

ORIGINATOR'S SECTION:														
1. College:	Desired Term and Year of Implementation (e.g., Fall 2008):													
<input checked="" type="checkbox"/> CoAS <input type="checkbox"/> CoBA <input type="checkbox"/> CoE	<i>Fall</i> Spring 2009													
2. Course is to be considered for G.E.? (If yes, also fill out appropriate GE form*) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No														
3. Course will be a variable-topics (generic) course? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No (“generic” is a placeholder for topics)														
4. Course abbreviation and Number:* CS 435														
5. Title: (Titles using jargon, slang, copyrighted names, trade names, or any non-essential punctuation may not be used.) Real-Time Concepts for Embedded Systems														
6. Abbreviated Title for Banner: (no more than 25 characters, including spaces) Embedded Systems														
7. Number of Units: 3														
8. Catalog Description: (Not to exceed 80 words; language should conform to catalog copy. Please consult the catalog for models of style and format; include all necessary information regarding consent for enrollment, pre- and/or corequisites, repeated enrollment, crosslisting, as detailed below. Such information does <u>not</u> count toward the 80-word limit.) Introduction to the high-level abstract modeling concepts and the lower-level fundamental programming aspects of real-time embedded systems development. The primary focus of the course is in the design, development and validation of microprocessor-based real-time embedded systems. Course topics will include real-time operating system design, real-time scheduling theory, general-purpose microprocessors, common bus architectures, memory management, device driver development, interrupts, general purpose peripherals: such as timers and counters, I/O subsystems along with some embedded system design problems and engineering issues.														
9. Why is this course being proposed? Embedded systems are virtually everywhere in today's world - from avionics to automobiles to everyday consumer electronics. Students need to be equipped with the skills necessary to compete in this market, so the purpose of this course is to provide the students with a solid understanding of real-time embedded systems, key concepts, design issues and the opportunity to develop software in an embedded environment.														
10. Mode of Instruction* (See pages 17-23 at http://www.calstate.edu/cim/data-element/APDB-Transaction-DED-Section V.pdf for definitions of the Course Classification Numbers)														
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Type of Instruction</th> <th>Number of Credit Units</th> <th>Instructional Mode (Course Classification Number)</th> </tr> </thead> <tbody> <tr> <td>Lecture</td> <td style="text-align:center;">3</td> <td style="text-align:center;">C2</td> </tr> <tr> <td>Activity</td> <td></td> <td></td> </tr> <tr> <td>Lab</td> <td></td> <td></td> </tr> </tbody> </table>	Type of Instruction	Number of Credit Units	Instructional Mode (Course Classification Number)	Lecture	3	C2	Activity			Lab			
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11. Grading Method:* <input checked="" type="checkbox"/> Normal (N) (Allows Letter Grade +/-, and Credit/No Credit) <input type="checkbox"/> Normal Plus Report-in-Progress (NP) (Allows Letter Grade +/-, Credit/No Credit, and Report-in-Progress) <input type="checkbox"/> Credit/No Credit Only (C) <input type="checkbox"/> Credit/No Credit or Report-in-Progress Only (CP)														
12. If the (NP) or (CP) grading system was selected, please explain the need for this grade option.														
13. Course Requires Consent for Enrollment? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Faculty <input type="checkbox"/> Credential Analyst <input type="checkbox"/> Dean <input type="checkbox"/> Program/Department - Director/Chair														
14. Course Can be Taken for Credit More than Once? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, how many times? (including first offering)														
15. Is Course Crosslisted: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, indicate which course _____ and check “yes” in item #22 below.														
16. Prerequisite(s): <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No CS 231 CS 331														

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.

17. Corequisite(s): Yes No

18. Documentation attached: Syllabus Detailed Course Outline

19. If this course has been offered as a topic, please enter topic abbreviation, number, and suffix:*

20. How often will this course be offered once established?* once a year

PROGRAM DIRECTOR/CHAIR - COLLEGE CURRICULUM COMMITTEE SECTION:
(Mandatory information – all items in this section must be completed.)

21. Does this course fulfill a requirement for any major (i.e., core course or elective for a major, majors in other departments, minors in other departments)? Yes No

If yes, please specify:
 Elective for the BS degree in computer science

22. Does this course impact other discipline(s)? *(If there is any uncertainty as to whether a particular discipline is affected, check "yes" and obtain signature.)* Yes No

If yes, obtain signature(s). Any objections should be stated in writing and attached to this form.

Discipline	Signature	Date	Support	Oppose
Discipline	Signature	Date	Support	Oppose

SIGNATURES : (COLLEGE LEVEL) :

(UNIVERSITY LEVEL)

1. Originator (please print or type name) TOM SPRINGER 4/7/2008 Date

2. Program Director/Chair [Signature] 4/7/2008 Date

3. College Curriculum Committee [Signature] 05/08/08 Date

4. College Dean (or Designee) [Signature] 5/12/08 Date

5. UCC Committee Chair _____ Date

6. Vice President for Academic Affairs (or Designee) _____ Date

7. President (or Designee) _____ Date

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.

Course Syllabus

Real Time Concepts for Embedded Systems

Instructor: Tom Springer
Office: SCI2
E-mail: tspringc@csusm.edu
Phone: (714) 934 - 9516 (Work)

Materials

Real-Time Systems Design and Analysis, P.A. Laplante. IEEE Wiley 2004

Reference:

An Embedded Software Primer, D.E. Simon Addison-Wesley 1999
Real-Time Systems, Jane S. Lu, Prentice-Hall 2000
Embedded System Design, Frank Vahid/Tony Givargis, Wiley 2002

Objective

The objective of this course is to provide a solid understanding of real-time embedded systems, key concepts, design issues and the opportunity to develop software in an embedded environment. Students will be developing their software using the VxWorks Real-Time Operating System (RTOS) interfacing with virtualized hardware emulated on the PC platform.

