Office of the Registrar
FORM 40G REV. 9/06

PURDUE UNIVERSITY

REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(500-600 LEVEL)

Print Form

3-07

DEPARTMENT ECE

EFFECTIVE SESSION Fall 2008

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

- [ ] 1. New course with supporting documents (complete proposal form)
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [X] 5. Change in course title
- [ ] 6. Change in course credit/type
- [X] 7. Change in course attributes
- [ ] 8. Change in instructional hours
- [X] 9. Change in course description
- [X] 10. Change in course requisites
- [X] 11. Change in semesters offered
- [ ] 12. Transfer from one department to another

PROPOSED:	EXISTING:
Subject Abbreviation	Subject Abbreviation ECE
Course Number	Course Number 568
Long Title Embedded Systems	
Short Title Embedded Systems	

Abbreviated title will be entered by the Office of the Registrar if omitted. (22 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Summer [X] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ] No [X]
4. Thesis Credit: Yes [ ] No [X]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
Maximum Repeatable Credit:
4. Credit by Examination
5. Designator Required
6. Special Fees
7. Registration Approval Type
Department [X] Instructor [ ]
8. Variable Title
9. Remedial
10. Honors
11. Full Time Privilege
12. Off Campus Experience

Instructional Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated	Delivery Method (Asyn. Or Syn.)	Delivery Medium (Audio, Internet, Live, Text-Based, Video)
	50	3	16	100		
Lecture						
Recitation						
Presentation						
Laboratory						
Lab Prep						
Studio						
Distance						
Clinic						
Experiential						
Research						
Ind. Study						
Pract/Observ						

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES): Prerequisite: ECE 437.

This course provides an introduction to the design of embedded and ubiquitous computing systems including their hardware and software architectures, design methodologies and tools, and communication protocols. The lectures are organized into three parts namely, (a) basic design principles including specification and modeling, hardware components and platforms, software organization, embedded and real-time operating systems, interfacing with external environments using sensors and actuators, and communication in distributed embedded systems, (b) advanced topics such as energy management, safety and reliability, and security, and (c) case-studies of real-world systems from a variety of embedded application domains such as biomedical devices, smart cards and RFID, networked sensors, personal computing devices, home appliances and electronics, mobile robotics, etc. In addition to hands-on programming assignments using off-the-shelf embedded system development kits

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Undergrad Curriculum Committee	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
				R. J. Ciora	10/6/08
Indianapolis Department Head	Date	Indianapolis School Dean	Date	Undergrad Curriculum Committee	Date
North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
Mark R Mellar	6/25/08			Marilyn O. Hurst	3/2/09
West Lafayette Department Head	Date	West Lafayette College/School Dean	Date	Graduate Council Secretary	Date
		Philip E. Pape	3/2/09		
Graduate Area Committee Convener	Date	Graduate Dean	Date	West Lafayette Registrar	Date
					3/14/09

OFFICE OF THE REGISTRAR

3/13/09

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FORM 40G REV. 9/06

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DEPARTMENT ECE EFFECTIVE SESSION Fall 2008

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☐	2.	Add existing course offered at another campus	☐	8.	Change in instructional hours
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☒	5.	Change in course title	☒	11.	Change in semesters offered
☐	6.	Change in course credit/type	☐	12.	Transfer from one department to another

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Check All That Apply:
☐ Summer ☒ Fall ☒ Spring

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☐ Calumet ☐ N. Central
☐ Cont Ed ☐ Tech Statewide
☐ Ft. Wayne ☒ W. Lafayette
☐ Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To ☐ Or ☐
Maximum Cr. Hrs.
3. Equivalent Credit: Yes ☐ No ☒
4. Thesis Credit: Yes ☐ No ☒

COURSE ATTRIBUTES: Check All That Apply

1. Pass/Not Pass Only	☐	7. Registration Approval Type	
2. Satisfactory/Unsatisfactory Only	☐	Department	☒
3. Repeatable	☐	Instructor	☐
Maximum Repeatable Credit:	☐	8. Variable Title	☐
4. Credit by Examination	☐	9. Remedial	☐
5. Designator Required	☐	10. Honors	☐
6. Special Fees	☐	11. Full Time Privilege	☐
		12. Off Campus Experience	☐

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North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
M. R. Mellal 6/25/08 West Lafayette Department Head	Date	West Lafayette College/School Dean	7/3/08 Date	Graduate Council Secretary	Date
Graduate Area Committee Convener	Date	Graduate Dean	Date	West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

Engineering Faculty Document No. 3-07
May 16, 2007

TO: The Faculty of the College of Engineering
FROM: The Faculty of the School of Electrical and Computer Engineering
RE: ECE 568 Changes in Title, Terms Offered, Prerequisite, Description, and Content

The faculty of the School of Electrical and Computer Engineering has approved the following changes in ECE 568. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: **ECE 568 – RISC & DSP Microprocessor System Design**
Sem.1 and 2. Class 3, cr. 3. (Offered in alternate years.)
Prerequisite: Department approval required.

