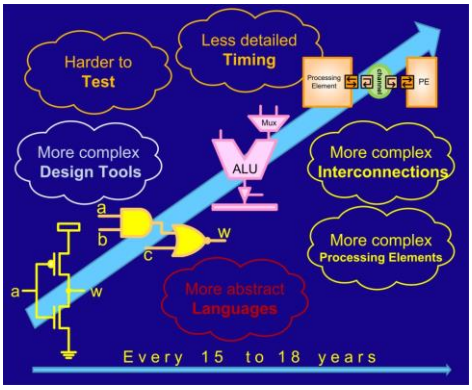
MENG GRADUATE CERTIFICATE PROGRAM:
Advanced Digital System Design

The growth of electronics in our everyday life is mainly owed to the digital technology and changes that have happened in the design of complex digital systems. For these changes to happen, new design techniques, tools, methodologies, and advanced integration techniques have evolved. This trend continues, and advanced work in this area requires not only the knowledge of the existing design tools and methods technology, but also, methodologies of design that enable turning even more complex applications into transistors on a single chip.

To cope with this emerging technology, the Master of Engineering program has planned the online *"*Advanced *Digital System Design"* certificate program that covers advanced design techniques at the register-transfer level (RTL) and more abstract design methods at the system level. In this program, use of design tools, FPGA-based implementation, hardware description languages (VHDL and Verilog), system level design, embedded design, and test and testability of designs are discussed and emphasized. The program requires taking three of the four courses offered through the program. Two of the courses are offered in Fall and the other two in Spring.



Fall courses:

Digital System Design (ECE 465). Topics include: *Digital Design process, Boolean Algebra, Gate and basic function design, Elementary sequential blocks, Latches and Flip-Flops, RT-level combinational and sequential Memory Devices, Manual synthesis of combinational blocks, Manual synthesis of sequential blocks, RT level synthesis, VHDL syntax and semantics*, *Design with VHDL, VHDL simulation and synthesis, Datapath-Controller partitioning, Complete RT-level simulation and synthesis.*

Embedded Processors and Architectures (ECE 594). Topics include: *RTL design with Verilog, Embedded Design, Altera ModelSim and Quartus II, Computer Arithmetic, Floating Point Arithmetic, Floating Point Processors, Instruction Set Architecture, Processor Architectures, Single Cycle, Multicycle, Pipelining, Memory Interfacing, Processor Interfaces, Interrupts, DMA, Embedded Processors, Altera Nios II and Avalon Switch Fabric, SOPC Embedded Hardware Configuration Tool, IDE Embedded Software Design Tool.*

Spring courses:

Advanced Digital System Design (ECE 594). Topics include: Advanced VHDL Topics, *System Design at the Register Transfer Level, FPGA-based Design, Top-down RTL design, Control-data Partitioning, RTL Timing, Control-Data Synchronization, Handshaking Methods, Busses and Bus Level Communications, Design of Configurable Cores, RTL Design of Processors, Developing Testbenches, Component Testing, Built-In Self-Test, Memory BIST, Board Testing.*

Methodologies for System Level Design and Modeling (ECE 594). Topics include: System Level *Design, Abstract RTL, Object Oriented C++ Logic Modeling and Simulation, RT level modeling with C++, RT Level Description with SystemC, SystemC Language Structure, Abstract Communications, SystemC Channels, System Level Interfaces (TLM-2.0), Transport interfaces and use of TLM 2.0 sockets, Direct Memory Interface, System Level Architectures, Message Passing, Pipelining, Interconnects, Hardware / software interface*.

Each course carries 4 credit hours. Courses are online with weekly video lectures and consulting hours. Homeworks, labs and exams are conducted online, and feedbacks are provided on weekly basis. Professor in charge of these courses is Dr. Zain Navabi (navabi@uic.edu), whom can be contacted for consultation, and for learning more details about the program or individual courses. Please go to the registrar page for registration.