

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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Embedded Systems Design

College: Engineering

Department: Electrical

First: Course Definition, a Summary:

1- Course Code: EE 617

2- Units: 3 credit hrs

3- Level: 3rd

4- Prerequisite: Basic knowledge of microprocessor/microcontroller architecture, programming is required

5- Co-requisite:

6- Location (if not on main Campus):

Second: Course Objectives

- To give students an understanding of the concept of Embedded Systems, primarily through the application of Microcontrollers.
- Acquainting the students with the knowledge Starting from an introductory level gain entry to professional practice in the embedded world.
- This course is by developing the underlying knowledge and skills appropriate to today's embedded system, in both hardware and software developments.
- Develop the knowledge of hardware which includes in-depth study both microcontroller design, and of the circuits and transducers to which microcontroller must interface.
- Developing the knowledge of the students in the software side, programming in both Assembler and C is covered. This culminates in the study and application of a Real Time Operating System, representing the most elegant way that an embedded system can be programmed.

Third: Course Description

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1- Topics to be covered		
Subject	No of Weeks	Units
What is Embedded System?	1	3
What is Microcontroller/Microprocessor?	1	3
Microcontroller/Microprocessor Components	2	6
Microcontroller/Microprocessor Performance Aspects	2	6
PIC, Intel, ARM Microcontroller Architectures	4	12
Implementation of Embedded Hardware/Software Codesign	3	9
Timing & Performance Analysis, Power Aware Computing, Security in Embedded System	2	6

2- Course components (Total hrs in the Semester: 60)

Lectures	Exercises	Other
45	----	----

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:
<ul style="list-style-type: none"> • Embedded Systems Applications • Microcontroller/Microprocessor Architectures • Hardware/Software Codesign

ii) Teaching strategies to be used to develop that knowledge
<ul style="list-style-type: none"> - Class lectures - Students' presentations - Group discussion in the Class - Assignments - Case study Report (data collection, internet search, and reporting)

iii) Methods of assessment of knowledge acquired
<ul style="list-style-type: none"> - Exams - Quizzes - Homework assignments - Term projects

b- Cognitive (Intellectual) Skills

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- i) Cognitive skills to be developed**
- The ability to design embedded system
 - Ability to analyze the processor functionalities
 - Ability to program processor through instruction sets

- ii) Teaching strategies to be used to develop these cognitive skills**
- Class lectures
 - Case studies analysis
 - Term projects

- iii) Methods of assessment of students' cognitive skills**
- Students' seminars and presentations
 - Term projects
 - Written reports

c. Interpersonal Skills and Responsibility

- i) Description of the interpersonal skills and capacity to carry responsibility to be developed**
- Decision making based on engineering analysis
 - Communication skills
 - Team work

- ii) Teaching strategies to be used to develop these skills**
- Reports
 - Term team projects
 - Presentations and seminars

- iii) Methods of assessment of students' interpersonal skills and capacity to carry responsibility**
- Evaluation of the team projects
 - Written reports
 - Students' seminars and presentations

d. Communication, Information Technology and Numerical Skills

- i) Description of the skills to be developed in this domain**
- Literature search
 - Problems numerical modelling
 - Utilization of computer applications in analysis and design

- ii) Teaching strategies to be used to develop these skills**

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- Class lectures
 - Case studies analysis
 - Computer lab sessions
 - Term projects
- iii) Methods of assessment of students numerical and communication skills**
- Term projects
 - Written reports
 - Students' seminars and presentations

e. Psychomotor (if applicable) & Other Non-cognitive Skills

- i) Description of the psychomotor or other skills to be developed and the level of performance required**
- NA

- ii) Teaching strategies to be used to develop these skills-**
- NA

- iii) Methods of assessment of student's psychomotor skills**
- NA

4- Student Assessment Schedule

<i>Serial</i>	<i>Assessment tool (test, group project, examination etc.)</i>	<i>Week due</i>	<i>Weight</i>
1	Term Project	3 rd	30 %
2	Mid Term Exam -1	7 th	20 %
5	Final Exam	16 th	50 %

5- Student Support

- Providing electronic library for references and scientific periodicals. Students have access to the ieeExplore and ScienceDirect digital libraries of the IEEE and Elsevier respectively
- Providing the necessary computer applications for the course.

6- Learning Resources

- i) Essential Books (References)**

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- The 8051 Microcontroller & Embedded Systems, M. Ali Mazidi
- Embedded System Design, Peter Marwedel
- Embedded Systems Architecture, Tammy Noergaard
- Embedded Systems World Class Designs, Jack Ganssle

ii) Course Notes Course materials are uploaded on the College Web-Site (www.qec.edu.sa) to be available for the students.

iii) Recommended Books

Designing Embedded Systems with PIC Microcontrollers Principles and Applications, Tim Wilmshurst

iv) Electronic Books & Web Sites:

- Scientific journals and forums.
Students have access to the ieeexplore and ScienceDirect digital libraries of the IEEE and Elsevier respectively

v) Periodicals

-IEEE and Elsevier Journals

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Students' Questionnaires
- Observing the students opinions recorded in the college student site
- Appeal box
- Carrying out extensive questioners by a sample of the distinguished students just after the graduation from the college

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Instructor report
- Public faculty seminars
- Periodical review of the teaching methods by both the department council and the education affairs vice dean

iii) Processes for Improvement of Teaching

- Assessment of students' work by external examiners
- Analysis of students' evaluation of course and instructor
- Seminars by industry professionals
- Evaluation of the course outlines and student works by external staff member

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- Periodical contact with different engineering authorities and industries for evaluating and getting their feedback and suggestions concerning the course outlines

- iv) Processes for verifying standards of student achievement**
- Check marking by an independent faculty member of a sample of student work
 - Periodic exchange and remarking of a sample of assignments/exams with a external evaluator

- v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.**
- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university)
 - Consequently, actions are to be taken to improve the course delivery when necessary
 - Review of the course objectives, outcomes and curriculum every 2 years