**Course Topics**

**EEE 525: Very Large Scale Integration (VLSI) Design**

**Prerequisite**: EEE 425 or equivalent

**Course Description:** Analysis and design of Very Large Scale Integrated (VLSI) circuits.

**Course Topics:**

* Intro, semiconductor processing basics, physical design basics
* Device parasitics, MOS operation, short channel effects, latch-up, sub-threshold conduction, MOS dynamic behavior
* Interconnect parasitics, electromigration, transmission line, models, Elmore delay, scaling, power/ground aspects
* Inverter basics, sizing, delay and timing, VTC and noise, power dissipation
* Logic styles
* Logical effort and sizing for design efficiency.
* Arithmetic circuit basics
* Memory circuit basics including register file, SRAM, DRAM and non-voltatile memory
* Projects include circuit and physical design.
  + There will be 3:
    - Standard cells
    - Synthesis and place and route project
    - Static register file
  + The first two will require circuit simulation and automated characterization
  + The last two will use static timing analysis
* Sequential logic, registers, types of latches, timing considerations, static and dynamic implementations
* Clock-skew, jitter, sources of skew/jitter,
* I/Os, packaging, module, multiple supply design, ESD design
* Design for test