Catalog Course Description:

Number systems, Boolean algebra, combinational and sequential circuits, processor functional units and control, pipelining, memory and caching, stored program computing, memory management, computer system organization, assembly language programming.

Entry Level Standards:

The student must have math, writing, verbal, and English language skills at the college level.

Prerequisite:

CST 1020 or department approval

Textbook(s) and Other Reference Materials Basic to the Course:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction, number representation</td>
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<tr>
<td>2</td>
<td>Computer system organization overview</td>
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<td>3</td>
<td>Gates, boolean algebra, Karnaugh maps</td>
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<td>4</td>
<td>Sum-of-products, combinational circuits</td>
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<td>5</td>
<td>Latches, flip-flops, sequential circuits</td>
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<tr>
<td>6</td>
<td>Exam 1, Micro-architecture: overview, control unit</td>
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<tr>
<td>7</td>
<td>Micro-architecture: data path, pipelining</td>
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<tr>
<td>8</td>
<td>Memory organization, cache, virtual memory</td>
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<tr>
<td>9</td>
<td>Buses, interfacing</td>
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<tr>
<td>10</td>
<td>Exam 2, Instruction set architecture</td>
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II. Course Objectives*:

A. Demonstrate familiarity with the hardware components of a digital computer. I,III,IV,VI,IX,XI
B. Demonstrate knowledge of principles and underlying concepts of Boolean algebra, logic gates, and functional units such as registers, CPU, ALU, and memory. I,II,III,IV,VI,IX,XI
C. Demonstrate the ability to logically manipulate computer's hardware through assembly language programming. I,II,III,IV,VI,IX

*Roman numerals after course objectives reference goals of the CST program.

III. Instructional Processes*:

Students will:

1. Design, implement, and test the hardware for an alarm system using a digital circuit simulator. Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Information Literacy Outcome, Transitional Strategy, Active Learning Strategy
2. Design, implement, and test an assembly language program for a relatively simple calculator. Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Information Literacy Outcome, Transitional Strategy, Active Learning Strategy
3. Use professionally accepted methods and materials in completion of applications. Technological Literacy Outcome, Personal Development Outcome, Transitional Strategy, Active Learning Strategy
4. Practice elements of the work ethic such as punctuality, professionalism dependability, cooperation, and contribution. Personal Development Outcome

*Strategies and outcomes listed after instructional processes reference Pellissippi State’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Design and implement moderately complex digital systems. A, B
2. Write simple to moderately complex assembler programs. B
3. Use register transfer notation (RTN) to describe operation of a simple RISC computer. A, B
4. Relate assembler instructions to hardware performance. B, C
5. Describe the pipelining of instructions and state hazards associated with its implementation. A, B
6. Convert numerical data between internal (binary) and external forms. B, C
7. Relate various types of computer memory to hardware implementation and system performance. A, B
8. Describe the operation of various I/O subsystems. A, B, C

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 80% of grade

Three one-hour tests will count 60% of the final grade. Weekly quizzes over recently covered topics count 20% of the final grade. There will be no make-ups.

B. Laboratory Expectations: 20% of grade

Weekly lab assignments will be given and should be completed during the scheduled lab time. If you cannot finish during the allotted time, you will be given until the beginning of the next week's first lab to complete the assignment. Attendance in labs is mandatory and will not be made up without sufficient cause. Labs will count for 20% of the final grade.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

Assuming that all class and lab work is completed with at least a C average on all three parts, (ie, tests, quizzes, labs), the final grade will be assigned as follows:

A  90 - 100
B  80 - 89
C  70 - 79
D  65 - 69
F  0 - 69

VI. Policies:

Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the
course.