

Savitribai Phule Pune University, Pune

Faculty of Commerce and Management

Master of Computer Applications (MCA)

Programme Curriculum
(2020-2022)

Semester IV

Course Code: IT-41

Course Name: DevOps

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	25	-	-	50	75

Course Description:

Course Objectives:

Course Outcomes:

Student will be able to

CO1: describe the evolution of technology & timeline (Understand)

CO2: explain Introduction to various Devops platforms (Remember)

CO3: demonstrate the building components / blocks of Devops and gain an insight of the Devops Architecture. (Understand)

CO4: apply the knowledge gain about Devops approach across various domains (Apply)

CO5: build DevOps application (Apply)

Course Structure:

Unit No.	Topics Details	Weightage in %	No of Sessions
1	1. Introduction to DevOps. 1.1. Define Devops 1.2. What is Devops 1.3. SDLC models, Lean, ITIL, Agile 1.4. Why Devops? 1.5. History of Devops 1.6. Devops Stakeholders 1.7. Devops Goals 1.8. Important terminology 1.9. Devops perspective 1.10. DevOps and Agile 1.11. DevOps Tools 1.12. Configuration management 1.13. Continuous Integration and Deployment 1.14. Linux OS Introduction 1.15. Importance of Linux in DevOps 1.16. Linux Basic Command Utilities 1.17. Linux Administration 1.18. Environment Variables 1.19. Networking 1.20. Linux Server Installation 1.21. RPM and YUM Installation	10	4
2	2. Version Control-GIT 2.1. Introduction to GIT 2.2. What is Git 2.3. About Version Control System and Types 2.4. Difference between CVCS and DVCS 2.5. A short history of GIT 2.6. GIT Basics 2.7. GIT Command Line 2.8. Installing Git 2.9. Installing on Linux 2.10. Installing on Windows 2.11. Initial setup 2.12. Git Essentials 2.13. Creating repository 2.14. Cloning, check-in and committing 2.15. Fetch pull and remote 2.16. Branching 2.17. Creating the Branches, switching the branches, merging 2.18. The branches.	15	3

3	<p>3. Chef for configuration management</p> <p>3.1. Overview of Chef; Common Chef Terminology (Server, Workstation, Client, Repository Etc.) Servers and Nodes Chef Configuration Concepts.</p> <p>3.2. Workstation Setup: How to configure knife Execute some commands to test connection between knife and workstation.</p> <p>3.3. Organization Setup: Create organization; Add yourself and node to organization.</p> <p>3.4. Test Node Setup: Create a server and add to organization, check node details using knife.</p> <p>3.5. Node Objects and Search: How to Add Run list to Node Check node Details.</p> <p>3.6. Environments: How to create Environments, Add servers to environments.</p> <p>3.7. Roles: Create roles, Add Roles to organization.</p> <p>3.8. Attributes: Understanding of Attributes, Creating Custom Attributes, Defining in Cookbooks.</p> <p>3.9. Data bags: Understanding the data bags, Creating and managing the Data bags, Creating the data bags using CLI and Chef Console, Sample Data bags for Creating Users.</p>	25	13
4	<p>5. Build tool- Maven</p> <p>5.1. Maven Installation</p> <p>5.2. Maven Build requirements</p> <p>5.3. Maven POM Builds (pom.xml)</p> <p>5.4. Maven Build Life Cycle</p> <p>5.5. Maven Local Repository (.m2)</p> <p>5.6. Maven Global Repository</p> <p>5.7. Group ID, Artifact ID, Snapshot</p> <p>5.8. Maven Dependencies</p> <p>5.9. Maven Plugins</p>	20	10
4	<p>4. Docker– Containers & Build tool- Maven</p> <p>4.1. Introduction: What is a Docker, Use case of Docker, Platforms for Docker, Dockers vs. Virtualization</p> <p>4.2. Architecture: Docker Architecture., Understanding the Docker components</p> <p>4.3. Installation: Installing Docker on Linux. Understanding Installation of Docker on windows. Some Docker commands. Provisioning.</p> <p>4.4. Docker Hub.: Downloading Docker images. Uploading the images in Docker Registry and AWS ECS, Understanding the containers, Running commands in container. Running multiple containers.</p> <p>4.5. Custom images: Creating a custom image. Running a container from the custom image. Publishing the custom image.</p>	30	15

