San Bernardino Valley College
Curriculum Approved: FA01

I. CATALOG DESCRIPTION:

A. Division: Technical and Workforce Development
Department: Electricity/Electronics
Course ID: ELECTR 266
Course Title: Microprocessor Technology
Lecture: 3 hours
Laboratory: 3 hours
Units: 4
Prerequisite: ELECTR 265

Course Description:
Fundamental principles of microprocessors, 8080 series, emphasizing their operation and applications in radio, VCR's and traffic control. Makes use of assembly language interfacing with both analog and digital circuitry. Includes breadboarding circuits and controlling them with the 8080 series microprocessor.

Schedule Description:
Fundamental principles of microprocessors, 8080 series, emphasizing their operation and applications in radio, VCR's and traffic control.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of this course, students will be able to:

A. Respond to the terminology used in microprocessors.
B. Interpret stack functions, addressing, logic instructions and register functions.
C. Explain different support chips used for timing and memory.
D. Explain the purpose of the microprocessor as applied to computer technology.
E. Construct various microprocessor circuits and interface circuits to specifications.
F. Explain the operation of various microprocessor circuits.
G. Describe the purpose and function of peripheral devices.
H. Analyze waveforms at various points in microprocessor circuits.
I. Troubleshoot microprocessor circuits.

IV. CONTENT:

A. The Basics of Computers
1. Historical introduction
2. Buzzwords
3. Bits “n” nibbles “n” bytes “n” words
4. Bus types
5. The three bus computer
6. Computer codes
7. High-level languages
8. The stored-program digital computer

B. 8080 Series Hardware and Addressing
1. Introduction
2. The 8088/8086 pin functions
3. The 8088/8086 timing cycles
4. Programmer’s map
5. Segmentation
6. Addressing techniques

7. Troubleshooting

C. Interfacing the 8080 Series to Memory
1. Introduction
2. Overview and block diagram
3. Detailed theory of operation
4. Clock and reset circuits
5. Troubleshooting

D. Problem Analysis
1. Introduction
2. Step 1: Define the problem
3. Step 2: Organize the order of events
4. Step 3: Draw a picture of the solution
5. Step 4: Adapt the solution to an appropriate environment
6. Step 5: Debugging the solution

E. Using the Macroassembler
1. Introduction
2. The macroassembler program
3. Assembler directives
4. Program segments
5. Procedures
6. Data definitions and constants
7. Control directives
8. Arithmetic operators
9. Troubleshooting procedures

F. The 8080 Series Instruction Set
1. Introduction
2. Hand coding instructions
3. The 8088/8086 instruction groups

G. Assembly Language Programming Techniques
1. Introduction
2. Initialization and constants
3. Initialization routines
4. Using calls and procedures
5. Testing RAM & ROM
6. Testing serial and parallel ports
7. Using program data and stack segments
8. Running programs from ROM
9. Downloading programs to run in RAM
10. Troubleshooting software with a logic analyzer

H. Series and Parallel Interfacing
1. Introduction
2. Serial interfacing
3. Asynchronous data transmission
4. The RS-232C standard
5. The 8251 USART
6. Sending and receiving characters on a polled basis
7. Parallel data transfers
8. Computer to printer interface
9. The 8255 parallel peripheral interface
10. Troubleshooting

I. Advanced Microprocessor Interfacing
   1. Introduction
   2. The 8088/8086 interrupt system
   3. The 8259 priority interrupt controller
   4. The 8254 counter/timer
   5. Direct memory access
   6. The 8237 DMA controller
   7. The 8088/8086 maximum mode
   8. Troubleshooting

J. Peripheral Devices
   1. Introduction
   2. Floppy disk drives
   3. Floppy drive controller
   4. MS-DOS function calls
   5. Hard disk drives
   6. Printers
   7. Monitors
   8. The 6845 CRT controller
   9. Keyboards
   10. Troubleshooting

K. Advanced Microprocessors
   1. Introduction
   2. An 80286/80386 comparison
   3. The 68000 microprocessor
   4. Troubleshooting

L. Multi-user Multitasking
   1. Introduction
   2. System architecture
   3. Local area networking
   4. Multi-user/multitasking operating systems

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor but may include:

A. Lectures and discussions about hardware and addressing, serial and parallel interfacing, assembly language, and peripheral devices.
B. Lectures and discussions are complemented with practical laboratory assignments, handouts, and instruction on different methods of analysis and troubleshooting.
C. Homework is assigned to promote know how, expertise, vocabulary and writing skills.

VI. TYPICAL ASSIGNMENTS:

Typical assignments will vary from instructor to instructor but may include:

A. Diagram a stack function for the microprocessor.
B. Complete an analysis of a specific microprocessor circuit.
C. Written homework assigned each week from the questions and problems in each chapter.
   Typical Question: Describe the principles of random access memory.

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but may include:

1. Quizzes
2. End-of-chapter tests
3. Practical labs with written conclusions graded on content and spelling
4. Final exam
   Typical Questions:
   a. Define the term “bus connection”.
   b. What is the purpose of the END statement?

B. Frequency of evaluation will vary from instructor to instructor but may include:
1. Periodic feedback based on chapter quizzes
2. Six (6) chapter exams
3. Six (6) practical labs
4. One (1) comprehensive final exam

VIII. TYPICAL TEXTS:
Goody, R. W., Intel Microprocessors, Glencoe, Ohio, 1995.
Thompson, A. W., Understanding Microprocessors: A Practical Approach, ITP Delmar, New York, 1995.
Singh, A., Microprocessors: Programming Interfacing, Prentice Hall, San Jose, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:
Scientific calculator.