Computer Engineering 2210: Introduction to Computer Engineering
Prior Number – Computer Engineering 111

Credit and Contact Hours
3 credit hours lecture (Three 50-minute or two 75-minute lectures per week). The accompanying laboratory is Computer Engineering 2211 (112).

Instructor

Text(s)

Catalog Information
Binary arithmetic, Boolean algebra, logic and memory elements, computer organization.

Prerequisite
Sophomore standing. Computer Engineering 2211 (112) is also a co-requisite for Computer Engineering and Electrical Engineering majors.

Required or Elective
Required undergraduate core course

Course Goals
General Outcomes
1. To describe the number systems used in digital systems and convert numbers from one number system to the other.
2. To perform binary arithmetic including unsigned addition, signed subtraction, multiplication and division.
3. To describe the basic and universal gate sets, their truth tables, properties, identities, and laws, and apply them to minimize digital functions.
4. To define the terminology used in specifying the functions in digital systems, minimize functions using K-maps, implement functions using PLA and PAL, and design the logic behind seven segment displays.
5. To list the problems and design difficulties associated with hardware manufacturing and calculate the propagation delay in digital circuits.
6. To describe different higher-order combinational circuits and apply them to implementing functions and simple digital systems.
7. To describe different flip-flops and memory elements designed from simple gates and use them to build registers, which are in turn used to build memories such as RAM and ROM.
8. To implement higher-order RAM circuits using smaller RAM modules.
9. To convert one type of flip-flop to another type of flip-flop.
10. To describe the structure of basic gates using CMOS technology.
11. To analyze a sequential network and design one from given specifications.
12. To design and implement digital circuits in simple projects.

**Relationship of Course to Program Outcomes**

<table>
<thead>
<tr>
<th>ECE Outcome</th>
<th>Course Outcomes</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>S S S S S S S S S</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>M M M M</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>S S S S S S S S</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>S S S S S S S S</td>
<td>W CS/ECE teams</td>
</tr>
<tr>
<td>e</td>
<td>M M M M</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>M M M</td>
<td>M Team project</td>
</tr>
<tr>
<td>g</td>
<td>M M M</td>
<td>M S</td>
</tr>
<tr>
<td>h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>j</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>M M M M M S S S</td>
<td></td>
</tr>
<tr>
<td>l</td>
<td>W M</td>
<td></td>
</tr>
</tbody>
</table>

S – strong connection; M – medium connection; W – weak connection

**Topics Covered**

1. Introduction to Concepts in Digital Systems (1 week)
2. Boolean algebra and logic gates (2 weeks)
3. Combinational logic design (2.5 weeks)
4. Digital hardware (selected topics) (1 week)
5. CMOS logic circuits (selected topics) (1 week)
6. Logic components (2.5 weeks)
7. Memory elements and arrays (2 weeks)
8. Sequential logic networks (2 weeks)
9. Computer organization (1 week)