	4.6. Docker Networking: Accessing containers, linking containers, Exposing container ports, Container Routing.		
Total:		100	45

Course References:

Reference Books:

1. DevOps for Developers: Michael Hüttermann
2. DevOps: A Software Architect's Perspective: Ingo M. Weber, Len Bass, and Liming Zhu
3. Building a DevOps Culture: Jennifer Davis, Katherine Daniels. Publisher: O'Reilly
4. Practical DevOps: Joakim Veronal
5. DevOps for Dummies: Gene Kim, Kevin Behr, George, Publisher: John Wiley & Sons

Web Reference:

1. <https://devops.com/>
2. <https://devopsinstitute.com/>
3. <https://aws.amazon.com/devops/>
4. <https://www.guru99.com/devops-tutorial.html>
5. <https://www.edureka.co/blog/maven-tutorial/>
6. <https://www.chef.io/configuration-management/>
7. <https://www.edureka.co/blog/devops-tutorial>

Course Code: BM-41
Course Name: PPM and OB

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
3 Hrs./Week	-	3	20	-	5	50	75

Course Description:

Course Objectives:

1. This course aims to improve students understanding of Management & human behavior in organization and the ability to lead people to achieve more effectively toward increased organizational performance.

Course Outcomes:

Student will be able to

- CO1: Describe and analyze the interactions between multiple aspects of management. (Understand)
- CO 2: Analyze the role of planning and decision making in Organization (Analyze)
- CO 3: Justify the role of leadership qualities, Motivation and Team Building. (Analyze)
- CO 4: Analyze stress management and conflict management (Analyze)
- CO 5: Describe Personality and Individual Behavior (Understand)

Course Structure:

Unit No.	Topics Details	Weightage in %	No of Sessions
1	1. Management: 1.1. Meaning and Definition 1.2. The need, scope and process of Management 1.3. Managerial levels/Hierarchy 1.4. Managerial functions: Planning, Organizing, Staffing Directing, Controlling 1.5. Types of managers & its Skill: Functional, Specialize, Generalize 1.6. Social responsibility of management	10	4
2	2. Nature & Development of Management Thought: 2.1. Historical perspective 2.2. Evolution of Management: Introduction to Scientific Management by Taylor, Administrative Management by Fayol, Contribution of Peter Drucker 2.3. System approach-with reference to management, organization and MIS 2.4. Contingency approach	10	4

3	3. Decision making: 3.1. Introduction 3.2. Decision making environment- Decision making under certainty, under uncertainty, under risk 3.3. Types of Decision, decision making processes & Tools 3.4. Individual Vs Group decision making 3.5. Herbert Simon's Model & Principle of Rationality <u>Note: Case studies should be covered on this topic</u>	10	4
4	4. Organization, Organizational Behavior & Organizational Culture: 4.1. Definition and Need for Organization 4.2. Introduction to OB, Organizing Process 4.3. Organizational structure (Functional organization, Product Organization, Territorial Organization) 4.4. Introduction- Development and Levels of Organizational Culture 4.5. Types of Corporate Culture	10	4
5	5. Motivation and Leadership: 5.1. Concept of Motivation, Benefits to organization and Manager 5.2. Maslow's need Hierarchy theory 5.3. Herzberg's Motivation- Hygiene Theory 5.4. Theory X and Y, Theory Z 5.5. Definition, Nature, Qualities of Leader, Leader V/s Manager 5.6. Leadership Styles (Autocratic, Participative, Laissez faire or subordinate-centered, Bureaucratic leadership, Transformational leadership, Transactional leadership)	15	7
6	6. Team Building 6.1. Concept of Team, Nature, Benefits from team, 6.2. Types of Teams 6.3. Creating Effective Teams, Turning Individuals into Team Player. <u>Note: Case studies should be covered on this topic</u>	15	10
7	7. Stress Management and Conflict management: 7.1. Work stress: Meaning of stress, Stressors, Sources of Stress, Types of stress 7.2. Stress Management strategies 7.3. Concept of Conflict, Functional versus Dysfunctional Conflict 7.4. Five stage Conflict Process, Types of Conflict (Task Conflict, Relationship Conflict, Process Conflict, Personality Conflict, Intergroup Conflict)	15	7

