Washington State University
School of EECS
Electrical Engineering Course Assessment Report

Course Number  EE 434
Course Title  ASIC & Digital Systems
Semester Offered Fall 2008
Instructor  Partha Pande
10th Day Enrollment 11 Number Completing Successfully (C grade or better) 10

I. Assessment Outcomes from the Course Syllabus

☐ (A) Ability to apply knowledge of mathematics, science and engineering.
☐ (B) Ability to design and conduct experiments as well as analyze and interpret data.
☐ (C) Ability to design a system, component, or process to meet desired needs.
☐ (D) Ability to function on multidisciplinary teams.
☐ (E) Ability to identify, formulate, and solve engineering problems.
☐ (F) An understanding of professional and ethical responsibility.
☐ (G) Ability to communicate effectively in written and oral formats.
☐ (H) A broad education necessary to understand the impact of engineering solutions in global, economic, and societal context.
☐ (I) Recognize the need for, and have the ability to engage in life long learning.
☐ (J) Have a broad education and knowledge of contemporary issues.
☐ (K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

II. List of Course Topics from the Course Syllabus

1. CMOS Circuit design methodologies: Different circuit design styles, comparative analysis.
2. Custom & Semicustom design
3. Standard-cell based design, and Array based design
4. Layout, Place& Route, Power grid and clock design.
5. Comparison between standard ASICs and FPGAs.
6. Different FPGA families, their advantages and disadvantages
7. RTL Design with VHDL & Verilog.
9. Design for Testability (DFT) techniques
10. Fault models, Fault equivalence
11. BIST, LFSR, MISR
12. Scan design
13. JTAG
14. IDDQ Test
15. SoC Test, P1500.

III. Course Assessment Summary Table: one row of the table should be devoted to each of the checked outcomes in part I.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics</th>
<th>Specific Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Ability to apply knowledge of mathematics, science and engineering.</td>
<td>1-15</td>
<td>Midterm exam 1: Problem 2, Midterm exam 2: Problems 2, 3 Final Exam: Problems 1, 2, 4, 5, 6 Homework 1, 2, 4</td>
</tr>
<tr>
<td>(B) Ability to design and conduct experiments as well as analyze and interpret data.</td>
<td>3, 7, 8</td>
<td>Course Project, Midterm exam 1: Problem 3 Midterm exam 2: Problems 1, 2</td>
</tr>
<tr>
<td>(C) Ability to design a system, component, or process to meet desired needs.</td>
<td>2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15</td>
<td>Course Project, Final Exam: Problems 2, 3 Homework 3</td>
</tr>
<tr>
<td>(E) Ability to identify, formulate, and solve engineering problems.</td>
<td>2, 7, 9</td>
<td>Course Project, Final Exam: Problems 4, 5 Homework 3</td>
</tr>
<tr>
<td>(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.</td>
<td>7, 8</td>
<td>Course Project</td>
</tr>
</tbody>
</table>

IV. Using the table as a guide, for each outcome summarize your evaluation of the students’ achievement of that outcome; cite student performance on the identified measures as evidence to support your conclusions.

(A) Ability to apply knowledge of mathematics, science and engineering
The homework assignments corresponding to this evaluation criterion were performed well by students with a success rate of around 90%. The examination problems measuring this criterion were adequately answered by most of the students. Some of the students faced problems with few homework assignments. This happened due to lack of proper background. But they overcame this difficulty with help from the instructor.

(B) Ability to design and conduct experiments as well as analyze and interpret data
Most of the students were able to complete the experiments involved in the course project. A few students needed extra time. The principal reason for this was unfamiliarity with the tools. In the mid term exam 1 some of the students failed to solve the relevant problem satisfactorily. Contrary to this in the mid term exam 2 around 90% of the students handled the problems correctly.

(C) Ability to design a system, component, or process to meet desired needs.
The students had to undertake a course project as part of the lab work. Around 85% of the students could complete this in time. Rest of the students required extensive help from the
instructor. The final and the 2nd midterm exam problems related to this criterion were handled reasonably well by most of the students.

(E) Ability to identify, formulate, and solve engineering problems.

Around 80% of the students could satisfactorily formulate the steps needed to complete the course project. A few students could not formulate the given problems in this assignment adequately due to lack of proper background in VHDL & Verilog.

(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

The course project was intended for the students to acquire skills and expertise in modern engineering tools. Though a few students needed help from the instructor at the initial stages of the experiments, but finally all the students completed satisfactorily.

V. Qualitative Assessment of Student Performance: using the arguments above and other data support the claim that students who completed this course with a grade of C or better have achieved each of the intended outcomes of this course.

The exams, homework assignments and the course project form a comprehensive evaluation mechanism to indicate that the students earning a C or better in the course have some level of understanding of the topic ASIC & Digital Systems. Specifically the midterm and the final exams allowed more detailed evaluation.

VI. Concerns: state any concerns you may hold about this class – were the students adequately prepared coming into it? Are there topics or outcomes where (some) students were weak after completing the course? Other concerns? Were there any comments on students’ course evaluations that should be addressed in future instances of the course? This section is very important for improving our program: it provides critical input to the curriculum committee for identifying areas requiring attention.

My main concern about this course was some of the students did not have adequate knowledge of VHDL. Consequently I had to spend few lectures on revising the background materials. Moreover, some students did not have their basic knowledge regarding digital circuits clear.

Signature __________________________________________ Date: _______________________

Please email a copy of the completed form to Patricia Arnold, patricia@eecs.wsu.edu and deliver a signed hardcopy to her mailbox.