedures used:	Exams and Projects
b- Schedule:	Week 7 exam 2 Projects through the semester Week 16Final exam
c- Weighing of Assessment:	Project 1 25% Project 2 20% Project 3 10% Quiz 5% Final exam 40%
8- List of References:	
a- Course Notes	From the Moodle on www.aast.edu
b- Required Books (Textbooks)	Michael Pont , *Embedded C* , Addison Wesley professional, 2002.
c- Recommended Books	Daniel Lewis, *Fundamentals of Embedded Software: Where C and Assembly Meet*, Prentice Hall, 2001 John Catsoulis , *Designing Embedded Hardware*, O'Reilly, 2002. Phillip Laplante, *Real-Time Systems Design and Analysis*, 3rd edition, Wiley Interscience, 2004
d- Periodicals, Web Sites, ..., etc.	

Course Instructor: **Head of Department:**

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