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**UNIVERSITY OF PETROLEUM & ENERGY STUDIES**

**School of Computer Science**

**Dehradun**

**COURSE PLAN**

Programme : B. Tech. CSE spl. DevOps

Course :Advanced Linux LAb

Subject Code : CSDV 2103

No. of credits : 1

Semester : IV

Session : Jan 2019 – May 2019

Batch : 2017 - 2021

Prepared by : Mr. Sunil Kumar

Email : skumar@ddn.upes.ac.in

**Approved By**

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Faculty HOD

UPES Campus Tel: +91-135-2770137

“Energy Acres” Fax: +91 135- 27760904

P.O. Bidholi, Via Prem Nagar, Dehradun Website: [www.upes.ac.in](http://www.upes.ac.in)

**COURSE PLAN**

1. **PRE-REQUISITES**

Elementary knowledge of Operating System, Development and Deployment.

1. **PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES for B.Tech. CSE spl. in DevOps**

**B1. PROGRAM OUTCOMES (POs)**

1. *Engineering knowledge:* Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. *Problem analysis:* Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. *Design/development of solutions:* Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. *Conduct investigations of complex problems:* Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. *Modern tool usage:* Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. *The engineer and society:* Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. *Environment and sustainability:* Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. *Ethics:* Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. *Individual and team-work:* Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. *Communication:* Communicate effectively on complex engineering activities with the engineering community and with society at-large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. *Project management and finance:* Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. *Life-long learning:* Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**B2. PROGRAM SPECIFIC OUTCOMES (PSOs)**

1. Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques.
2. Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms.
3. Apply the understanding of DevOps as cultural philosophies, practices, and tools that increase the ability to deliver applications and services at high velocity.

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1. **COURSE OBJECTIVES**
2. To enable the learner to understand the fundamentals of build and release management.
3. To enable students, the usage of build and release management tools.
4. **COURSE OUTCOMES (COs), Mapping with POs and PSOs**

Upon completion of this course the learners will be able to:

CO1: Understand and Implement basic concepts of Linux OS along with shell programming.

CO2: Design and implement advanced features such as configuring DNS server, mail server, login banner message and FTP server and package management threads.

CO3: manage Linux OS network services with Linux OS security.

**Table: Correlation of the Course with the POs and PSOs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO/CO | PO  1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO  9 | PO  10 | PO  11 | PO  12 | PSO  1 | PSO  2 | PSO  3 |
| CO1 |  |  |  |  | 3 |  |  |  |  | 2 |  | 2 |  | 2 | 3 |
| CO2 |  |  |  |  | 3 |  |  |  |  |  |  | 2 |  | 2 | 3 |
| CO3 |  |  |  |  | 3 |  |  |  |  |  |  | 2 |  | 2 | 2 |
| CO4 |  |  |  |  | 3 |  |  |  |  | 2 |  | 2 |  | 3 | 3 |

1=weakly mapped 2= moderately mapped 3=strongly mapped

1. **COURSE OUTLINE**

|  |  |  |
| --- | --- | --- |
| S. No. | Aim of the Experiment | CO’s |
| 1 | Scripting and the Shell | CO1 |
| 2 | Adding New Users, Backups and Syslog Files | CO1 |
| 3 | Configuring DNS server | CO2 |
| 4 | The Network File System | CO3 |
| 5 | Sending a test email using standard SMTP commands | CO3 |
| 6 | Configuring mail server | CO2 |
| 7 | Package management – yum/apt | CO2 |
| 8 | Configuring login banner message | CO2 |
| 9 | Adding additional network interfaces | CO3 |
| 10 | Converting Linux machine into a Switch using scripts | CO3 |
| 11 | Scheduling tasks with Cron and anacron | CO2 |
| 12 | Configuring FTP server | CO2 |
| 13 | Network Management and Debugging | CO3 |
| 14 | Linux Security | CO3 |

**Table: Correlation of POs vs. COs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 |  |  |  |  | 3 |  |  |  |  | 2 |  | 2 |  | 2 | 3 |
| CO2 |  |  |  |  | 3 |  |  |  |  |  |  | 2 |  | 2 | 3 |
| CO3 |  |  |  |  | 3 |  |  |  |  |  |  | 2 |  | 2 | 2 |

**F. PEDAGOGY**

In continuation to problem description, the solution to the given problem statement should be designed suitably using algorithm/flow-chart/pseudocode. After obtaining a successful design, the design is implemented using C++ language and tested with appropriate test cases (with an insight on Input/Output Data Constraints). Students are evaluated under two main categories (1) Performance (via efficient design and implementation) and record, and (2) Preparation of the student evaluated via viva-voce /quiz. The same is detailed in Section-E.

**G. COURSE COMPLETION PLAN**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. of Experiments planned/taken | | No. of Activities planned/ conducted | | No. of Quizzes/ viva planned/ conducted | | % Labs Experiments completed |
| 14 |  |  |  | 2 |  |  |

One lab session = 120 min.

