Dept Number	CS 503	Course Title	Fault-Tolerant Computing Systems
Semester Hours	3	Course Coordinator	Bidyut Gupta
Catalog Description	An introduction to different aspects of fault-tolerance in computing systems. Redundancy techniques with an emphasis on information redundancy, software fault-tolerance, coding techniques, algorithm-based fault-tolerance, fault-tolerant interconnection network architecture, DFT techniques, and quantitative evaluation methods.		

Textbooks

References

Course Learning Outcomes

- To give the students an introduction to the different aspects of fault detection, diagnosis and tolerance in computer systems in general.
- To prepare the background such that students will be able to carry out further work in a more specialized fashion in any of these areas.

Assessment of the Contribution to Program Outcomes

Outcome →	1	2	3	4	5	6	7	8	9	10
Assessed →	X	X	X	X	X		X			

Prerequisites by Topic

CS 401.

Major Topics Covered in the Course

1. Introduction : Fault Characterization, reliability modeling, physical faults and fault models. {4 classes}
2. Test generation in digital systems : concepts, structural level and functional level test generation, random testing. {6 classes}
3. Design for testability : testability measures, scan techniques, testable networks, syndrome testability. {6 classes}
4. Fault Simulation : simulation models, algorithms for simulation and evaluation, parallel and deductive fault simulation. {6 classes}
5. Coding Techniques: parity check, unidirectional, arithmetic and communication codes and properties, self-checking circuits, fault-tolerant combinational and sequential machines.{6 classes}
6. System Diagnosis : Digraph models, diagnosability analysis and algorithms, distributed diagnosis. {6 classes}
7. Fault-tolerant VLSI based architectures : Interconnection networks, binary cube, graph networks, dynamic reconfiguration. {6 classes}