

## Course Outcomes Guide

**Course Title:** Microprocessors & Microcontrollers ELE 105

**Date:** May 2018

**Course Team:** Juan C Luna

### **Expected Learning Outcomes:**

- Have a sound introduction to microcontroller hardware.
- Understand the fundamentals of hardware programming techniques in C and assembly language.
- Read with proficiency reference material and microcontroller code.
- Understand the theory and operation of motor control code and circuitry.
- Be able to interface microcontroller peripherals with external sensors and motors.

### **Assessment:**

At the end of Spring 2018 semester, the instructor administered an ELE105 assessment exam. The assessment exam covers all course outcomes. There was no data from previous semesters to analyze or compare.

### **Validation:**

The course outcomes and assessment tool for Microprocessors & Microcontrollers (ELE 105) are consistent and aligned with recommendations from the following IEEE publications:

- Merging Pedagogical Approaches: University of Glasgow-UESTC Joint Education Programme in Electronics and Electrical Engineering. K. Meehan et al. Frontiers in Education Conference (FIE), 2014 IEEE. 978-1-4799-3922-0
- Intelligent Performance Assessment of Students' Laboratory Work in a Virtual Electronic Laboratory Environment. Achumba et al. IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES, VOL. 6, NO. 2, APRIL-JUNE 2013
- Assessment of undergraduate electrical engineering laboratory studies. G. Carter et al. IEEE PROC, Vol. 127, Pt. A, No. 7, SEPTEMBER 1980

The final grade comprises a combination of homework, lab activities, with several exams in between. A final assessment exam can determine the overall comprehension of the subject, although it will not measure other components typical of lab activities, like team player skills, hands-on expertise. The final assessment exam cannot measure homework effort and time management skills. Nevertheless, the final assessment exam can be an expected consequence of the effort put into the lab and homework activities.

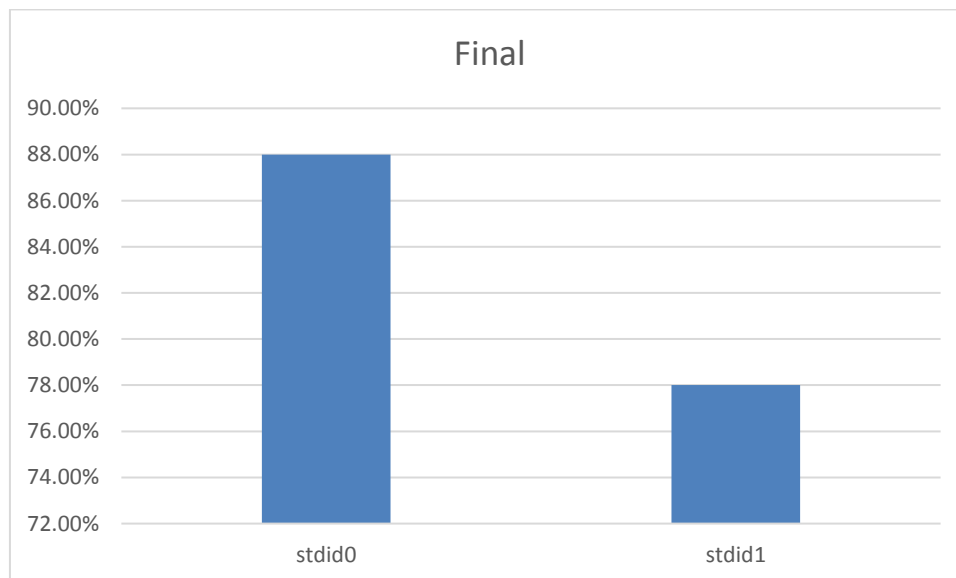
## Results:

### **Assessment Final Exam Results: Spring 2018**

The overall average score for the exam was 83%, the median was 83%, and the highest score was 88%. The sample size was 2 for the Spring 2018 semester.

Since the sample was not statistically significant, no relevant course outcome question breakdown was done.

#### **Spring 2018. N=2**



**Average Relevant Course Outcome Question: N/A**

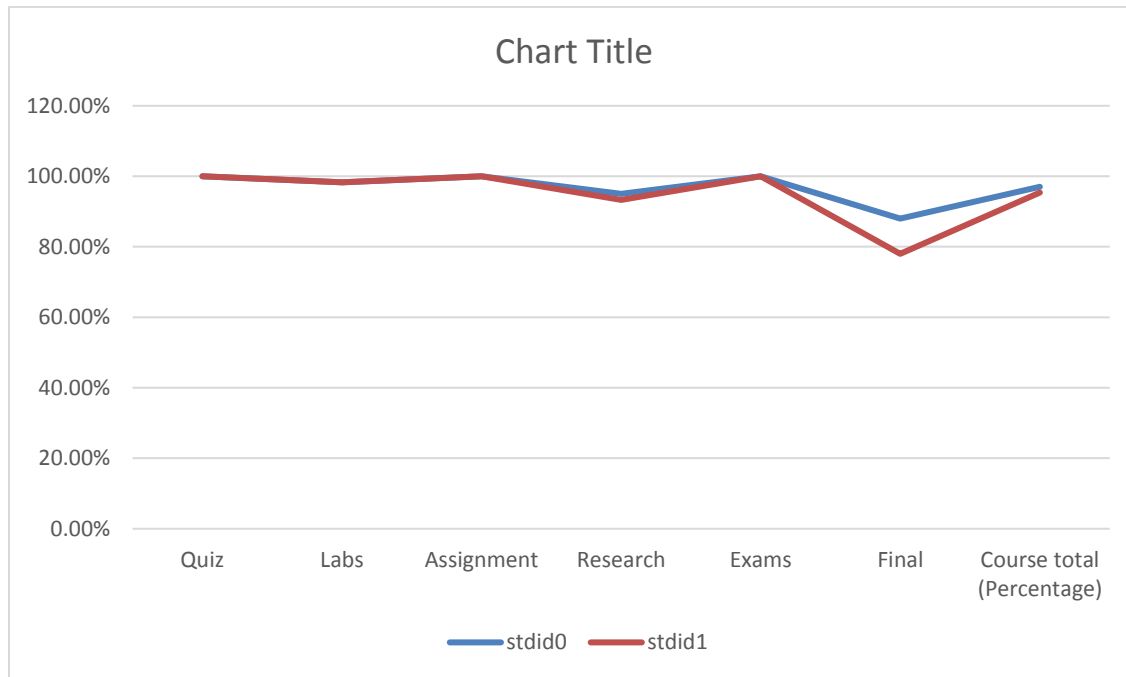
#### ***Strengths & Weaknesses:***

Based in the data, most students perform extremely well in questions pertaining

- An introduction to microcontroller hardware.
- To understand the fundamentals of hardware programming techniques in C and assembly language.
- To read with proficiency reference material and microcontroller code.
- To understand the theory and operation of motor control code and circuitry.
- To be able to interface microcontroller peripherals with external sensors and motors.

### Assessment Final Grade Results: Spring 2018

As it was expected the final grade is highly correlated with completion of assignments, lab activities, quizzes and exams.



From the above graph, the data shows that the final grade is strongly correlated with Quizzes and Assignments.

This data shows how important are all the core assessment components.

#### **COMPARISONS TO PREVIOUS SEMESTERS :**

N/A

#### **Follow-up**

- The data will be evaluated to improve teaching techniques
- The results will be used to alter the course content to focus on areas where students had the most issues

#### **Budget Justification**

No additional resources needed.