ELEC 5280/6280/6286 – BUILT-IN SELF-TEST
(Elective for ECPE, Elective for ELEC)

Proposed Catalog Data: ELEC 5280/6280/6286. BUILT-IN SELF-TEST (3) LEC. 3. Pr., ELEC 2200, ELEC 2210. Testing during product life-cycle, fault models and detection, design for testability, test pattern generation, output response analysis, concurrent fault detection, manufacturing and system use, built-in self-test approaches and applications.


Coordinator: Charles E. Stroud, Professor of Electrical & Computer Engineering

Course Objectives:
1. An understanding of the testing process and its impact on design and manufacturing.
2. An understanding of fault modeling, detection, and simulation techniques.
3. The ability to generate test patterns to detect faults and fault models in a digital circuit.
4. The ability to implement Built-In Self-Test techniques including test pattern generators, output response analyzers, test controllers, and input isolation mechanisms.
5. Hands-on experience with Computer-Aided Design (CAD) tools for fault simulation.

Prerequisites by topic:
1. Digital logic design and analysis or switching theory
2. Electronics and MOS transistors

Topics:
1. Overview of Built-In Self-Test (BIST) (2 classes)
2. Fault models, detection, and simulation (6 classes)
3. Design for testability (3 classes)
4. Test pattern generation (5 classes)
5. Output response analysis (2 classes)
6. Concurrent fault detection (2 classes)
7. Manufacturing and system level use of BIST (2 classes)
8. Built-in logic block observer (2 classes)
9. Pseudo-exhaustive BIST (2 classes)
10. Circular BIST (2 classes)
11. Scan-based BIST (3 classes)
12. Non-intrusive BIST (2 classes)
13. BIST for regular structures (3 classes)
14. BIST for programmable logic (3 classes)
15. Mixed-signal BIST (3 classes)
16. Exams and review (3 classes)

Class schedule (50 minute classes):

Typical methods for evaluating student performance:
Hour quizzes (3) 60%
Final exam 20%
Homework/design projects 20%
Justification for graduate credit: Graduate students enrolled in ELEC 6280/6286 will be assigned more advanced projects than the students in ELEC 5280. These projects will require additional outside reading of current BIST literature.

Computer usage: Fault modeling and simulation assignments will require the use of the digital logic fault simulation program AUSIM, available for free on the web page www.eng.auburn.edu/~strouce/ausim.html. Note that every student is expected to do his/her own work. Discussion of various aspects of the problems/design projects with fellow students is acceptable, provided that solutions/designs are not copied.

Class attendance: Students are expected to attend class regularly and on time. In case of absence, the student is responsible for all course business conducted in class.

Policy on unannounced quizzes: There will be no unannounced quizzes.

Special Accommodations: Any student requiring special accommodations should come instructor’s office within the first two days of class, bringing letter from the Office of Students with Disabilities.

Contribution of course to meeting the professional component
Engineering topics: 3 credits
33% engineering science (1 credit)
67% engineering design (2 credits)

Primary program outcomes related to this course:
Outcome 1. Ability to apply knowledge of math, science and engineering to solve problems.
Outcome 2. Ability to apply in-depth knowledge in one or more disciplines
Outcome 3. Ability to design an electrical component or system to meet desired needs.
Outcome 6. Proficiency in the use of computers and other modern tools to solve engineering problems.

Prepared by: Charles E. Stroud Date: September 28, 2007