Philadelphia University
Faculty of Engineering
Department of Computer Engineering

First Semester, 2012/2013

Course Syllabus	
Course Title: Embedded Systems Design	**Course code**: 630414
Course Level: 4th Year	**Course prerequisite:** 630313
Lecture Time: 8:15-9:45 Monday & Wednesday	**Credit hours:** 3

Academic Staff Specifics				
Name	**Rank**	**Office No.**	**Office Hours**	**E-mail Address**
Dr. Kasim Al-Aubidy	Prof.	701	13:00-14:00 Monday & Wednesday	qmlone@yahoo.com

Course module description:

Basic introduction to microcontroller-based embedded systems design, development and implementation. It includes embedded system types, microcontroller architecture, programming, I/O interfacing, task scheduling, interrupt management and other related topics.

Course module objectives:

The main objective of this course is to provide the student with the basic understanding of embedded systems design. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications. Learning the concepts will be enforced by a Project to design and develop an embedded system based on a single-chip microcontroller.

Course/ module components:
- **Books (title , author (s), publisher, year of publication):**
  An Introduction to the design of small-scale Embedded Systems. By: Tim Wilmshurst, Palgrave, UK, 2004. ISBN:0-333-92994-2.
- **Support material (s) (vcs, acs, etc).**
- **Study guide (s) (if applicable)**
- **Homework and laboratory guide (s) if (applicable).**

Teaching methods:
Lectures, discussion groups, tutorials, problem solving, debates, etc.
Learning outcomes:
- Knowledge and understanding: Understanding principles of embedded systems design; be aware of architectures and behaviors of embedded systems.
- Cognitive skills (thinking and analysis):
- Communication skills (personal and academic).
- Practical and subject specific skills (Transferable Skills).

Course Intended Learning Outcomes									
A - Knowledge and Understanding									
A1.	A2.	A3.	A4.	A5.	A6.	A7.	A8.		
B - Intellectual Skills									
B1.	B2.	B3.	B4.	B5.	B6.	B7.	B8.	B9.	
C - Practical Skills									
C1.	C2.	C3.	C4.	C5.	C6.	C7.	C8.	C9.	C10.
D - Transferable Skills									
D1.	D2.	D3.	D4.	D5.	D6.	D7.			

Assessment instruments

- **Short reports and presentations**: Reading related to current topic will be assigned every week. Assignments and other Homework (HW) will be given throughout the semester, focusing on the concepts learned from these readings.
- **Quizzes:** THREE Quizzes will be offered.
- **Project:** Project is an essential part of this course. Assessment will be based on 3 phases: System Specification, System Design, Hardware and Software Implementation with Project Demonstration. Detailed topics and schedule will be announced in due course.
- **Final examination**: 40 marks

Allocation of Marks	
Assessment Instruments	**Mark**
1st examination	**20%**
2nd examination	**20%**
Project & Presentation	**10%**
Quizzes	**10%**
Final Examination:	**40%**
Total	**100%**

Documentation and academic honesty

- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.
- **Ethics and Disability Act:**
  - Students may consult with one another on solutions, but copying another student's code is strictly prohibited.
  - Students should write their own code. Using code found on books or internet is prohibited.
  - The Instructor follows general university "Academic Dishonesty/Cheating Policy".

Course/module academic calendar

week	Basic and support material to be covered	Homework
(1)	Introduction to embedded systems.	
(2)	Introduction to microcontroller Architecture.	
(3)	Microcontroller Operation	HW1
(4)	Microcontroller Programming: Instruction set.	
(5)	Microcontroller Programming: Program Developing.	Project Selection
(6)	Microcontroller Programming: Timing & Subroutines.	
(7)	Flow of Data.	HW2
(8)	Memory Interfacing.	

(9)	Analog I/O Interfacing	
(10)	Serial Interfacing.	HW3
(11)	Dealing with Time.	Project (Phase1)
(12)	Interfacing to External Devices.	
(13)	MiniProjects using Microcontrollers (1)	Project (Phase2)
(14)	MiniProjects using Microcontrollers (2)	
(15)	MiniProjects using FPGA	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

The student is responsible for all assignments on a weekly basis.

No make-up will be given for missed quizzes, tests or assignments, unless a case is made in advance with Instructor's approval.

Module references
Books

1. S. R. Ball, "Embedded Microprocessor Systems: Real World Design", 2nd edition, Newton, Mass. USA, 2002.
2. S. Ball, *Analog Interfacing to Embedded Microprocessor Systems*, Newness, 2003
3. Berger, *Embedded Systems Design*, CMP Books, 2002
4. J. Ganssle, *The Art of Designing Embedded Systems*, Butterworth, 2002
5. S. Heath, *Embedded Systems Design*, Elsevier, 2003.
6. R. Kamal, "Embedded Systems: Architecture, Programming & Design", 1st edition, 2007, McGraw Hill, USA 2007.
7. P. Laplante, *Real-Time Systems Design and Analysis*, IEEE Press, 2004
8. D.W. Lewis, *Fundamentals of Embedded Software*, Prentice hall, 2002
9. Q. Li, *Real-Time Concepts for Embedded Systems*, CMP Books, 2003
10. P. Marwedel, *Embedded Systems Design*, Kluwer Academic Publishers, 2003
11. T. Noergaard, *Embedded Systems Architecture*, Newess Press, 2005
12. J. Orwant, *Designing Embedded Hardware*, O'Reilly, 2002
13. J. Peatman, "Embedded Systems Design with the PIC18F452 microcontroller", Prentice-Hall, USA 2003.
14. Selic et al., *Real-Time Object-Oriented Modeling*, JohnWiley and Sons, 1994
15. Simon, *Embedded Software Primer*, Addison-Wesley, 1999
16. J.A. Titus, T.B. O'Hanlan, *The Digital I/O Handbook*, Sealevel Systems, 2004
17. K. Topley, *J2ME in a Nutshell*, O'Reilly, 2002
18. F. Vahid, T. Givargis, *Embedded System Design*, John Wiley and Sons, 2002
19. M. Zurawski, *Embedded Systems Handbook*, CRC Press, 2005.
20. Steven Heath, "Embedded Systems Design", 2nd edition, Newton, Mass. USA, 2002.

Journals:
Websites

1. http://www.microchip.com/wwwproducts/devices.aspx?ddocname=en010230
2. http://www.boondog.com/tutorials/pic16F84/pic16f84.html
3. http://www.ke4nyv.com/picprojects.htm
4. http://www.mstracey.btinternet.co.uk/index.htm.