**H. EVALUATION & GRADING**

Students will be evaluated regularly/continuously throughout the course based on the following:

1. Performance & Record - 50%
2. Viva Voce or Quiz Examination - 50%

**H.1 Performance & Record:** WEIGHTAGE - 50%

8 lab Experiments are conducted either face-to-face (F2F) or online (e-labs/ virtual labs). The lists of activities performed under the experiments are detailed in Section-F. A sample template of the evaluation of lab activity is provided in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Evaluation of each Lab Activity** | |  |  |
|  | Problem Description | 10% marks |  |  |
|  | Algorithm Design | 30% marks |  |  |
|  | Coding Syntax, Execution and Bug Fixing | 40% marks |  |  |
|  | I/O Test cases & Data Constraints | 10% marks |  |  |
|  | Records (submitted before the very next turn.) | 10% marks |  |  |

**H.2 Viva Voce or Quiz Examination:** WEIGHTAGE - 50%

The preparation of the students would be evaluated based on two viva-voce or quiz examinations in periodic schedules (each with 50% weightage).

It is mandatory for the students to attend the above said continuous evaluation. Students who do not attend will lose their marks. Continuous Internal Assessment Record Sheet will be displayed at the end of the semester.

**GRADING:**

The overall marks obtained at the end of the semester comprising the above two mentioned shall be converted to a grade.

Student(s), who have met the qualifying criteria of individual practical subject but not met qualifying criteria of SGPA, will not be allowed to re-appear for improvement. However those students with Grade “F” and those who wish to re-appear in the practical subject, shall be required to pay the prescribed fee per subject as notified by the University. These students will be eligible to *repeat continuous evaluation* of that respective practical subject (s) during summer vacation (June-July).

Grade shall be awarded on the performance of the student(s). The Grade will be capped as per the rules mentioned in student Bulletin. All Other rules and regulations such as requirement of passing, etc. will remain same as mentioned in rules & regulations.

**I. DETAILED DELIVERY PLAN**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Name of Experiment** | **Sub-Topics** |
| 1 | Scripting and the Shell | What is a Shell Program? |
| Support for Programming |
| Creating a Shell Program |
| Which Shell? |
| 2 | Adding New Users, Backups and Syslog Files | User Accounts |
| Backups in Linux |
| Syslog in Linux |
| 3 | Configuring DNS server | The BIND Installation |
| UBUNTU'S BIND Conventions |
| Configuring BIND |
| Zone File Configuration |
| DNS Redundancy |
| DNS Testing |
| 4 | The Network File System |  |
| 5 | Sending a test email using standard SMTP commands |  |
| 6 | Configuring mail server |  |
| 7 | Package management – yum/apt |  |
| 8 | Configuring login banner message |  |
| 9 | Adding additional network interfaces |  |
| 10 | Converting Linux machine into a Switch using scripts |  |
| 11 | Scheduling tasks with Cron and anacron |  |
| 12 | Configuring FTP server |  |
| 13 | Network Management and Debugging | Network Troubleshooting |
| Ping – Check to see if a Host is Alive |
| Traceroute |
| Netstat |
| tcpdump |
| 14 | Linux Security | Advantages of Using Sudo |
| Enforcing Strong Password Criteria |
| Enabling Firewall Through iptables |
| Creating Encrypted Backups Using gpg and tar |
| Protecting Network Ports |

1. **SUGGESTED READING**

**Text Books**

1. Advanced Linux – Volume 1, Xebia Press

**Reference Books:**

1. **Running Linux – Book by Matthias Kalle Dalheimer, Matt Welsh**
2. **Linux System Administration - Tom Adelstein, Bill Lubanovic**

Note: Also refer to the Web-links/Resources in Blackboard and NPTEL videos.

1. **GUIDELINES**

**Cell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) must be turned off during the lab session.

**e-Mail and online learning tool:** Each student in the class should have UPES e-mail id and a password to access the Blackboard regularly. The best way to arrange meetings with faculty is by email and prior appointment. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.

**Attendance:** Students are required to have **minimum attendance of 75%** in the subject.

1. **COURSE OUTCOME ASSESSMENT**

To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through Continuous assessments. Each assessment is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.

**Format for Indirect Assessment of Course Outcomes**

|  |  |
| --- | --- |
| NAME: |  |
| ENROLLMENT NO: |  |
| SAP ID: |  |
| COURSE: | Advanced Linux Lab |
| PROGRAMME: | B.Tech (CS+DevOps) |

Please rate the following aspects of the Course Outcomes. Use the scale 1 to 4 \*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Outcomes** | **1** | **2** | **3** | **4** |
| CO1 | Understand and Implement basic concepts of Linux OS along with shell programming. |  |  |  |  |
| CO2 | Design and implement advanced features such as configuring DNS server, mail server, login banner message and FTP server and package management threads. |  |  |  |  |
| CO3 | Manage Linux OS network services with Linux OS security. |  |  |  |  |

Very Good

4

3

Below Average

Average

Good

2

1

\*