	7.5. Managing Conflict (Styles for Handling Dysfunctional Conflict, Third-Party Interventions)		
	<u>Note: Case studies should be covered on this topic</u>		
8	8. Personality and Understanding Individual Behavior: 8.1. Introduction, Definition of Personality - Determinants of Personality 8.2. Personality Theories -Personality and Organization 8.3. Personality Structure -Personality and Behavior 8.4. Ego State, Johari window- Transactional Analysis	15	5
Total:		100	45

Course References:

Recommended Books:

Reference Books:

1. Principles and Practices of Management- Shejwalkar
2. Essential of management- 7th edition Koontz H & Weirich H TMH
3. Management Today Principles and Practices - Burton & Thakur
4. Mgmt. Principles and Functions - Ivancevich & Gibson, Donnelly
5. Organizational behavior Keith Davis
6. Organizational behavior Fred Luthans TMH 10th edition
7. Organizational behavior Dr. Ashwatthapa THI 7th edition
8. Organizational Behavior - Fred Luthans
9. Organizational Behavior - Stephen Robbins
10. Organizational Behavior - K. Aswathappa (8th revised edition)
11. Business psychology and Organizational Behavior – Eugene McKenna
12. Understanding Organizational Behavior - Udai Pareek
13. Organization Development – Wendell L. French and Cecil H. Bell Jr.

Course Code: ITC41
Course Name: Project

Credit Scheme			Evaluation Scheme				
Lecture	Practical	Credit	Internal			External	Total
			Written	Practical	Tutorial		
-	40 Hrs./Week	22	-	250	-	300	550

Course Description:

A project is an assignment that the student needs to complete at the end of semester IV to strengthen the understanding of fundamentals through effective application of the subjects learnt.

Course Outcomes:

Student will be able to

CO1: Create working project using tools and techniques learnt in the programme (Create)

Course Structure:

The project is an outcome of technical skills and domain knowledge acquired by the students during the program. Students demonstrate problem solving skills, analytical ability, logical thinking, communication skills and team work during the course of the project. The project can be implementation of a research work published in any reputed journal.

1. The project may be done individually or in groups. However, if project is done in groups, each student must be given a responsibility for distinct modules.
2. Selected project/module must have relevant scope as per the marks assigned and can be carried out in the Institute or outside with prior permission of the Institute.
3. Internal guide should monitor and evaluate the progress of the project on individual basis through handwritten workbook maintained by students containing various project milestones with learnings and remarks from internal guide for concurrent evaluation.
4. The Semester IV project should be having sufficient scope for 400 marks. The project work will carry 300 marks for internal assessment and 250 marks for external assessment.
5. Students are expected to show working demo of the project during final evaluation in semester IV.
6. The project report should be prepared as per the University prescribed format with all the chapters mentioned in project guidelines. And it should be printed on back-to-back pages (one copy) which should be signed by the internal guide and the Director of the Institute. A client (colleges, Non IT organization, and IT organization) certificate should be attached to prove the authenticity of the project work done.
7. The project will be assessed internally as well as externally by the examiners appointed by the institutions and University.

Type of Projects

1. Application Development

The students are advised to choose a project that involves window-based development, web-based development, mobile-based development, projects based on machine learning. Analysis and interpretation of any company specific data is not permitted.

2. Embedded Systems / IoT

A project should be developed and implemented for application specific system after thorough investigation of the latest development in the field of electronics or communication to facilitate their efficient operation. The Real Time Operating System (RTOS) or open source platform can be used to develop embedded applications such as Robotics, Microcontroller / Microprocessor based projects etc. An IOT project can be used to design products for reliability and security using simple electronics concepts and integrating with a cloud platform to get the data real-time and make some operational analysis. It has to use efficient algorithms for strong authentication and security protocols and disable non-essential services.

Few examples of IoT applications

Smart home, Health care applications, Smart waste management, Activity Tracker etc.

3. ETL Projects

Extract, transform, load (ETL) is the process of integrating the data from one or more sources. It is expected from the student that he should demonstrate the entire ETL process with reference to any domain like finance, banking, insurance, retail etc.

Data extraction consists of extracting the data from homogeneous or heterogeneous sources and transforming it into a proper format using data cleansing. The data can be finally loaded into a final target database such as operational data base, a data mart or data warehouse. This data can be further used for the purpose of querying and analyzing.

