

## INT 821E: CLOUD AND GRID COMPUTING

**Aim:** The aim of the course is to equip the learner with knowledge and skills in implementing Cloud and Grid Computing technologies in organizations.

### Course Objectives

The course objectives are to:

- i. Expose the characteristics of grid and cloud computing.
- ii. Explore the design principles of grid and cloud computing ;
- iii. Illustrate security mechanisms in grid and cloud computing applications;
- iv. Explore distributed computing applications.

### Expected Learning Outcomes:

By the end of the course, the learner should be able to:

- i. Demonstrate an in-depth understanding characteristics of grid and cloud computing;
- ii. Demonstrate an in-depth understand of the design principles of grid and cloud computing;
- iii. Illustrate security mechanisms in grid and cloud computing applications;
- iv. Design and demonstrate distributed computing applications.

### Course Content:

Concepts of cloud computing including: Utility Computing, SaaS (Software as a Service), Paas (Platform as a Service), IaaS (Infrastructure as a Service), Automation, Cloud /Grid middleware, Elastic Computing, Cloud databases, Scalability, Fabric Computing, Green IT, High Performance Computing, Programming Methodology and middleware used for parallel computing in grid and cloud systems. Design and development of application-specific parallel up-to-date software for grid and cloud programming environments. Parallel computing platforms, parallel programming models, programming patterns(such as task and data parallelism), middleware for job and resource management and fault tolerance. Program design theory. Current technology implementation in grid and cloud computing. Grid security. Grid infrastructure. Virtualization technology. Cloud operating systems. Cloud and grid data storage and management. Cloud security.

**Pre-requisite:** N/A

### Mode of Delivery:

Class lectures, practical laboratory sessions, independent study, group discussions, seminars

**Course Assessment:** Continuous Assessments 40% End of Semester Examinations 60%

### Instruction materials and or equipment:

- A computer installed with an operating system supporting grid and cloud computing(Linux or Unix)
- Tools: Globus, Gridgain, XtremOS, Proactive, Axis(Tomcat), OpenCA and Hadoop

### Core Reading Materials

- i. Aguiar, E., Zhang, Y., & Blanton, M. (2014). An overview of issues and recent developments in cloud computing and storage security. In *High Performance Cloud Auditing and Applications*. Springer New York.
- ii. Falfushinsky, V., Skarla, O., & Tulchinsky, V. (2014). Integration of cloud computing platform to grid infrastructure. *International Journal of Computing*, 12(4),

### Recommend Reading Material

- i. Jones, B. (2014). *Grid and Cloud. From Physics to Daily Life: Applications in Informatics, Energy, and Environment*, 81-102.
- ii. Rafiq, A., & Ahsan, B. (2014). *Secure and Dynamic Model for Book Searching on Cloud Computing as Mobile Augmented Reality. International Journal of Modern Education and Computer Science (IJMECS)*, 6(1), 72.
- iii. Rajkumar B., James B., Andrzej G. *Cloud Computing: Principles*. John Wiley & Sons, 2011
- iv. Vladimir Silva, Charles River Media Inc. *Grid Computing for Developers*, 2006