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CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS
COURSE MODIFICATION PROPOSAL
Courses must be submitted by November 3, 2008,
to make the next catalog (2009-2010) production

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DATE (CHANGE DATE EACH TIME REVISED): OCTOBER 16, 2008 REV 11.14.08
PROGRAM AREA(S) : COMPUTER SCIENCE
Directions: All of sections of this form must be completed for course modifications. All documents are stand alone sources of course information.

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1. **Course Information.**
   [Follow accepted catalog format.] (***Add additional prefixes i f cross-listed***)

OLD	NEW
Prefix COMP Course# 462 Title Embedded Systems Units (3)	Prefix COMP Course# 462 Title Embedded Systems Units (3)
3 hours lecture per week	3 hours lecture per week
hours blank per week	hours blank per week
☒ Prerequisites: Comp 362	☒ Prerequisites: Comp 350 and Comp 362
☐ Consent of Instructor Required for Enrollment	☐ Consent of Instructor Required for Enrollment
☐ Corequisites:	☐ Corequisites:

OLD Catalog Description (Do not use any symbols):
This course covers the deisgn of embedded systems. This includes the analysis of small computer systems designed for robotic mechanisms and common appliances such as cell phones and other hand held devices. The course will cover the design, implementation and testing of software used in such systems with special attention paid to maximizing the use of limited computational resources and the need for event-driven real time system responses.

NEW Catalog Description (Do not use any symbols):
Covers the design of embedded systems. This includes the analysis of small computer systems designed for robotic mechanisms and common appliances such as cell phones and other hand held devices. Topics include the design, implementation and testing of software used in such systems with special attention paid to maximizing the use of limited computational resources and the need for event-driven real time system responses.

OLD
Graded
☐ Gen Ed Categories
☐ Lab Fee Requested
Course Level:
☒ Undergraduate
☐ Post-bac/Credential
☐ Graduate
☐ CR/NC
☒ A - F
☐ Optional (Student's choice)
☐ Repeatable for up to ____ units
Total Completions ____
☐ Multiple Enrollment in same semester

NEW
Graded
☐ Gen Ed Categories
☐ Lab Fee Requested
Course Level:
☒ Undergraduate
☐ Post-bac/Credential
☐ Graduate
☐ CR/NC
☒ A - F
☐ Optional (Student's choice)
☐ Repeatable for up to ____ units
Total Completions ____
☐ Multiple Enrollment in same semester

2. **Mode of Instruction (Hours per Unit are defaulted)**   Hegis Code(s)_____
(Provided by the Dean)

Existing

	Units	Hours Per Unit	Benchmark Enrollment	Graded
Lecture	**3**	**1**	**24**	☒
Seminar	____	____	____	☐
Lab	____	____	____	☐
Activity	____	____	____	☐
Field Studies	____		____	☐
Indep Study	____		____	☐
Other blank	____		____	☐

Proposed

	Units	Hours Per Unit	Benchmark Enrollment	Graded	CS No. (filled out by Dean)
Lecture	**3**	**1**	**24**	☒	____
Seminar	____	____	____	☐	____
Lab	____	____	____	☐	____
Activity	____	____	____	☐	____
Field Studies	____		____	☐	____
Indep Study	____		____	☐	____
Other blank	____		____	☐	____

3. Course Attributes:

☐ **General Education Categories**:   All courses with GE category notations (including deletions) must be submitted to the GE website: http://summit.csuci.edu/geapproval.   Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)
  ☐   A-1 Oral Communication
  ☐   A-2 English Writing
  ☐   A-3 Critical Thinking
B (Mathematics, Sciences & Technology)
  ☐   B-1 Physical Sciences
  ☐   B-2 Life Sciences – Biology
  ☐   B-3 Mathematics – Mathematics and Applications
  ☐   B-4 Computers and Information Technology
C (Fine Arts, Literature, Languages & Cultures)
  ☐   C-1 Art
  ☐   C-2 Literature Courses
  ☐   C-3a Language
  ☐   C-3b Multicultural
  ☐   **D (Social Perspectives)**
  ☐   **E (Human Psychological and Physiological Perspectives)**
  ☐   **UDIGE/INTD Interdisciplinary**
  ☐   **Meets University Writing Requirement**
  ☐   **Meets University Language Requirement**

☐   American Institutions, Title V Section 40404: ☐ Government   ☐ US Constitution   ☐ US History
Refer to website, Exec Order 405, for more information: http://senate.csuci.edu/comm/curriculum/resources.htm
☐   Service Learning Course (Approval from the Center for Community Engagement must be received before you can request this course attribute).

4. Justification and Requirements for the Course. *[Make a brief statement to justify the need for the course]*

OLD
Embedded systems encompass software that resides on small computers that control applicances, cars, telephones as well as robots. Very often, the software has to respond to events that occur in real-time, so it introduces hard deadlines on the timing of responses so the system has to be written in a way that allows fulfilling such time-critical applications. The controllers constitute very specific programming environments that include gateways to control manipulators and sensors. This course will teach the students how to write effective programs in such environments, how to debug and deploy them and how to manage their lifecycles

☐ Requirement for the Major/Minor
☒ Elective for the Major/Minor

NEW
Embedded systems encompass software that resides on small computers that control applicances, cars, telephones as well as robots. Very often, the software has to respond to events that occur in real-time, so it introduces hard deadlines on the timing of responses so the system has to be written in a way that allows fulfilling such time-critical applications. The controllers constitute very specific programming environments that include gateways to control manipulators and sensors. This course will teach the students how to write effective programs in such environments, how to debug and deploy them and how to manage their lifecycles

☐ Requirement for the Major/Minor
☒ Elective for the Major/Minor

Submit Program Modification if this course changes your program.

