Syllabus

UC Irvine extension

EECS_X497.19
Writing Portable Device Driver for Embedded Systems
Fall 2010

Class Meeting Information
This course meets online.

Instructor Information

Name: Aaron Baranoff
Skype: abaranoff
Email: aaron_baranoff@hotmail.com
Web site: www.baranoff.com

Aaron Baranoff, B.A., Principal Engineer L-3 Communications and co-founder, MataiTech LLC, has been developing software and drivers for embedded microprocessors as well as WINDOWS and LINUX for over 20 years. He has extensive experience designing and delivering portable device drivers for multiple platforms and architectures including co-simulation environments. Baranoff also has extensive field and lab experience. The drivers he has developed have been used in many products, and have been used in conjunction with VxWorks, VRTX, PSOS, Windows, Linux, and many other operating systems that are both real time and non real time. Baranoff also has ASIC and FPGA design experience.

Prerequisites — Classes or Knowledge Required for this Course
Basic familiarity with C programming.

Course Sequencing
No sequence.

Course Description

Writing Portable Device Drivers is an elective course in the Certificate Program in Embedded Systems Engineering. Gain a competitive edge on writing portable device drivers source code. Participants will gain practical knowledge of what constitutes a device driver, how to build one from a hardware datasheet, and how to write the code that will be readily portable across multiple platforms and operation systems. Increase your knowledge of timing, interrupt handling, direct memory access (DMA), how to avoid pitfalls, and other critical issues fundamental to writing device drivers. Hands-on lab exercises reinforce code writing skills.

Course Objectives

After completing this course, the student will be able to:

• The practical hands on knowledge to write an embedded device driver.
• The ability to build a device driver starting from the datasheet.
• Learn how to avoid common pitfalls by trying these new skills out and asking questions.

Course Text or Online Resources
Online.

Syllabus

EECS 497.17
Writing Portable Device Driver for Embedded Systems
Fall 2009

Course Outline

Week 1	Getting familiar With the Environment
Topics/Reading	This first week is considered an orientation week. During this time please leave a welcome message for your classmates and instructor.
Objectives	• Become familiar with the system
Assignments Due	Introduce yourself online
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 2	Introductions and Getting stated
Topics/Reading	This week we start with what is software and other technical introductions.
Objectives	• Introduction • What is Software? • What is a device driver • What is an embedded system • Discussion - Embedded Systems All Around Us
Assignments Due	Introductions
Method of instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 3	What is portability
Topics/Reading	Portability and what is means and Dealing with a datasheet
Objectives	• What is portability • Impact of portability • Starting with a Datasheet • Explanation of Lab 1
Assignments Due	Embedded Systems Around the World
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Syllabus

EECS 497.17
Writing Portable Device Driver for Embedded Systems
Fall 2009

Week 4	Getting the rights bits into the right bytes
Topics/Reading	Getting things in the right place at the right time
Objectives	- DMA - Sequence - Timing - Lab 2
Assignments Due	Lab 1
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 5	Read a Datasheet
Topics/Reading	Data sheets and critical regions
Objectives	- Critical Regions - Verification - Learning to read data sheets - Lab 3
Assignments Due	Lab 2
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 6	Coding typical items
Topics/Reading	How to code some typical items
Objectives	- Counters - Registers vs.... the Register keyword - The Volatile Keyword - Statics - Lab 3
Assignments Due	Lab 2 - With feedback incorporated
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Syllabus

EECS 497.17
Writing Portable Device Driver for Embedded Systems
Fall 2009

Week 7	Catching your mistakes
Topics/Reading	Preventing problems
Objectives	• More eyes the merrier • Write you code as if… • Lab 3A
Assignments Due	Lab 3
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 8	Optimizing and Caches
Topics/Reading	Preventing problems
Objectives	• Caches • Optimizers • Interrupts / Interrupt Service Routines • Deferred Processing • Tasks • Lab 4
Assignments Due	Lab 3A
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Week 9	Interfacing to Hardware
Topics/Reading	Interfacing to Hardware
Objectives	• Wrapper functions • Keeping up with hardware • C++ and drivers
Assignments Due	Lab 4
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

Syllabus

EECS 497.17
Writing Portable Device Driver for Embedded Systems
Fall 2009

Week 10	Common sense prevails
Topics/Reading	Common Sense and drivers
Objectives	• Common Sense • Wrapping Up
Assignments Due	Lab 5
Method of Instruction	The students and the instructor will interact via the asynchronous threaded discussions (forums)

UC Irvine extension

EECS 497.17
Writing Portable Device Driver for Embedded Systems
Fall 2009

Grading Scale

100-90% - A
89-80% - B
79-70% - C
69-60% - D
59 and less - F
- Participation (active)
- Labs (Equally weighted)
- Feedback (questions and answers)

3 Credits.

Types of Communication

In an online course, the majority of our communication takes place in the course forums. However, when we have a need for communication that is private, whether personal, interpersonal, or professional, we will use individual email (and by request phone).

Code of Conduct

All participants in the course are bound by the University of California Code of Conduct, found at
http://www.ucop.edu/ucophome/coordrev/ucpolicies/aos/uc100.html.

Course Policies

Expectations of students

I expect you to

- Participate actively, constructively, and politely in all course forums
- Complete and return all assignments and labs.
- Enjoy and Learn

Expectations of the instructor

You can expect me to

- Respond to individual email within 72 hours (although it will in general be much faster)
- Give you individual feedback on your posted assignments within 72 hours (although it will in general be much faster)
- Enjoy the teaching!