# PURDUE UNIVERSITY
## REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE
### (10000-40000 LEVEL)

Print Form

*EFD 32-10*

DEPARTMENT School of Electrical and Computer Engineering (EFD 32-10)     EFFECTIVE SESSION Fall 2010

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

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

**PROPOSED:**

Subject Abbreviation _____

Course Number _____

Long Title  ASIC Design Laboratory

Short Title  ASIC Design Laboratory

**EXISTING:**

Subject Abbreviation  ECE

Course Number  33700

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

**TERMS OFFERED**
Check All That Apply:

☐ Summer   ☐ Fall   ☐ Spring

**CAMPUS(ES) INVOLVED**

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

### CREDIT TYPE

1. Fixed Credit: Cr. Hrs. _____
2. Variable Credit Range:
   Minimum Cr. Hrs _____
   (Check One)   To ☐   Or ☐
   Maximum Cr. Hrs. _____
3. Equivalent Credit:  Yes ☐   No ☐

### 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. Special Fees ☐
6. Registration Approval Type   Department ☐   Instructor ☐
7. Variable Title ☐
8. Honors ☐
9. Full Time Privilege ☐
10. Off Campus Experience ☐

| ScheduleType | Minutes Per Mtg | Meetings Per Week | Weeks Offered | % of Credit Allocated |
|---|---|---|---|---|
| Lecture | | | | |
| Recitation | | | | |
| Presentation | | | | |
| Laboratory | | | | |
| Lab Prep | | | | |
| Studio | | | | |
| Distance | | | | |
| Clinic | | | | |
| Experiential | | | | |
| Research | | | | |
| Ind. Study | | | | |
| Pract/Observ | | | | |

**Cross-Listed Courses**
_____
_____
_____
_____
_____

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Prerequisites: ECE 27000 Minimum Grade of C

*COURSE LEARNING OUTCOMES:
See attachment.

| | | | |
|---|---|---|---|
| Calumet Department Head | Date | Calumet School Dean | Date |
| Fort Wayne Department Head | Date | Fort Wayne School Dean | Date |
| Indianapolis Department Head | Date | Indianapolis School Dean | Date |
| North Central Department Head | Date | North Central Chancellor | Date |
| West Lafayette Department Head  3/31/10 | Date | West Lafayette College/School Dean  5/24/2010 | Date |
| | | West Lafayette Registrar  7/9/10 | Date |

## OFFICE OF THE REGISTRAR

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| ☐ | 5. | Change in course title |
| ☐ | 6. | Change in course credit/type |

| | | |
|---|---|---|
| ☐ | 7. | Change in course attributes (department head signature only) |
| ☐ | 8. | Change in instructional hours |
| ☐ | 9. | Change in course description |
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| ☐ | 11. | Change in semesters offered (department head signature only) |
| ☐ | 12. | Transfer from one department to another |

**PROPOSED:**

Subject Abbreviation _____

Course Number _____

Long Title ASIC Design Laboratory

Short Title ASIC Design Laboratory

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

**EXISTING:**

Subject Abbreviation ECE

Course Number 33700

**TERMS OFFERED**
Check All That Apply:

☐ Summer　☐ Fall　☐ Spring

**CAMPUS(ES) INVOLVED**

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

**CREDIT TYPE**

1. Fixed Credit: Cr. Hrs. _____
2. Variable Credit Range:
   Minimum Cr. Hrs _____
   (Check One)　To ☐　Or ☐
   Maximum Cr. Hrs. _____
3. Equivalent Credit: Yes ☐　No ☐

| Schedule Type | Minutes Per Mtg | Meetings Per Week | Weeks Offered | % of Credit Allocated |
|---|---|---|---|---|
| Lecture | ___ | ___ | ___ | ___ |
| Recitation | ___ | ___ | ___ | ___ |
| Presentation | ___ | ___ | ___ | ___ |
| Laboratory | ___ | ___ | ___ | ___ |
| Lab Prep | ___ | ___ | ___ | ___ |
| Studio | ___ | ___ | ___ | ___ |
| Distance | ___ | ___ | ___ | ___ |
| Clinic | ___ | ___ | ___ | ___ |
| Experiential | ___ | ___ | ___ | ___ |
| Research | ___ | ___ | ___ | ___ |
| Ind. Study | ___ | ___ | ___ | ___ |
| Pract/Observ | ___ | ___ | ___ | ___ |

**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. Special Fees ☐

6. Registration Approval Type
   Department ☐　Instructor ☐
7. Variable Title ☐
8. Honors ☐
9. Full Time Privilege ☐
10. Off Campus Experience ☐

