

ENGR 3133: Microprocessor Systems Design

2003-2004 Catalog Data: Co-requisite: ELEG 3103. Prerequisites: ELEG 2134, ELEG 2103, or consent. Digital design using microprocessors. Microcomputer architecture, memory structures, I/O interfaces, addressing modes, interrupts, assembler programming, development tools.

Textbook: Microcomputer Engineering, 3rd ed.; Gene H. Miller; Prentice Hall; 2004.

References:

1. Axiom Manufacturing [<http://www.axman.com>]
2. MiniIDE [<http://www.mgtek.com/miniide/>]
3. GNU Development Chain for 68HC11 & 68HC12 [<http://www.gnu-m68hc11.org/>]
4. WebRing for 68HC11 [<http://n.webring.com/webring?ring=hc11:list>]

Coordinator: Dr. Carl Greco, Assoc. Prof.

Prerequisites by topic:

1. Digital logic design
2. Programming language

Objectives:

1. Secure knowledge of microprocessor architecture. [1]¹
2. Develop an understanding of assembly language programming, addressing modes and interrupt processing. [1]
3. Understand debugging procedures and tools. [1]
4. Bus architectures and interfacing between external devices and the microcontroller. [1, 3]
5. Prepare formal written lab reports. [1,2,3]

Topics:

1. Introduction to the microprocessor and microcontroller.
2. Microprocessor architectures.
3. CPU registers, features, and condition codes.
4. Addressing modes, 68HC11 hardware.
5. Assembly language programming, Timer Operations.
6. AS11 assembler, debugging, code location.
7. Top-down software design, structured programming.
8. Parallel I/O, I/O synchronization, address decoding.
9. Asynchronous events, interrupts and service routines.
10. Internal and external memory, memory interfacing.
11. Serial and Analog I/O.

¹ Refers to the number of the educational objective(s) of the program leading to the BSEE degree at Arkansas Tech University that applies to course objective.

Laboratory and Computer Projects:

1. Lab 1: Intro to Microcomputer Hardware and Development Tools
2. Lab 2: Real-Time Software
3. Lab 3: Modular Code Design
4. Lab 4: Interrupt Service Routine
5. Lab 5: Interface to Keypad and LCD

Evaluation Methods:

- A. Homework
- B. Exams
- C. Laboratory projects

Performance Criteria:

1. Students will demonstrate an understanding of microcontroller architecture. [A]²
2. Students will demonstrate an understanding of assembly language programming, addressing modes, and interrupt processing. [B]
3. Students will demonstrate an understanding system development and debugging tools. [C]
4. Students will demonstrate an understanding of structured and top-down programming. [A, B, C]
5. Students will demonstrate an understanding of I/O interfacing. [B, C]
6. Students will demonstrate an understanding of interrupt processing. [B, C]

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² Refers to evaluation method(s) to measure student performance.