4. Research Projects

The research project will be able to demonstrate the skills of working scientifically, and through the project the students will be able to understand how to do a literature review, and how to appraise the literature to address questions. To explore an area of interest (develop some expertise and a deeper understanding of a topic). Understand the tools to critically and thoughtfully appraise problems which are faced every day; to learn communicate scientific research in verbal presentations and written form. As an example, the students can identify any problem, by observation or through survey to understand the problem in depth and propose the solution by applying the research methodology.

Project Guidelines:

1. Application Development Project

Chapter No		Details
1		Introduction
	1.1	Company Profile / Institute Profile / Client Profile
	1.2	Abstract
	1.3	Existing System and Need for System
	1.4	Scope of System
	1.5	Operating Environment - Hardware and Software
	1.6	Brief Description of Technology Used 1.6.1 Operating systems used (Windows or Unix) 1.6.2 RDBMS/No Sql used to build database (mysql/ oracle, Teradata, etc.)
2		Proposed System
	2.1	Study of Similar Systems (If required research paper can be included)
	2.2	Feasibility Study
	2.3	Objectives of Proposed System
	2.4	Users of System
3		Analysis and Design
	3.1	System Requirements (Functional and Non-Functional requirements)
	3.2	Entity Relationship Diagram (ERD)
	3.3	Table Structure
	3.4	Use Case Diagrams
	3.5	Class Diagram
	3.6	Activity Diagram
	3.7	Deployment Diagram
	3.8	Module Hierarchy Diagram
	3.9	Sample Input and Output Screens (Screens must have valid data. All reports must have at-least 5 valid records.)
4		Coding
	4.1	Algorithms
	4.2	Code snippets
5		Testing
	5.1	Test Strategy
	5.2	Unit Test Plan
	5.3	Acceptance Test Plan
	5.4	Test Case / Test Script
	5.5	Defect report / Test Log
6		Limitations of Proposed System
7		Proposed Enhancements
8		Conclusion

9		Bibliography
10		Publication / Competition certificates
11		Appendix – Cost sheet , Data sheet
12		User Manual (All screens with proper description/purpose Details about validations related to data to be entered.)

2. Embedded Systems / IoT Project

Chapter No		Details
1		Introduction
	1.1	Company Profile / Institute Profile / Client Profile
	1.2	Abstract
	1.3	Existing System and Need for System
	1.4	Scope of System
	1.5	Operating Environment - Hardware and Software
	1.6	Brief Description of Technology Used 1.6.1 Operating systems used (Windows or Unix) 1.6.2 Database (if applicable)
2		Proposed System
	2.1	Study of Similar Systems (If required research paper can be included)
	2.2	Feasibility Study
	2.3	Objectives of Proposed System
	2.4	Users of System
3		Analysis and Design
	3.1	Technical requirements – H/W , S/W
	3.2	System Architecture / Block Diagram
	3.3	System Hardware Details
	3.4	Pin Diagrams
	3.5	Interface diagrams
	3.6	Design Sequence
	3.7	System Software Details
	3.8	Process / System Flow chart
4		Coding
	4.1	Algorithms
	4.2	Code snippets (if applicable)
5		Testing
	5.1	Results & reports
	5.2	Test cases
	5.3	Acceptance Testing
	5.4	Test reports in IEEE format
6		Limitations of Proposed System
7		Proposed Enhancements

8		Conclusion
9		Bibliography
10		Publication / Competition certificates
11		Appendix – Cost sheet , Data sheet
12		User Manual (All screens with proper description/purpose Details about validations related to data to be entered.)

3. ETL Projects

Chapter No		Details
1		Introduction
	1.1	Company Profile / Institute Profile / Client Profile
	1.2	Existing System functionality (Source System for which the ANALYTICS is being developed)
	1.3	Business process understanding and specifications 1.3.1 Business Requirement Specifications: 1.3.1.1 The o/p from BR Analysis are BRS Business Requirement Specifications (Business specific Rules to be mentioned here from analysis point of view) 1.3.1.2 Identify the dimensions, required attributes, measures, filter conditions, adjustments for KPIs going to be used in the Target system and its availability in the Source System. If any gaps suggest remediation of gaps 1.3.2 Business Rules Collection 1.3.3 Identify the Key Performance Indicator (specified by client) 1.3.4 Establish the User Acceptance Criteria
	1.4	Scope of the project
	1.5	Operating Environment - Hardware & Software, Description of Tools / Technology to be used in the Target system 1.5.1.1 Operating systems used (Windows or Unix) 1.5.1.2 RDBMS/NoSql used to build database (mysql/ oracle, Teradata, etc.) 1.5.1.3 ETL tools used (Talend/Informatica, Datastage etc) 1.5.1.4 OLAP/ Data mining/ machine learning/ analytics tools used (Python/ Cognos, BO, etc.) 1.5.1.5 Data visualization tools (power BI / Tableau)
2		Proposed System
	2.1	Creating multiple ETL strategies - Specifying metadata details, identifying heterogeneous architectures, processes for I/O only for ETL, scrapping , identifying the volatilities in the channels , designing strategies in the context of the business and existing ERP
	2.2	Comparing them in the context of selected business system (as per the business requirements)
	2.3	Suggesting optimum solution (process)
3		Analysis and Design
	3.1	Use Case Diagram
	3.2	Activity diagram to demonstrate Process flow (execution of ETL process)

