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OFFICE OF THE SENATE COUNCIL

APPLICATION FOR NEW COURSE

1. Submitted by College of Engineering Date 9-15-2006

   Department/Division offering course Electrical and Computer Engineering

2. Proposed designation and Bulletin description of this course
   EE589 Advanced VLSI

   a. Prefix and Number EE589 b. Title* Advanced VLSI

   *NOTE: If the title is longer than 24 characters (including spaces), write
   A sensible title (not exceeding 24 characters) for use on transcripts Advanced VLSI

   c. Lecture/Discussion hours per week 3 d. Laboratory hours per week

   e. Studio hours per week f. Credits 3

   g. Course description

   An advanced class in topics related to Very Large Scale Integration. Example topics are advanced simulation, yield impact, memory design, statistical analysis and data reduction.

   h. Prerequisites (if any)

   EE584

   Engineering Standing

   i. May be repeated to a maximum of (if applicable)

4. To be cross-listed as

   Prefix and Number Signature, Chairman, cross-listing department

5. Effective Date Spring 2007 (semester and year)

6. Course to be offered X Fall ☐ Spring ☐ Summer

7. Will the course be offered each year? X Yes ☐ No
   (Explain if not annually)

8. Why is this course needed?

   Student demand
   This course has been taught two other semesters as a special topics course (EE599), with and average of 11 students.

   Knowledge and background needed in current research programs.
   VLSI is a well-funded research area nationwide and other universities typically have several VLSI courses to support this area.

   Knowledge and background needed in growing industries.
   VLSI supports local, national, and international industries and is at the core of microelectronics industry. Demand for well trained students is high and will continue to be high for the foreseeable future.

9. a. By whom will the course be taught? Joseph A. Elias

   b. Are facilities for teaching the course now available? X Yes ☐ No
   If not, what plans have been made for providing them?

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10. What enrollment may be reasonably anticipated? 12-18

11. Will this course serve students in the Department primarily? X Yes ☐ No

Will it be of service to a significant number of students outside the Department? ☐ Yes X No
If so, explain.

Will the course serve as a University Studies Program course? ☐ Yes X No

If yes, under what Area?

12. Check the category most applicable to this course

☒ traditional; offered in corresponding departments elsewhere;

☐ relatively new, now being widely established (at least at the undergraduate level)

☐ not yet to be found in many (or any) other universities

13. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky? X Yes ☐ No

14. Is this course part of a proposed new program: ☐ Yes X No
If yes, which?

15. Will adding this course change the degree requirements in one or more programs? ☐ Yes X No
If yes, explain the change(s) below (NOTE – If "yes," a program change form must also be submitted.)

16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.
(see student learning outcomes in attached syllabus)

18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate students in assignments, grading criteria, and grading scales. X Check here if 400G-500.
(See grading policy in attached syllabus).

19. Within the Department, who should be contacted for further information about the proposed course?

Name Joseph A. Elias Phone Extension 7-1834

APPLICATION FOR NEW COURSE

Signatures of Approval:

23 in favor 0 against 9/8/06 Date of Approval by Department Faculty	Reported by Department Chair
12/14/06 Date of Approval by College Faculty	Reported by College Dean
4/24/07 *Date of Approval by Undergraduate Council	Reported by Undergraduate Council Chair
Approved by Graduate Council *Date of Approval by Graduate Council	4/12/07 Reported by Graduate Council Chair
*Date of Approval by Health Care Colleges Council (HCCC)	Reported by HCCC Chair
*Date of Approval by Senate Council	Reported by Senate Council Office
*Date of Approval by University Senate	Reported by Senate Council Office

*If applicable, as provided by the Rules of the University Senate

Rev 7/06

EE589

Spring 2007

Course Title	Introduction to VLSI
Web Site	http://www.engr.uky.edu/~elias
Time	MWF, 9-10am
Room	CB333
Instructor	Dr. Joseph A. Elias, Adjunct Faculty, Cypress Semiconductor
Office	PFAT 589
Email	elias@engr.uky.edu
Office Hours	MWF, before (8:30) / after (10:00) class, or by appointment
Teaching Assistant	Wei Wen
Office	ASTEC 349
Email	wwen0@engr.uky.edu
Office Hours	TR, 11am-12pm

Textbook

R. Jacob Baker, CMOS, Circuit Design, Layout, and Simulation, 2nd Edition, 2005, ISBN 0-471-70055-X

Attendance

Students are expected to attend all the lectures, as critical information needed for the class is verbally communicated. Quizzes will not be announced ahead of time and will not be made up.

Interaction with Instructor and TA

The instructor is a full-time employee of Cypress Semiconductor. This means that he is not on campus, except for lectures. If you want to contact him, please do so before or after class, or arrange an appointment via email. The TA will set office hours. They will be available during those times, and are not expected to be available outside the posted hours.

Computer Use

The class uses advanced tools used throughout the semiconductor industry. You will learn the basics of how to use the software and are expected to report any software issues to the instructor and TA immediately. The student should be flexible in using the tools, as there are instances where choosing the incorrect options may cause a tool "crash". The tutorials provided give step-by-step instructions on how to avoid these issues. If there are instances of system problems, these need to be communicated (with log files) to the instructor and TA.

Once mastered, these tools will allow you to capture schematics, simulate, and layout circuits for fabrication, exactly as is done in major semiconductor companies.

You will be given login accounts the first week of the semester. The best method for accessing the software is through Unix stations located in RGAN. Any other access is subject to very slow transfer rates and possible problems that are not going to be debugged by the instructor.

Goals

The student should be able to do layout, schematic capture, extracted simulation, and programming of various VLSI techniques. The student should also know about real-life manufacturing issues and how they relate to VLSI layout and design.

Grading

UG	GR	
10%	10%	Quizzes
30%	30%	CAD Homeworks
30%	30%	Exam I
20%	15%	Design Project
10%	10%	Final Presentation
0%	5%	Paper Review (graduate students)

90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	E

The quizzes are random and will not be announced in advance. The CAD homeworks will be 1-2 weeks for each assignment. The exam is structured to determine the students' knowledge by answering essay questions, and is not multiple-choice. The design project is to be done in groups with each member contributing equally. The final presentation will focus on your presentation skills, and your ability to answer oral questions.

Graduate Student Grading

Since this class is a mix of undergraduate and graduate students, per the University Regulations, graduate students must have different grading than undergraduates. To satisfy this requirement, all graduate students must turn in a 5-page review of a technical paper pertinent to VLSI. Example journals to survey are Journal of Solid State Circuits, Electronic Device Letters, and transactions related to those journals.

Outcomes

1. Knowledge of advanced circuits, such as MUX, DEC, SA
2. Knowledge of memories, such as FLASH, DRAM, SRAM
3. Design and simulate (schematic and layout) various designs
4. Work on a team project
5. Programming in Perl, Ruby, and Skill to automate the designs

Grading Scale for Graduate Students

100 – 90% = A
89.9 – 80% = B
79.9 – 70% = C
< 69.9% = E