Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. This request is submitted by the Department of Electrical & Computer Engineering.

2. Course prefix, number and complete title of course: ECEN 699 (Advances in VLSI Logic Synthesis)

3. Course description (not to exceed 50 words): Advances in VLSI Logic Synthesis (3-0) Credit 3. Logic representation, manipulation, and optimization; combinational and sequential logic; Boolean function representation schemes; exact and heuristic two-level logic minimization; multi-valued logic representation and manipulation; multi-level logic representation and minimization; testing; technology mapping.

4. Prerequisite(s): Approval of instructor and graduate classification.

5. Is this a variable credit course? □ Yes ☒ No If yes, from ________ to ________

6. Is this a repeatable course? □ Yes ☒ No If yes, this course may be taken ________ times.

7. Will this course be repeated within the same semester? □ Yes ☒ No

8. If this course been taught as a 489/689?

   □ Yes ☒ No If yes, how many times? ______

   Indicate the number of students enrolled for each academic period it was taught. 9 (F05), 22 (F06), 20 (F07)

9. This course will be:

   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)

   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

   M.S., MEN, Ph.D. in Electrical & Computer Engineering

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

   Approval recommended by:

   [Signature] 7/17/2009

   [Position] Date

   [Signature] 7/17/09

   [Position] Date
Department of Electrical and Computer Engineering

ECEN 699 Course Syllabus
Instructor: Sunil P Khatri
333F WERC, Department of ECE
sunilkhatri@tamu.edu
(979) 845-8371

Name and Title: ECEN 699 -- Advances in VLSI Logic Synthesis
Semester: Fall 2009
Hours: Lecture 3, Lab 0, Credits 3.

Description: Logic representation, manipulation, and optimization; combinational and sequential logic; Boolean function representation schemes; exact and heuristic two-level logic minimization; multi-valued logic representation and manipulation; multi-level logic representation and minimization; testing; technology mapping.

Learning Outcomes: At the end of the course, the student should be able to perform the design of digital systems from a sound theoretical and practical perspective and have access to and an understanding of a suite of powerful tools that can be applied to a wide variety of CAD for VLSI problems.

Prerequisite: Approval of instructor and graduate classification.

Tentative Course Outline: Each lecture below is 1.5 hrs long. There are 30 lectures listed below, resulting in a total of 45 lecture hours. The number of lectures for each topic are indicated in parentheses.

1. Introduction
   Logic functions and their representation (1 lecture)
   Unate functions/recursive paradigm (1 lecture)

2. Two Level Minimization
   ESPRESSO two level minimization (2 lectures)
   multivalued minimization (1 lectures)
   BDDs (2 lectures)

3. Multi-Level Logic Synthesis
   Introduction (Boolean networks, factored forms) (1 lecture)
   division (2 lecture)
   simplification (1 lecture)
   full simplify (2 lecture)
   SPFDs (2 lectures)
   technology mapping (1 lecture)
   timing optimization (1 lecture)
   application to special logic implementation styles (1 lecture)

4. Logic Synthesis for Quantum Computers
   Introduction (1 lecture)
   quantum technology mapping (1 lecture)
   quantum don't cares (1 lecture)

5. Sequential Logic Synthesis
   introduction (FSM networks) (1 lecture)
   node minimization (1 lecture)
   state minimization (2 lecture)
   retiming and resynthesis (1 lecture)
   verification (2 lecture)
   state assignment (2 lecture)
Textbook: No textbook will be used. Notes will be available on the course website. These notes are synthesized from multiple sources.

Grading Policy:

- Homework Assignments – 20% (20 points)
- 2 Midterm Exams – 40% (40 points)
- Final Project – 40% (40 points)

The final project will be based on the thoroughness of the literature review you conduct for your selected topic, the innovativeness and creativity of your proposed solution, the technical feasibility of your proposed solution and the clarity of the presentation that you make to the class.

Your final grade will be calculated based on the total points that you earn in the class. The points will be curved based on the class average, and may lower the following standard that is shown below:

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<thead>
<tr>
<th>Grade</th>
<th>Points (out of 100)</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100</td>
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<tr>
<td>B</td>
<td>80-89</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<td>D</td>
<td>60-69</td>
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<td>F</td>
<td>59 and lower</td>
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Late Submissions: Late submissions of assignments will be accepted only in the case of University excused absences.

Americans with Disabilities Act (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal non-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodations of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information, please visit http://disability.tamu.edu.

Academic Integrity Statement and Policy: “Aggies do not lie, cheat, or steal, or tolerate those who do”. It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. Please see the Honor Council Rules and Procedures at http://www.tamu.edu/aggiehonor