	3.3	Design of Target system (Elaborate the tiers of DW architecture in the Target System)
	3.4	Database schema / Table specifications of Target system
	3.5	Details of Source & Targets of mapping in the database
	3.6	Details of Load (Full/Incremental etc.)
	3.7	Design of ETL schema/strategy
4	4.1	Design of strategy for Visualization 4.1.1 Visualizations in support of comparison of performance of various ETL strategies 4.1.2 Data visualization using different techniques (if any)
5		Drawbacks and Limitations Proposed Enhancements
6		Conclusion

4. Research Projects

Research projects especially are designed to gain knowledge about some specified area and the deliverable is that knowledge gained, usually encapsulated in some form of report.

Students are expected to contribute something new to academic or practical knowledge in their research area—something original that is more than the accepted knowledge.

Completing a Research Project as part of your coursework is an opportunity to:

- learn to read and interpret other people's research critically by doing your own. This gives you an insight into the effects of practical difficulties and theoretical debates on published research
- develop and apply the knowledge that you have learnt in 4 semesters of your curriculum.
- submit a paper for peer-reviewed publication. (If successful, this will give a boost to your c.v.) If you wish to enroll in a research degree such as PhD, a research project as part of your coursework will assist the committee evaluating your application in assessing whether you are ready to do independent research.

Research Index

1. Title page
2. Acknowledgements

You should acknowledge the assistance given to you by your supervisors, and any other person or organization that has helped you in the planning, conduct, analysis or reporting of your project.

3. Abstract

This is a synopsis of your study question, aims and objectives, background literature, methods, results, key conclusions and recommendations. This should be 250–300 words long and should be very clear and easy to follow.

4. Introduction

In this section of your report you introduce the subject, provide the background to the topic or problem, outline the study question (or problem or study hypothesis), and outline the aims and objectives of your study.

5. Literature review

This is a review of the literature on the topic or problem you are studying. It should include a review of any other studies or projects similar or relevant to yours, and perhaps a review of the literature on the method you have chosen if your project tests a new method of research or analysis.

6. Methods

This section includes the methodology of your research. It will cover such issues as:
In case of Computer Management Research :

- Study design
- Study population, sampling frame and numbers, sampling method
- survey design
- survey or data collection instruments
- protocol for obtaining data
- ethical issues and how they are addressed
- information letters, consent forms
- data management and analysis methods
- statistical analysis and tests
- In case of Computer Science Research:
 - Study design
 - System Architecture
 - Implementation
 - Experimental Implementation
 - Simulation
- Data management and analysis methods
- Analysis and testing

7. Results

In this section you present the results of your research. Tables, figures and graphs are an excellent means of presenting this sort of information. All tables, figures and graphs, should be numbered consecutively throughout the whole report, and labelled with a clear and concise descriptive title.

8. Discussion

In this section you interpret your results and discuss their implications, with reference to other published research. Any limitations in your research methodology should also be referred to here. Examiners expect you to acknowledge these limitations as an integral part of your evaluation of your project.

9. Conclusion

This section summarizes the key results and the conclusions that you can draw from these results. It also needs to reflect what your initial project aims and objectives were.

10. Recommendations

It is good research practice to make recommendations or to suggest directions for further research or actions as a result of your project findings.

11. References

This is a list of all the references and sources you used in your literature review, methodology and discussion. This includes books, journal articles, abstracts, conference and symposium papers, media articles, and any form of published literature or comment.

12. Appendices

This section may contain copies of any questionnaires if any or evaluation instruments used covering letters, participant information and ethics approvals, or additional explanations.