ECE 218 - Digital Systems


Enrollment: Required course for CPE and EE majors.


Coordinator: J. Wang, Assistant Professor of ECE

Course goals: After completing this course, the student should be able to do the following:
1. Perform arithmetic in bases 2, 8, and 16.
2. Demonstrate the ability to apply Boolean algebra to digital logic problems.
3. Implement Boolean functions with logic gates.
4. Simplify Boolean functions using Karnaugh maps.
5. Design logic circuits from verbal problem descriptions.
6. Describe situations where medium-scale integration circuits are useful.
7. Analyze and design logic circuits containing flip-flops.
8. Design and analyze synchronous sequential circuits.
9. List various types of memories and programmable logic devices.

Prerequisites by topic: None

Lecture schedule: Two 75-minute sessions per week
Laboratory schedule: None

Topics:
1. Number and Symbol Encoding (1 week)
2. Boolean Algebra (1 week)
3. Boolean Function (1 week)
4. Two-Level Logic Implementation and Optimization (1 week)
5. Don't Care and Other Logic Gates (1 week)
6. Encoder and Decoder (1 week)
7. Multiplexer and Tri-State Buffer (1 week)
8. Adders (1 week)
9. Flip-flops and Finite State Machine (1 week)
10. Registers and Counters (1 week)
11. Register-transfer Level Design (1.5 week)
12. Memory Array (1 week)
13. Programmable Logic (1 weeks)
14. Midterm and Final Exams (1.5 weeks)

Computer usage: None

Laboratory topics: None
<table>
<thead>
<tr>
<th>Student Outcomes</th>
<th>Course Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Apply knowledge of math, engineering, science</td>
<td>1,2,3,4,5,6,7,8,9</td>
</tr>
<tr>
<td>b. Design and conduct experiments / Analyze and interpret data</td>
<td></td>
</tr>
<tr>
<td>c. Design system, component, or process to meet needs</td>
<td>3,4,5,7,8,9</td>
</tr>
<tr>
<td>d. Function on multi-disciplinary teams</td>
<td></td>
</tr>
<tr>
<td>e. Identify, formulate, and solve engineering problems</td>
<td>2,4,7,8</td>
</tr>
<tr>
<td>f. Understand professional and ethical responsibility</td>
<td></td>
</tr>
<tr>
<td>g. Communicate effectively (written / oral)</td>
<td></td>
</tr>
<tr>
<td>h. Broad education</td>
<td></td>
</tr>
<tr>
<td>i. Recognize need for life-long learning</td>
<td></td>
</tr>
<tr>
<td>j. Knowledge of contemporary issues</td>
<td></td>
</tr>
<tr>
<td>k. Use techniques, skills, and tools in engineering practice</td>
<td></td>
</tr>
</tbody>
</table>

Prepared by:  J. Wang            Date:  October 15, 2013