Statement of Teaching Activity

Dr. Shawki Areibi **PhD Computer Engineering**

My interest in academic career was initially sparked by the teaching experience in the Department of Electrical Engineering at the University of Waterloo, where I assisted in teaching several courses and supervised several projects. My efforts and hard work on interactive classroom teaching and my familiarity with education systems of Canadian universities through my teaching at Ryerson Polytechnic University and Guelph University have further strengthened my capability of teaching. During my academic career I have been involved in teaching several courses (hardware/software) ranging from first year engineering to fourth year graduates. I am confident that my academic background, independent research ability, technical skills and strong commitment to teaching will enable me to make valuable contributions to both the department and the university. The following is a summary of courses which I have taught and developed during my stay at the Electrical Engineering Dept at Ryerson Polytechnic University and currently at the School of Engineering at the University of Guelph.

Undergraduate Courses

- **GEN123 Circuit and Systems (University of Waterloo, 1^{st} Year)**
  This course is an introductory course for students majoring in electrical and computer engineering as well as a basic introduction to electric circuits for students in other engineering disciplines. The main goal of the course is to provide an effective and efficient environment for students to obtain a thorough understanding of the analysis as well as an introduction to the design of linear electric circuits. As a sessional I taught this course twice at the Unvirsity of Waterloo for both Mechanical Engineering and Computer Science. A complete WEB page was developed for the course and further discussions with the course coordinator has led to restructuring of the contents of the course and a new text book which is more suitable for the students.

- **Digital Design (University of Guelph, 2^{nd} Year)**
  This course is an introductory course in digital logic design, which is a basic course in most electrical and computer engineering programs. The main goals of the course are (1) to teach students the fundamental concepts in classical manual digital design and (2) to illustrate clearly the way in which digital circuits are designed today, using CAD tools. I have completely developed the Digital Design Course ENG241 which is newly offered at the school of engineering in the Fall of 2000. A Technical Report in the form of a tutorial has been written on VHDL Hardware Descriptive Language which enables the students to enter their designs via a language instead of schematic capture method. Two platforms have been extensively tested from Xilinx and Altera for using their FPGA (Field Programmable

Gate Arrays) in the labs. All labs have been developed and tailored to help the student understand and assimilate the lecture material. A complete WEB page has also been developed for this course with sections on assignments, labs, lecture notes and links to several pages on the internet that are relevant to this course.

- **Real Time Operating Systems (Ryerson Polytechnic, 3^{rd} Year)**
  This course is about the concepts, structure, and mechanisms of operating systems. Its purpose is to present the nature and characteristics of modern-day operating systems. The inent of the course is to provide a thorough discussion of the fundamentals of operating system design, and to relate these to contemporary design issues and to current directions in the development of operating systems. The major lab involves writing and developing parts of a simple RTX (real-time kernel). In addition some programming assignment for CPU scheduling and memory management are given. The development of code is in C and C++.

- **Microcomputer Interfacing (University of Guelph, 4^{th} Year)**
  This course is an advanced course that exposes students to advanced techniques in interfacing. In order to make learning the topics of this course an enjoyable and rewarding experience I redeveloped the course to include advanced data acquisition systems, VLSI and FPGA design. The labs are considered to be an integral part of the course. Several topics have been chosen for students to implement ranging from LCD and keyboard interfacing to advanced control of a complete robot. Previously the labs used to be based on Motorola MC6811 and currently they are based on MC6812 to enable the students to control systems using a high level language such as C. I have also introduced a new technique based on a simulator that lets students visualize activity occurring internally in the chip (such as read/write address/data bus, the instruction register, and the effective address register) and enables them to connect external hardware devices. A complete web page has been developed for this course to enable students to retrieve assignments, previous exams, labs and links to appropriate web pages relevant to the course.

- **VLSI Design (Ryerson Polytechnic, 4^{th} Year)**
  The abbreviation VLSI stands for Very Large Scale Integration, which refers to those integrated circuits that contain more than a million transistors. The circuits designed may be general purpose integrated circuits such as microprocessor, digital signal processors, and memories. They may also be application-specific integrated circuits (ASICS) which are designed for a narrow range of applications. This course introduces the students to the analysis, synthesis and design of VLSI circuits and implementing them on silicon. This course has been newly introduced in the ES&C program for the stream of Embedded Systems. The laboratory reinforces the subject material covered in the lecture and stresses hardware issues. To mimic the real design process, the students make extensive use of design tools such as circuit-and-switch-level simulation as well as layout editing and extraction.

Graduate Courses

- **Optimization For Engineering (University of Guelph)**
  In many different areas of engineering (robotics, power, biological, environmental and water resources, image processing, VLSI design, physical design etc.) engineers typically must develop methods for solving hard problems. Most practical problems which have finite or countable an infinite number of alternative solutions can be formulated as combinatorial optimization problems. This course introduces graduate students to the main concepts of optimization. By classifying subsets of the problem within the optimization domain or by relaxing the problem, one can often find an efficient method or heuristic for solving the problem. I have recently introduced this course to serve as an introduction into combinatorics and optimization. The main objectives of this course are: (1) to understand the basic concept of optimization and how it is used as a tool for decision making. (2) to give the student a general understanding of NP-complete and NP-hard problems and (3) to familiarize the student with state of the are tools for solving classical combinatorial optimization problems such as CPLEX, ASA, LOCO, etc.