

## ECE 344 Knowledge Probe – Fall 2009

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ABET Outcome probed: A, B, C

Relevant pre-and co-requisite classes: ECE 238L, ECE 206L

### 1. Instrument

The knowledge probe (KP) consisted of three questions on a specific knowledge probe quiz. The questions were created specifically to identify how well students could use their mathematical skills to analyze and interpret data. Also, students would need analysis capabilities for problems presented and abilities to design – at the assembly language level – modules for handling different experimental situations. Outcome A is probed by Question 1. Outcome B is probed by Question 2. Outcome C is probed by Questions 2 and 3.

#### Question 1

This question addresses the ability of students to understand different number systems for information representation, how to convert between these number systems, and do simple mathematics in those number systems. For students involved in doing work with microprocessors, this is important and straightforward information. The process is fairly simple, and it was expected that approximately 85% of the students would provide correct answers.

#### Question 2

This question addressed the ability of the students to work with a system represented by assembly language instructions, and then to interpret the results of an experiment conducted on this system. Students must know what the instructions do to the data, and determine the correct results of the represented system. The question requires not only overview type of information, but also detailed knowledge of the activity carried out by the instructions and the work carried out. It was expected that 70% of the students would be able to provide correct answers.

#### Question 3

This question extends the concepts of a system represented by assembly language level instructions to touch on the real time activities and handling events appropriately. Once again, students must be aware of the desired activities of the processor, and what instructions are needed to cause the desired result in a timely fashion. The question requires students to apply detailed knowledge of the processor and its instruction set and architecture in order to achieve overall system objectives. Expected student performance would be approximately 70% with correct answers.

## Results

Twenty one people participated in the knowledge probe, with the following results:

### Question 1.

Of the 21 students that took the exam, only 4 scored 5 points. The remaining students scored much better, with an average score of 8.1. Since this is basic information, steps are being taken to reinforce these concepts earlier in the curriculum.

### Question 2

Surprisingly, the average score received by students on this question is 8.6 (out of 10). 90% of the students received a score of 80% or better. The students demonstrated understanding of the experiment, how to set it up, and the measurements that could be obtained, as well as interpreting the results.

### Question 3

The scores received by the students for this question mirrored the scores for Question 2. That is, 76% of the students (16) received a score of 80% or better. The detailed knowledge required to successfully address the different aspects of the question were understood sufficiently to carry out the required work.

## Analysis

The questions utilized for this knowledge probe were very detailed, and some effort might be expended in searching for a better way to examine the student's grasp of the concepts without requiring detailed knowledge of the instruction set and architecture of a specific machine. Nevertheless, the Knowledge Probe indicates that the students recognize the activities required for correct functionality of the overall system in a timely and correct manner.