Revised: **K, M, N, P, Q**

Date of Previous Revision:

Date of Current Revision:

M: Course Objectives / Learning Outcomes:

The student should be able to:

> **demonstrate an understanding of the relationship between the machine language and the computer hardware in the context of functionality and complexity by**
>> **designing and implementing programs in machine and assembly language**
>> **functionally describing architectural support for operating systems and programming languages such as heaps, stacks, and task switching**
>> **describing the function of the hardware using a formal description language such as RTN (Register Transfer Notation)**
>> **virtually simulating the hardware functions**
>>> **using a high level language such as VHDL, Verilog, or C++**
>>> **using a logic circuit simulator such as LogicWorks**
>> **quantitatively describing the complexity and speed of various architectural components using mathematical functional notation and timing diagrams**
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> **understand numbers of various bases and operations to be done on them by**
>> **mathematically defining fixed point and floating point numbers**
>> **designing arithmetic circuits or algorithms used to implement addition, subtraction, multiplication, and division**
>
> **understand the concept of microprogramming demonstrated by**
>> **describing the hardware usin**