Name of the Programme   : MSc Data Science
Course Code   : CSD 525
Title of the Course   : Cloud Computing
Number of Credits   : 4(4L-0T-0P)
Contact hours   : 60 hours(60L)
Effective from AY   : 2023-24

Pre-requisites for the Course	Web Development, Programming, Basics of Computer Networks
Course Objectives	The course aims to equip students with an understanding of the fundamentals of Cloud Computing, enabling them to use and adopt cloud services and tools in real-life scenarios, explore major cloud platforms like Google Apps, Microsoft Azure, and Amazon Web Services, and gain knowledge in the practical applications of cloud computing.
Content	**Unit I:** **Introduction to Cloud Computing:** Cloud Computing Overview: Characteristics – challenges, benefits, limitations, Evolution of Cloud Computing, Cloud computing architecture, Cloud Reference Model (NIST Architecture) **Infrastructure as a Service:** Service Model, Characteristics, Benefits, Enabling Technologies Case Study: AWS, OpenStack	**15 hours**
	Unit II **Platform as a Service**: Service Model, Characteristics, Benefits, Enabling Technologies Case Studies : IBM Bluemix, GAE, Microsoft Azure **Software as a Service** Service Model, Characteristics, Benefits, Enabling Technologies Case Study: Salesforce.com, CRM, Online Collaboration Services	**15 hours**
	Unit III: **Data Analytics as a Service**: Hadoop as a service, MapReduce on Cloud, Chubby locking Service	**15 hours**
	Unit IV: **Introduction to Public and Private Clouds** Shared Resources – Resource Pool – Usage and Administration Portal – Usage Monitor – Resource Management– Cloud Security – Workload Distribution – Dynamic provisioning. **Storage as a service** Historical Perspective, Datacenter Components, Design Considerations, Power Calculations, Evolution of Data Centers, Cloud data storage - CloudTM	**15 hours**
Pedagogy	Lectures/ Tutorials/Hands-on assignments/Self-study/Flipped classroom

References/ Readings	1. Buyya, R., Broberg, J., & Goscinski, A. M. (Eds.). (2010). Cloud computing: Principles and paradigms. John Wiley & Sons. 2. Hwang, K., Dongarra, J., & Fox, G. C. (2013). Distributed and cloud computing: from parallel processing to the internet of things. Morgan kaufmann. 3. Jamsa, K. (2013). Cloud Computing SaaS, PaaS, IaaS, Virturalization, Business Models, Mobile, Security, and More. 4. Khan, S. U., & Zomaya, A. Y. (Eds.). (2015). Handbook on data centers. 5. Manjunath, G., & Sitaram, D. (2011). Moving to the cloud: Developing apps in the new world of cloud computing. Elsevier. 6. Reese, G. (2009). Cloud application architectures: building applications and infrastructure in the cloud. " O'Reilly Media, Inc.". 7. Rhoton, J., & Haukioja, R. (2011). Cloud computing architected: solution design handbook. Recursive Press. 8. Shroff, G. (2010). Enterprise cloud computing: technology, architecture, applications. Cambridge university press.
Course Outcomes	Upon successful completion of the Cloud Computing course, students will be able to: 1. Understand Cloud Computing, including its characteristics, challenges, benefits, and limitations. 2. Apply Platform as a Service (PaaS) in depth, understanding its service model, characteristics, benefits, and the enabling technologies 3. Apply Data Analytics as a Service, including Hadoop as a service, MapReduce on Cloud, and Chubby locking Service. 4. Design, develop, and demonstrate real-world applications leveraging Cloud Computing technologies