

EEE 598: VLSI Design for Reliability

Catalog Description: Compact modeling of CMOS transistors, with emphasis on technology scaling, statistical variations, and reliability degradation. Circuit design techniques and simulation tools for resilience, including those for spatial and temporal variations, as well as radiation effects.

Prerequisites: EEE 425/591 Digital Systems and Circuits, EEE 436/591 Fundamentals of Solid-State Devices, EEE 525 VLSI Design

Course Topics:

- Physical principles and operational characteristics of short-channel MOSFET transistors
- SPICE modeling of MOSFET for circuit simulations
- Scaling of MOSFET transistors
- Process variations in CMOS design
- Temporal shift of transistor parameters
- Device and circuit reliability, including aging, noise, and radiation effects
- Statistical datapath design and timing analysis
- Reliable on-chip memory design
- Adaptive design techniques for reliability
- Radiation hardening techniques of integrated circuits