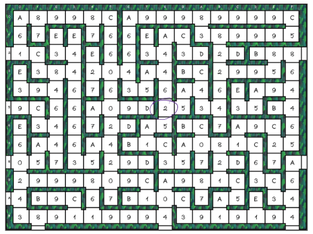
Prof Hill

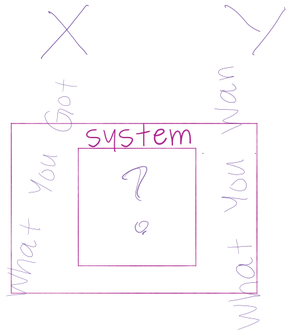
EE346

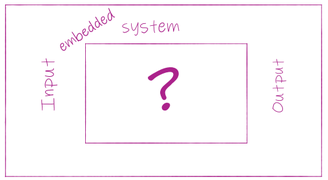
EE 346

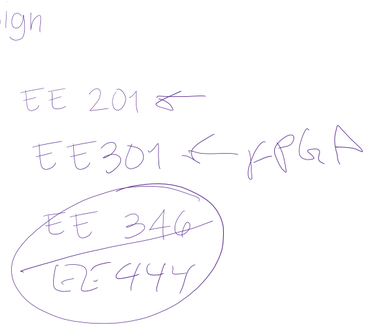
Microprocessor Principles and Applications

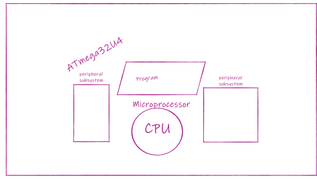
An Introduction to Microcontrollers, Assembly Language, and Embedded Systems

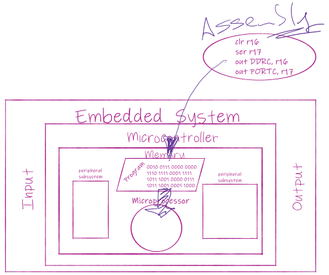












EE 346 Microprocessor Principles and Applications Syllabus

This course will be an introduction to modern RISC based microcontrollers and assembly language programming. We will use the Atmel AVR family of microcontrollers to teach hardware concepts of small, minimum-component systems performing simple task-oriented activities.

Course Schedule[1]
The following outline of classes is subject to change.

Class 1 and 2 – Introduction to Microcontrollers and Assembly Language Programming

- Introduction to Microcontrollers and the **ATmega32U4**
- Arduino the Documentary
- Introduction to the Microcontrollers and Assembly, plus The History of the Computer and Microcontrollers
- Special Topics (*covered in lab*) How to Move a Bit

Class 3 – The AVR RISC Microcontroller Architecture

- AVR RISC Load-Store Architecture, The Register File, and the ALU
- Harvard Memory Model, Flash Program and Data Memory (RAM and EEPROM)
- Special Topics (*covered in lab*) An Introduction to the 3DoT Board and the IR-Shield, plus How to Solder IR sensors.

Class 4 – Addressing Modes Part I: Working with the AVR Load-Store Architecture

- Introduction to Addressing Modes, Instruction Types, The AVR Instruction Set
- Program and Data Addressing Modes, How to "Address" the data: Data – Direct (Load-Store Instructions), I/O Direct, Register Direct, Flash Program – Direct, and Relative

Class 5 and 6 – Arithmetic and Logic Instructions

- Rotate and shift Instructions, Addition and subtraction of unsigned and signed numbers, the Status Register (SREG), Multiplication and Division
- Working with bits, and byte-wide logical instructions
- Wednesday, February 3rd – **Quiz 1**

Class 7 and 8 – Branching and Looping

- Unconditional and Conditional Program Control Transfer plus Bit and Bit-test Instructions
- Looping Constructs
- Special Topics (*covered in lab*) Design Strategies and the Test Bench

Class 9 – Subroutine Basics

- The AVR Stack, Call and Return Instructions,
- Why and When to use Subroutines

Class 10 – The ATmega32U4 I/O Port Structure

- Pin description of the ATmega32U4 and 3DoT, I/O Registers and Port Programming

Class 11 – Midterm

- The AVR Microcontroller & Assembly Language Programming

Midterm #1	Wednesday February 24th

[1] These dates may change.