Helen and John C. Hartmann Department of Electrical and Computer Engineering  
New Jersey Institute of Technology

ECE 353-001: Computer Architecture and Organization (3-0-3)

Instructor:  John Carpinelli, 315 ECEC, (973) 596-3536  
email: carpinelli@njit.edu, home page: http://web.njit.edu/~carpinel/

Office hours:  Wednesdays and Fridays 10:00-11:25; or by appointment  
Meeting times: Wednesdays and Fridays 8:30-9:55, ECEC 115

Text:  Computer Systems Organization and Architecture, Addison-Wesley, John D.  

Description:  This course emphasizes the hardware design of computer systems.  Topics  
include register transfer logic, central processing unit design,  
microprogramming, ALU design, pipelining, vector processing, micro-coded  
arithmetic algorithms, I/O organization, memory organization and  
multiprocessing.

Course Outcomes:  1) The student will be able to design the instruction set architecture for a  
processor to meet specific computer requirements.  
2) The student will be able to evaluate the tradeoffs in the design of an  
instruction set architecture and the processor that implements it.  
3) The student will be able to design a system to meet a given specification  
using register transfer language.  
4) The student will be able to design a basic CPU given the instruction set  
architecture using either hardwired or microcoded control.  
5) The students will be able to design a hierarchical memory system to meet a  
given specification.  
6) The student will be able to design an I/O system to meet a given  
specification.

Student Outcomes:  1. an ability to identify, formulate, and solve complex engineering problems by  
applying principles of engineering, science, and mathematics (CLO 1-5)  
2. an ability to apply engineering design to produce solutions that meet specified  
needs with consideration of public health, safety, and welfare, as well as global,  
cultural, social, environmental, and economic factors (CLO 2-4, 6)  
6. an ability to develop and conduct appropriate experimentation, analyze and  
interpret data, and use engineering judgment to draw conclusions (CLO 4-6)
Course Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Instruction Set Architectures</td>
</tr>
<tr>
<td>2</td>
<td>Basic Computer Organization</td>
</tr>
<tr>
<td>3,4</td>
<td>Register Transfer Languages</td>
</tr>
<tr>
<td>4,5</td>
<td>CPU Design - Hardwired Control, Test #1</td>
</tr>
<tr>
<td>6,7</td>
<td>Microsequencers Control Unit Design</td>
</tr>
<tr>
<td>8,9</td>
<td>Computer Arithmetic, Test #2</td>
</tr>
<tr>
<td>10,11</td>
<td>Memory Organization</td>
</tr>
<tr>
<td>11,12</td>
<td>I/O Organization</td>
</tr>
<tr>
<td>13</td>
<td>RISC Processing, Test #3</td>
</tr>
<tr>
<td>14</td>
<td>Parallel Processing</td>
</tr>
</tbody>
</table>

Grading Policy: Homworks/Quizzes 10%  
3 Tests @ 15/20/25% 60%  
Final Exam 30%

Honor Code: The NJIT Honor Code will be upheld, and any violations will be referred to the Dean of Students for disciplinary action.