

Fall 2018

ECE 354 - Digital Test

Jacob Savir

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ECE354

1. Course number and name: ECE354 Digital Test
2. Credits and contact hours 2 credits; 2 contact hours.
3. Instructor's or course coordinator's name Jacob Savir

Text book, title, author and year P. H. Bardell et. al., "Built-in Test for VLSI: pseudorandom techniques", Wiley Interscience, 1987. ISBN 0-471-62463-2.

a. other supplemental materials: Class notes

4. Specific course information
 - a. Catalog Description: Covers theory and practice related to test technology. Topics include fault modeling, test generation, fault simulation, design for testability, fault diagnosis, built-in self-test, scan design, and many others. Surveys several industrial design for testability structures.
 - b. prerequisites or co-requisites: ECE 251 or equivalent, Math 333 or equivalent
 - c. indicate whether a required, elective, or selected elective: required
5. Specific course learning outcomes (CLO):
 - I. Student are able to a test set for a digital circuit.
 - II. Student are able to apply design for testability techniques.
 - III. Student are able to design LSSD and BIST into their product.
 - IV. Student are able to compute test signatures.

Relevant student outcomes (ABET criterion 3):

- (a) an ability to apply knowledge of mathematics, science, and engineering (CLO I, IV)
- (e) an ability to identify, formulate, and solve engineering problems (CLO II, III)
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. (CLO II,IV)

6. Brief list of topics to be covered:

Week 1: Introduction to test; review of Boolean algebra

Week 2, 3: Test generation algorithms: Boolean difference; D-algorithm

Week 4: Fault simulation: parallel, deductive, concurrent

Week 5: Scan design: LSSD

Week 6: BIST generators: LFSRs, primitive polynomials

Week 7: Signature collection: MISRs, aliasing probability

Week 8: Pseudorandom BIST theory: signal probability, detection probability, test length

Week 9: Parker-McCluskey algorithm, cutting algorithm, detection probability profile

Week 10: Logic modification; weighted random patterns

Week 11: Delay test: concept, two-pattern test, test length

Week 12: Industrial design-for-testability techniques

Week 13: BIST structures: ECIPT, STUMPS, BILBO

Week 14: Review