5. Learning Objectives. (List in numerical order)

Upon completion of the course, the student will be able to:
OLD
Sketch the key components of embedded system software
Identify, reference and analyze embedded systems industry standards
Sketch the key components of embedded systems hardware

Upon completion of the course, the student will be able to:
NEW
Sketch the key components of embedded system software
Identify, reference and analyze embedded systems industry standards
Sketch the key components of embedded systems hardware

Select the appropriate software architecture for an embedded system design
Produce software designs that use computer ports effectively
Produce working software used as "drivers" for embedded systems
Identify and sketch the key components of a real time embedded system
Identify and sketch the key components of a robotic controller
Produce working software that adds some elements of intelligence to a robot

6. Course Content in Outline Form. (Be as brief as possible, but use as much space as necessary)

OLD	NEW
* Principles of real-time systems	* Principles of real-time systems
* Fundamental hardware concepts	* Fundamental hardware concepts
* Microprocessors	* Microprocessors
* Device drivers	* Device drivers
* Embedded operating systems	* Embedded operating systems
* Fundamentals of robotics	* Fundamentals of robotics
* Handling touch sensors	* Handling touch sensors
* Handling vision	* Handling vision
* Controlling manipulators	* Controlling manipulators
* Math for robots	* Math for robots
* Self-orientation	* Self-orientation
* Multi-robot environment	* Multi-robot environment

Does this course content overlap with a course offered in your academic program? ☐ **Yes** ☒ **No**
If YES, what course(s) and provide a justification of the overlap.

Does this course content overlap a course offered in another academic area? ☐ **Yes** ☒ **No**
If YES, what course(s) and provide a justification of the overlap.

Overlapping courses require Chairs' signatures.

7. Cross-listed Courses (Please note each prefix in item No. 1)
        A. List cross-listed courses (Signature of Academic Chair(s) of the other academic area(s) is required).
        B. List each cross-listed prefix for the course:
        C. Program responsible for staffing:

8. References. *[Provide 3-5 references]*

OLD Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, Tammy Noergaard, Spring 2001
An Embedded Software Primer, David E. Sloan, Addison-Wesley Professional 1999
Buikding Robots with Lego Mindstorms: The Ultimate Tool for Mindstorms Maniacs, Mario Ferrari, Giulio Ferrari, Ralph Hempel, Syngress, 2001
Creative Projects with Lego Mindstorms, Benjamin Erwin, Addison-Wesley Professional, 2001

NEW Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, Tammy Noergaard, Spring 2001
An Embedded Software Primer, David E. Sloan, Addison-Wesley Professional 1999
Buikding Robots with Lego Mindstorms: The Ultimate Tool for Mindstorms Maniacs, Mario Ferrari, Giulio Ferrari, Ralph Hempel, Syngress, 2001
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9. Tenure Track Faculty qualified to teach this course.
   All Computer Science faculty

10. Requested Effective Date or First Semester offered: Fall 2009

11. New Resource Requested: ☐ Yes ☒ No
   If YES, list the resources needed.

   A. **Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)**
   B. **Library Needs (streaming media, video hosting, databases, exhibit space, etc.)**
   C. **Facility/Space/Transportation Needs:**
   D. **Lab Fee Requested:** ☐ Yes ☐ No. **Refer to the Dean's Office for additional processing**
   E. **Other.**

12. Indicate Changes and Justification for Each. *[Check all that apply and follow with justification. Be as brief as possible but, use as much space as necessary.]*

☐ Course title	☐ Course Content
☐ Prefix/suffix	☐ Course Learning Objectives
☐ Course number	☐ References
☐ Units	☐ GE
☐ Staffing formula and enrollment limits	☐ Other cross listing
☒ Prerequisites/Corequisites	☐ Reactivate Course
☒ Catalog description	
☐ Mode of Instruction	

   Justification: Students need background in both Operating Systems and Software Engineering to get the most out of this course.

13. Will this course modification alter any degree, credential, certificate, or minor in your program? YES ☐ NO ☒
   If, YES attach a program update or program modification form for all programs affected.
   Priority deadline for New Minors and Programs: October 6, 2008 of preceding year.
   Priority deadline for Course Proposals and Modifications: November 3, 2008.
   Last day to submit forms to be considered during the current academic year: April 15th.

William J. Wolfe   10/16/08

Proposer(s) of Course Modification   Date
Type in name. Signatures will be collected after Curriculum approval.

Approval Sheet

Course: Comp 462

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

Program Chair		
	Signature	Date

Program Chair		
	Signature	Date

Program Chair		
	Signature	Date

General Education Chair		
	Signature	Date

Center for Intl Affairs Director		
	Signature	Date

Center for Integrative Studies Director		
	Signature	Date

Center for Multicultural Engagement Director		
	Signature	Date

Center for Civic Engagement and Service Learning Director		
	Signature	Date

Curriculum Chair		
	Signature	Date

Dean of Faculty		
	Signature	Date