CS 6150 RELIABLE COMPUTING

Semester Hours: 3.0
Coordinator: TBD
Text: TBD
Author(s): TBD
Year: TBD

Contact Hours: 3

SPECIFIC COURSE INFORMATION

Catalog Description:
Techniques for writing reliable software including n-version programming, fault-tolerant data structures and formal proofs of correctness. Rollback and recovery methods. Fault-tolerant hardware and methods of hardware error detection and correction. Prerequisites: Admission to MS in CS program, or consent of department

Course type: Elective

SPECIFIC COURSE GOALS

• TBD

LIST OF TOPICS COVERED

• Fault-Tolerant Hardware
  o Tandem computer architecture(*)
  o Stratus computer architecture
  o The (4,2) computer architecture
  o Hardware error detection and correction through coding(*)
  o Redundant array of inexpensive disks (RAID)(*)
• Fault-Tolerant Software
  o Formal proofs of correctness(*)
    ▪ Axiomatic semantics and proof rules
    ▪ Weakest precondition
    ▪ Strongest post condition
    ▪ Invariants and assertions
  o Formal specification – an overview
    ▪ VDM or Z
    ▪ Algebraic specification and data types
  o Roll back and recovery, check pointing(*)
  o Software safety
- N-version techniques(*)
- Fault tolerant data structures and scrubbing(*)
- User of error detection codes in software
- Data integrity in distributed transactions
  - Validation protocols for transactions
  - Distributed check pointing
- Estimation of Mean Time Between Failures (MTBF)
  - Numerical aspects of software testing
  - Domain testing
  - Effect of redundant components
  - Effect of scrubbing
  - Standards for software fault-tolerance

(*)These topics are core material to be covered every time the course is taught.