CS820   **DISTRIBUTED SYSTEMS**   **3-0-0-3**

Content Overview
Topics covered include:
- characterization of distributed systems,
- system models,
- Inter process communication,
- remote invocation,
- Indirect communication,
- Operating system support,
- Distributed objects and components,
- Security, Distributed file systems
- Web services, , and name services.

Course Objective
This subject in particular aims:
- to convey insight into, and knowledge of the principles and practice underlying the design of distributed systems.
- to provide an understanding of the principles on which the Web, Email, DNS and other interesting distributed systems are based.
- Questions concerning distributed architecture, concepts and design; and how these meet the demands of contemporary distributed applications will be addressed.
- The depth covered in this subject enables you to evaluate existing systems or design new ones.

Intended Course Outcome
Upon completion, a graduate of the program should have:
- Have an understanding of the principles and paradigms underlying distributed software systems
- Obtain experience developing distributed applications
- Expertise in Internet programming and distributed computing,
- Be able to apply acquired techniques and knowledge to contribute to the development and implementation of enterprise software systems,
- Be able to analyse and design ICT projects and future ICT needs, and
- Be able to apply Internet-based distributed computing systems and algorithms to e-Science and e-Business applications.

Syllabus
- Part I: Foundations – approx. 5 weeks
  - Introduction, Inter-process Communication, Socket and Thread Programming, and System Models
- Part II: Programming and Principles – 4 weeks
  - Distributed Objects and Programming,
  - Operating System support services, Distributed Shared Memory Systems
- Part III: Paradigms/Platforms - 3 weeks:
  - RMI, Kerberos, NFS etc. taught during Part I & II
  - Distributed File Systems, Security and Naming Services
- Guest Lectures / Advanced Topics (not in exam)
  - CDN, Cloud, and industrial applications

- Depth of some parts may be reduced as the Dept. has dedicated subjects on some of these topics:
    - Distributed Algorithms, Software Systems Security, Cluster and Cloud Computing, High-Performance Database Systems

Assessment
- Project work and some short assignments:
    - During semester worth 40%
        - Assignment 1 (Single): 15%
        - Assignment 2 (Group): 25%
- Written examination:
    - A written examination (three hours) at the end of the semester worth 60%
- All components **must** be completed satisfactorily (50% marks) to pass the subject.

Books and References
- Main Text Book:
    - CDK: Couloris, G, Dollimore, J. and Kinberg, T, *Distributed Systems - Concepts and Design*, 5th Edition, Addison-Wesley, Pearson Education, UK, ISBN 0132-143-011. http://www.cdk5.net
- Programming Reference:
    - R. Buyya, S. Selvi, X. Chu, **"Object Oriented Programming with Java: Essentials and Applications",** McGraw Hill, New Delhi, India, 2009.
    - Sample chapters at book website: http://www.buyya.com/java/
- Research Articles:
    - To be supplied by the Lecturer (if used)!