**Cross-Listed Courses**
_____
_____
_____
_____
_____
_____

**COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):**
Prerequisites: ECE 27000 Minimum Grade of C

**\*COURSE LEARNING OUTCOMES:**
See attachment.

| | | | | |
|---|---|---|---|---|
| Calumet Department Head | Date | Calumet School Dean | Date | |
| Fort Wayne Department Head | Date | Fort Wayne School Dean | Date | |
| Indianapolis Department Head | Date | Indianapolis School Dean | Date | |
| North Central Department Head | Date | North Central Chancellor | Date | |
| West Lafayette Department Head _2_ | Date 3/31/10 | West Lafayette College/School Dean | Date 5/24/2010 | West Lafayette Registrar | Date |

## OFFICE OF THE REGISTRAR

TO:        The Faculty of the College of Engineering

FROM:      The Faculty of the School of Electrical and Computer Engineering

RE:        Change to Existing Undergraduate Course: ECE 33700, ASIC Design Laboratory,
           change in requisites.

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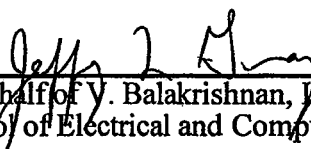recommendation for approval.

**From:**    ECE 33700 ASIC Design Laboratory
             Sem. Fall, Spring; Cr. 2; Lecture 2.
             **Prerequisites:** ECE 27000
             **Restrictions:** Must be enrolled in one of the following:  School of Electrical &
             Computer Engineering
             **Description:** Introduction to standard cell design of VLSI (Very Large Scale
             Integration) digital circuits using the VHDL hardware description language (Very
             High Speed Integrated Circuits Hardware Description Language). Emphasis on how
             to write VHDL that will map readily to hardware. Laboratory experiments using
             commercial grade computer-aided design (CAD) tools for VHDL based design,
             schematic based logic entry, logic and VHDL simulation, automatic placement and
             routing, timing analysis, and testing.

**To:**      ECE 33700 ASIC Design Laboratory
             Sem. Fall, Spring; Cr. 2; Lecture 2.
             **Prerequisites:** ECE 27000 Minimum Grade of C
             **Restrictions:** Must be enrolled in:  School of Electrical & Computer Engineering
             **Description:** Introduction to standard cell design of VLSI (Very Large Scale
             Integration) digital circuits using the VHDL hardware description language (Very
             High Speed Integrated Circuits Hardware Description Language). Emphasis on how
             to write VHDL that will map readily to hardware. Laboratory experiments using
             commercial grade computer-aided design (CAD) tools for VHDL based design,
             schematic based logic entry, logic and VHDL simulation, automatic placement and
             routing, timing analysis, and testing.

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes ___#24___

Date ___4/20/10___

Chairman ECC ___R. Cipra___

**Reason:** This course is part of the Core Curriculum for the BSCmpE degree. Subsets of Core Curriculum courses serve as prerequisites for most upper division ECE electives. In addition, a degree requirement for all ECE students is to achieve a GPA in all major-area (ECE) courses of at least a 2.0. Therefore, in order to ensure that ECE students are as well prepared as possible for upper division ECE courses, as well as to facilitate their achievement of the minimum major-area GPA of 2.0, a minimum grade requirement in the key ECE prerequisite course is being proposed.

on behalf of V. Balakrishnan, Interim Head
School of Electrical and Computer Engineering

School of Electrical and Computer Engineering (EFD 32-10)

Course Learning Outcomes:

   i.    understand and use major syntactic elements of VDHL - entities, architectures, processes, functions, common concurrent statements, and common sequential statements.
  ii.    design combinational logic in a variety of styles including: schematic, structural VHDL, and behavioral VHDL, as well as demonstrate an awareness of timing and resource usage associated with each approach.
 iii.    design common sequential functions: flip-flops, registers, latches, and state-machines..
  iv.    create a VDHL test bench and use it to test/verify a sequential VHDL design of moderate complexity.
   v.    place, route, and verify timing of a standard cell design.
  vi.    draw, given commented VHDL code of moderate complexity, a corresponding RTL level block diagram.
 vii.    use, modify, and create scripts to control the synthesis process.
viii.    use different design styles, constraints, and optimization options to achieve required synthesis results.
  ix.    explain the difference between various ASIC design approaches - standard cell, full custom, and programmable devices.
   x.    prepare functional and interface requirements for a sequential design project of the student's choosing.
  xi.    create the hierarchical decomposition of a sequential design.
 xii.    gain experience in the oral presentation of their work to others.
xiii.    work in a tema and negotiate the division of labor.
 xiv.    gain familiarity with the use and purpose of design reviews.
  xv.    prepare final design documentation sufficient for another engineer to use, test, or enhance the design.