

## **ENG EC535 Introduction to Embedded Systems**

### **2007-2008 Catalog Data:**

Prereq: basic knowledge of assembly languages, computer organization, and logic circuits; basic knowledge of data structure and algorithms; programming skills in C/C++. This course introduces students to a unified view of hardware and software in embedded systems. The lectures will survey a broad array of subjects including system specification languages, embedded processors, hardware accelerators, memory architecture, communication architecture, real-time operating systems, hardware-software co-design techniques and verification techniques. The concepts will be reinforced with homework and project assignments that involve system design, modeling and validation. The assignments will involve the Gezel language, ARM/Linux-based evaluation boards, and optionally Xilinx FPGA. 4 cr.

### **Status in Curriculum: Elective**

### **Class/Lab Schedule:**

Lecture: 4 hours/week

### **Textbooks and other required materials:**

None. Lecture notes and reading materials will be provided.

### **Reference:**

Jonathan Cobert, Linux Device Drivers, Third Edition, O'Reilly, 2005  
Robert Love, Linux Kernel Development, Second Edition, Novell Press, 2005

### **Coordinator:**

Wei Qin, ECE Department, Assistant Professor

### **Prerequisites by topic:**

EC413, Computer Organization or equivalent  
Experience in C/C++ programming and Linux

### **Goals:**

To provide students with:

- An understanding of the basic tools for designing embedded systems
- An understanding of sound design methodologies
- An experience of embedded system development

### **Course Outcomes:**

- 1) Understand the characteristics of embedded hardware
- 2) Understand the characteristics of embedded software
- 3) Understand the role of real time operation systems
- 4) Understand the common formalisms for data flow modeling
- 5) Understand common performance and cost metrics
- 6) Understand common approaches to enhance a embedded processor

- 7) Be capable of developing basic device drivers in Linux
- 8) Be capable of developing embedded applications under Linux
- 9) Appreciate the fundamental issues in hardware/software codesign

**Course Outcomes mapped to Program Outcomes:**

<b>Program:</b>	<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>
<b>Course:</b>	1-6	7,8	4-8	8	7-9		8,9		9		7,8
<b>Emphasis:</b>	5	5	5	4	5		2		2		5

**Topics in Project Assignments:**

- MP3 player using Bluetooth
- Pocket Game Console
- Digital Picture Frame
- Security Camera
- Portable VoIP phone
- Student-proposed topic

**Contribution of Course to Meeting the Professional Component:**

Engineering topics: 90%

Math & Basic Science: 5%

General Education: 5%

**Prepared by:** Wei Qin

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