

(NOTE: Exercise extra caution while performing these exercises and codes)

1. Perform various Virtual Machine based exercises on <https://vulnhub.com/>
2. Perform exercises from <https://www.hacker101.com/>
3. Follow the lessons and activities from <https://www.hackingloops.com/ethical-hacking/>
4. Activities on Google site for hacking <https://google-gruyere.appspot.com/>
5. Activities on OWASP WebGoat <https://github.com/WebGoat/WebGoat>

## DISCIPLINE SPECIFIC ELECTIVE COURSE: Cloud Computing

### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Cloud Computing	4	3	0	1	Pass in Class XII	NIL

### Learning Objectives

The objective of an undergraduate cloud computing course is to provide students with a comprehensive understanding of cloud computing technologies, services, and applications.

### Learning outcomes

On successful completion of this course, the student will be able to:

- Knowledge of the fundamental concepts and principles of cloud computing, including virtualization, scalability, reliability, and security.
- Ability to design, develop, and deploy cloud-based applications using popular cloud platforms and services.
- Familiarity with cloud computing architectures, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).
- Understanding of the economic, legal, and ethical implications of cloud computing, including issues related to data privacy, ownership, and security.
- Ability to evaluate and select cloud-based solutions based on their technical, economic, and business requirements.
- Understanding of the broader societal and environmental impacts of cloud-based services and applications.

## SYLLABUS OF DSE

### Unit 1

**Overview of Computing Paradigm:** Recent trends in Computing : Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing,

### Unit 2

**Introduction to Cloud Computing:** Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing,

### **Unit 3**

**Cloud Computing Architecture:** Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

### **Unit 4**

**Case Studies:** Case study of Service model using Google Cloud Platform (GCP), Amazon Web Services (AWS), Microsoft Azure, Eucalyptus.

### **Unit 5**

**Cloud Computing Management:** Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling.

### **Unit 6**

**Cloud Computing Security:** Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

### **Essential/recommended readings**

1. Thomas Erl, Ricardo Puttini and Zaigham Mahmood, Cloud Computing: Concepts, Technology and Architecture, Publisher: PHI, 2013.
2. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2013.
3. Boris Scholl, Trent Swanson, and Peter Jausovec, Cloud Native: Using Containers, Functions, and Data to Build Next-Generation Applications, Publisher : Shroff/O'Reilly, 2019.

### **Additional References**

1. *Cloud Computing Bible*, Barrie Sosinsky, Wiley-India, 2010
2. *Cloud Computing: Principles and Paradigms*, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. *Cloud Computing: Principles, Systems and Applications*, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

### **Suggested Practical List:**

#### **Practical exercises such as**

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms

3. Working on tools used in cloud computing online:
  - a. Storage
  - b. Sharing of data
  - c. manage your calendar, to-do lists,
  - d. a document editing tool
4. Exploring Google cloud
5. Exploring Microsoft cloud
6. Exploring Amazon cloud