Philadelphia University
Faculty of Engineering
Department of Computer Engineering
Summer Semester, 2015/2016

Course Syllabus

Course Title: Embedded Systems Design	**Course code**: 630470
Course Level: 4th Year	**Course prerequisite(s):** 630371
Lecture Time: 8:00-9:00 Sunday to Thirsday	**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	kma@philadelphia.edu.jo

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).

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:** TWO to THREE Quizzes will be offered (dates TBD).
- **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**: 50 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, Microcontroller Architecture.	Project Selection
(2)	Microcontroller Operation, Programming: Instruction set, Program Developing..	HW1
(3)	Microcontroller Programming: Timing and Subroutines.	
(4)	Microcontroller Input/Output Interfacing; digital, analog, pulses.	HW2
(5)	Keypad Interfacing. LCD Interfacing	HW3
(6)	Serial Interfacing, ESD using single board.	Project (Phase1)
(7)	Embedded Systems and Wireless Sensor Networks.	
(8)	MiniProjects Design using single-chip microcontrollers	Project (Phase2)

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