

A CASE STUDY ON TEACHING DESIGN TO UNDERGRADUATES: A COMPREHENSIVE FIRST COURSE IN VLSI DESIGN

Orlando J. Hernandez*
Electrical & Computer Engineering
The College of New Jersey
Ewing, New Jersey 08628-0718

ABSTRACT

As new technologies are developed, educational institutions still have the responsibility to equip students with a well-balanced education. This balance must consist of a solid coverage of the fundamentals, and additionally, a coverage and perspective of these new technologies. Graduates will be expected to use these technologies, and ultimately improve upon them as they join the workforce as productive members of society. This paper presents a case study on the challenges of teaching state-of-the-art design to undergraduate students. The issues encountered are exposed specifically through the discussion of the development and teaching of a comprehensive first course in Very Large Scale Integrated Circuit (VLSI) design at The College of New Jersey (TCNJ). This course attempts to provide a solid foundation in VLSI design with an amount of detail that will enable students to productively do design, and a breath of the subject matter that spans silicon process technology, digital and analog design, as well as system issues. The goal is to provide student with powerful learning experiences that they can easily transfer to a future workplace. In using this approach, several important issues are raised and encountered, and they are discussed in this paper. Issues such as the level of preparation or pre-requisite knowledge that the students must have so that this model is successful; the reaction of students to modern and very specialized Computer Aided Design (CAD) tools; how students deal with uncertainty, lack of data, and degrees of freedom encountered during design activities; and the reaction of student to the intensity of such a course from the perspectives of breath, depth, and level of difficulty of assignments that mirror those that can be expected to be received in the workplace. Conclusions on the advantages of the approach of combining state-of-the-art instruction and course intensity versus other approaches are derived, and perspectives on how to use student feedback to continuously improve the course are offered.

Keywords: Undergraduate Education, Design Education, VLSI Design

* Corresponding Author. Fax (609) 637-5148. E-mail: hernande@tcnj.edu