Overview of reduced instruction set (RISC) microprocessors and digital signal processing (DSP) microprocessors, with emphasis on incorporating these devices in general purpose and embedded system designs, respectively. The first half of the course emphasizes design considerations for RISC microprocessor based computer systems; a half-semester design project focuses on design principles that could be utilized in a general-purpose computer system (e.g., an engineering workstation). The second half of the course emphasizes design considerations for DSP microprocessor based computer systems; a half-semester design project focuses on analog I/O interfacing techniques and use of these devices for embedded applications (e.g., spectrum analyzer, digital audio equalizer).

To: **ECE 568 – Embedded Systems**
Sem. 2 of even years. Class 3, cr. 3
Prerequisite: ECE-437 or equivalent

This course provides an introduction to the design of embedded and ubiquitous computing systems including their hardware and software architectures, design methodologies and tools, and communication protocols. The lectures are organized into three parts namely, (a) basic design principles including specification and modeling, hardware components and platforms, software organization, embedded and real-time operating systems, interfacing with external environments using sensors and actuators, and communication in distributed embedded systems, (b) advanced topics such as energy management, safety and reliability, and security, and (c) case-studies of real-world systems from a variety of embedded application domains such as biomedical devices, smart cards and RFID, networked sensors, personal computing devices, home appliances and electronics, mobile robotics, etc. In addition to hands-on programming assignments using off-the-shelf embedded system development kits, the course will feature a comprehensive project where students will design, implement, and evaluate a prototype embedded system.

Reason: The course description and content have been changed to reflect the updated content of the course.

Mark J. T. Smith, Head
School of Electrical & Computer Engineering

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE
ECC Minutes #25
Date 5/9/08
Chairman ECC

Supporting Documentation

ECE 568– Embedded Systems

Required Text: There is no required text book. Assigned readings will be distributed.

Recommended References:
(1) Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", John Wiley and Sons, 2001 (ISBN: 0471386782)
(2) Wayne Wolf, "High-Performance Embedded Computing: Architectures, Applications, and Methodologies", Morgan Kaufmann, 2006. (ISBN: 012369485)

Weeks	*Principal Topics*
1	Introduction to embedded systems, overview of the design flow
1	Embedded system specification and modeling
1	Embedded hardware platforms and peripherals
1	Interfacing to the external world through sensors and actuators
1	Design and synthesis of ASIC hardware
1	Software organization, scheduling, and execution
1	Embedded and real-time operating systems
1	Wired communication and bus protocols
1	Basics of wireless communication and embedded networking
2	Energy management and low-power design
1	Safety and reliability in embedded systems
1	Secure embedded system design
1	Case studies: Low-end systems (medical devices, smart cards, sensors)
1	Case studies: High-end systems (automobiles, home electronics, robotics)
Final	Project presentations and demonstrations

Special Information: The final project, done in teams of two or three, will involve the design, implementation, and evaluation of an embedded system. Projects can be hardware based, software based, or even about proving the theoretical properties of a design. A good project should address the following aspects: target applications, related existing solutions, new features and limitations of the design, technological and economic feasibility.

Course Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1) Design simple embedded systems. [4; a, c, k]
2) Choose effective communication for embedded systems. [3, 4; e, k]
3) Analyze real-time scheduling algorithms. [4; a]
4) Identify design flaws. [3, 4; b, e, k]

Outcome Assessment Method: The students will have several opportunities to satisfy the course outcomes including homeworks, programming assignments, exams, and a final project. A student will satisfy each course outcome when his/her score for the corresponding exam/assignment/homework/project question(s) equals or exceeds a value specified as representing minimal competency. If the student fails to meet this level of minimal competency on a specific course outcome, the student will have a second chance to do so by appearing for a retest (either written or through an interview, to be chosen by the instructor). While the retest will not affect the student's score on the original test, it will provide him/her a second opportunity to demonstrate competency on the course material, thus satisfying the course outcome.