<table>
<thead>
<tr>
<th>Dept Number</th>
<th>CS 503</th>
<th>Course Title</th>
<th>Fault-Tolerant Computing Systems</th>
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<tr>
<td>Semester Hours</td>
<td>3</td>
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<tr>
<td>Course Coordinator</td>
<td>Bidyut Gupta</td>
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**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**

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<th>Outcome</th>
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**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}