Lectures

The lectures are based on the topics in the textbook however some of the material covered in the lectures may not be in the textbook. You are responsible for all the material covered in class. Some class time will be devoted to labs where you will get hands-on experience with some of the topics discussed in the lectures.

Homework

Homework will consist of mainly programming assignments related to developing virtualized software for embedded subsystems. Due to the specialized nature of the software environment students may need to develop their software in the lab.

Project

The term project will consist of the design and implementation of a virtualized embedded system. Coding is to be done in C/C++ though C may be easier due to the amount of low-level coding. The term project can be done in groups of three and you will have to demonstrate the design and operation of your project.

Exams

There will be a midterm that will cover the material up to that point. The final is comprehensive but will concentrate on the material covered in the second half of the course. All exams are open books and open notes. No make-up exams will be allowed.

Grading

Assignments	20%
Project	20%
Midterm	25%
Final	35%

This is an absolute scale. Your particular grade will be determined by your overall percentage.

Schedule

The schedule listed below is only preliminary and subject to change.

Date	Type	Subject
<i>Wk 1</i>	Lecture	Introduction
<i>Wk 1</i>	Lecture	Basic Real-Time Concepts
<i>Wk 2</i>	Lecture	Hardware Fundamentals
<i>Wk 2</i>	Lecture	Basics of Embedded Systems
<i>Wk 3</i>	Lecture	Embedded System Initialization
<i>Wk 3</i>	Lab	Bootting the RTOS on the Embedded Processor
<i>Wk 4</i>	Lecture	Real-Time Kernels
<i>Wk 4</i>	Lecture	Real-Time Scheduling
<i>Wk 5</i>	Lecture	Real-Time Scheduling
<i>Wk 5</i>	Lab	General-purpose software for the embedded processor
<i>Wk 6</i>	Lecture	Exceptions & Interrupts
<i>Wk 6</i>	Lab	Interrupt Service Routines (ISR)
<i>Wk 7</i>	Lecture	Bus Architectures (PCI, cPCI, VME, TCA)
<i>Wk 7</i>	Lab	cPCI Bus Interface
<i>Wk 8</i>	Lecture	Peripheral Devices
<i>Wk 8</i>	Lab	Timers, Counters
<i>Wk 9</i>	Lecture	I/O Devices
<i>Wk 9</i>	Lab	Serial Devices – UART's
<i>Wk 10</i>	Lecture	Memory Management
<i>Wk 10</i>	Lab	Memory Mapped I/O, DMA
<i>Wk 11</i>	Lecture	Software System Design Software Engineering
<i>Wk 11</i>	Lab	Event Registers, Signals
<i>Wk 12</i>		Case Study: NASA's X-37 SMV (Space Maneuverable Vehicle) Program
<i>Wk 12</i>	Lecture	Programming Languages Procedural/Object Languages
<i>Wk 13</i>	Lecture	Performance Analysis
<i>Wk 13</i>	Lecture	Performance Optimization
<i>Wk 14</i>	Lecture	Common Design Problems
<i>Wk 15</i>	Lecture	Engineering Considerations
<i>Wk 15</i>		Project Demo

Debbie Schwarz

From: sjayasin [sjayasin@csusm.edu]
Sent: Friday, May 02, 2008 11:30 AM
To: Debbie Schwarz
Subject: Fwd: CS 435 C form

Debbie,

Here is the response (from John Chang, chair of CS) regarding the CD 435 C form. All that is needed is to change the first offering to Fall 2009 and then check 'no' under question # 3. If the rest of the committee agrees this can be approved.

Jay

Department of Chemistry and Biochemistry
Sci. II 229
California State University
333 South Twin Oaks Valley Road
San Marcos, CA 92096
Tel: (760)-750-8075
Fax: (760)-750-3439
<http://www.csusm.edu/jayasinghc>

Begin forwarded message:

From: "John Chang" <jchang@csusm.edu>
Date: May 2, 2008 9:02:22 AM PDT
To: "sjayasin" <sjayasin@csusm.edu>, "Tom Springer" <tspringe@csusm.edu>, <tom.j.springer@boeing.com>
Subject: RE: CS 435 C form

Jay,

This is my oversight. Tom prepared the original form and I submitted to your committee without making necessary changes.

First of all, it is intended to be a "Regular" course, not a topics one. A similar topics course was offered in the past. Please make necessary corrections. C-form is the right one for submission. We understand that the earliest date to offer this course is Fall 2009.

Please let me know if you need any further information.

Thanks.

John

From: sjayasin [mailto:sjayasin@csusm.edu]
Sent: Thu 5/1/2008 11:48 AM
To: Tom Springer; tom.j.springer@boeing.com
Cc: John Chang

Subject: CS 435 C form

Dear Tom,

I am writing on behalf of CAPC. We are reviewing your C-form for CS 435. We had a couple of questions and would appreciate it if you can provide some clarification.

(1). You had checked 'yes' to question # 3 in the C-form indicating that CS 435 would be a variable topics course. Was this your intent? The course description did not look like a topics course. If CS 435 is not a topics course then we can correct this for you. Also keep in mind that as a regular course the earliest you will be able to offer this would be the fall of 2009.

(2). If you want to offer the course in spring of 2009 you could offer it as a topics course (under CS 497) and submit a T form in september.

Hope this clarifies matters and hope to hear from you soon.

Thanks,

Jay

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