General Information

Credits: 3

Time and Place: 9:30 – 10:45 TR
1143 Mechanical Engineering

Prerequisite: ECE 552 (Computer Architecture)
Math/Stat 431 or its equivalent (Basic Probability)
Graduate standing or consent of the instructor

Instructor: Kewal K. Saluja
Room 4611 Engg. Hall, Ph: 262-6490
E-mail: saluja@ece.wisc.edu

Office Hours: Mondays 2:00 – 3:00 PM
Tuesdays 2:00 – 3:00 PM
Wednesdays 2:00 – 3:00 PM
Other days – by appointment

Text/Ref books: Course-pack (required)


**Homework:** Assignments will be given almost every other week, and will normally be due in two weeks following the distribution date, unless otherwise specified. Approximately 5 to 6 assignments will be given; all are equally weighted. No late assignments will be accepted except under extreme non–academic circumstances.

**Computer Usage:** One or two assignments will make use of tools (such as Matlab) available on computers. Use of these tools may be partly discussed in class and you will be expected to develop better understanding of the tool yourself through its use.

**Exams:** There will be one exam which is tentatively scheduled to be held on Tuesday April 15 (evening exam). The exam will cover material from the topics covered in the course till the exam. The final is scheduled for Wednesday, May 14 at 5:05 PM but it is most likely to be replaced by the presentation of project papers. Project paper presentation and discussions on projects will start by April 21 the date specified in the course outline.

**Projects:** Each team of students will be required to submit a term paper involving either an in–depth literature survey of an advanced topic or an individual research into some special and concurrent topic. Research papers that can be submitted to IEEE/ACM conferences are strongly encouraged. Students are encouraged to find a topic for term paper/project and discuss it with the instructor. A list of recommended topics for the term project will be distributed early in the course and students are encouraged to work on it throughout the term. An oral presentation to the class is required near the end of the semester. A written paper is tentatively due on Monday April 28.

**Grading Policy:**
- 15% Homework
- 35-40% Exam
- 10-15% Research papers evaluation
- 35-40% Term paper
Course Overview and Motivation

This course is concerned with models and methods used in the analysis and design of fault-tolerant and highly reliable computer systems. Fault tolerance has long been a requirement of computers in specialized applications such as telephone switching and spacecraft control. Advances in hardware and software technology are, for the first time, making such systems cost-effective and, indeed, necessary for a wide range of industrial, commercial and even personal applications. The topics to be covered in this course include:

**Topics:**
1. Faults and their manifestations
2. Fault/error modeling and test generation
3. Reliability, availability and maintainability analysis
5. System level fault diagnosis
6. Hardware and software redundancy techniques
7. Fault–tolerant system design methods
8. Software fault-tolerance
9. Fault-tolerant networks
    Additional topics to be covered time permitting
10. Wireless bulk systems (sensor fusion)
11. Case studies of fault-tolerant systems
12. Current research issues
13. Fault injection methods
14. Mobile computing and Mobile communication environment