Subject: **Computer Systems**

Summary: The computer systems exam evaluates the student's understanding of the concepts and techniques for the access and management of computing resources (as provided by an operating system or middleware) and computer systems performance. Knowledge at the undergraduate and junior graduate levels is required. The exam is concerned with issues related to conventional general-purpose uniprocessor systems, parallel and distributed systems (including clouds) as well as real-time systems. Specific topics that are addressed are reflected by the keywords provided below. Beyond the subjects covered by the keywords, one must have an understanding of basic computer organization, general programming techniques, and computer communications at the application level (as applied to distributed systems).

Keywords

- Basic models of concurrent computation.
- Process management (mutual exclusion, synchronization, and communication).
- Processor management (allocation and scheduling).
- Memory management.
- I/O management.
- File systems.
- Deadlock handling.
- Hard real-time systems.
- Client-server systems.
- Clock synchronization.
- Remote Procedure Calls (RPC).
- Modeling methodology (analytical and simulation modeling, model validation).
- Basic models for performance analysis.
- Performance approximations.
- Bottleneck identification.
- Simulation methods.
- Analysis of simulation results.
- Distributed Object Computing systems and middleware
- Platforms for Big Data analytics
- Cloud Computing: infrastructure-as-a-service, platform-as-a-service, software-as-a-service, autoscaling
- Web Servers