



SWAMINARAYAN
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SWAMINARAYAN UNIVERSITY

FACULTY OF IT AND COMPUTER SCIENCE

Syllabus for 3 Semester

MINOR PROJECT - MCA1307

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : New technologies are replacing older one very quickly whose effects can be seen in our society. Internship Project is a opportunity for the students to get flavor of such emerging technology and familiar with industry environment to identify scope as well as focus of their career development path. The main objective of the internship is to get hands-on practice. In turn it will help students to lay down a path for their further professional career by observing, understanding, adopting mechanism of working in the industry. Students will also develop various types of skills by pursuing the internship project programme. The duration of internship will be six weeks. It will be after completion of 3rd Semester and in the Semester 4th. Any options from following can be chosen by the students: 1. Internship in the industry - The student is suggested to select branch-specific training in the IT or relevant Industry where they learn the skills. The student shall produce a joining letter in the beginning and relieving letter after the completion of the internship. It is desirable to do the internship offline. In the case of the online conduction mode, the student has to submit supporting evidence in the form of a screenshot and activity log report of the conducted session along with other necessary documents. 2. Project – If student is not able to carry internship in the industry, student may develop a project on topic related to respective computer engineering branch under faculty guidance. Additionally, Institute/ department may arrange technical sessions/ workshops from industry experts to give exposure to students about recent technologies and tools. It can be fabrication / experimental results/ simulations/ Application development / Design and / or Analysis of System(s) etc. related to the emerging technologies of the Computer/IT. Students needs to report at institute every 15 days about progress to internal guide in suggested reporting format which is given in syllabus and represent his/her work carried out for monitoring and evaluation purpose.

COMPETENCY The purpose of this course is to help the student to attain the following industry identified competency through various teaching-learning experiences: Develop effective programming skills, problem-solving abilities, and technical knowledge to solve challenge innovatively while gaining hands-on experience for professional development opportunities.

COURSE OUTCOMES (COs) The practical exercises, the underpinning knowledge, and the relevant soft skills associated with this competency are to be developed in the student to display the following COs: The student will develop underpinning knowledge, adequate programming skills of competency for implementing various applications using tools and technologies to attain the following course outcomes. a) Apply acquired knowledge to solve domain related societal problems. b) Develop effective communication within academic and industrial environments. c) Utilize industry-standard tools as well as technologies to design, develop, and test the systems. d) Apply problem-solving skills to resolve technical issues encountered in IT Industry. e) Develop life-long learning skills for a successful professional career.

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
0	0	4	2.00	0	0	40	60	100

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
Total Hours			

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

Distribution of Theory Marks					
Remember	Understand	Apply	Analyze	Evaluate	Create

Legends :

R : Remembrance

U : Understanding

A : Application

N : Analyze and

E : Evaluate

C : Create and Above Levels

Note : This Specification table shall be treated as a general guideline for student and teacher. The actual distribution of marks in question paper may vary slightly from above table.

9 . LIST OF EXPERIMENTS :



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FACULTY OF IT AND COMPUTER SCIENCE

Syllabus for 3 Semester

BIG DATA ANALYTICS - MCA1306

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : Today's world is a data-driven world. Increasingly, the efficient operation of organizations across sectors relies on the effective use of vast amounts of data. Big data analytics helps us to examine these data to uncover hidden patterns, correlations, and other insights. It is a fast-growing field and skills in the area are some of the most in-demand today.

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
3	0	4	3.00	60	40	20	30	150

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to Big Data Introduction to Big Data, Big Data characteristics, Challenges of Conventional System, Types of Big Data, Intelligent data analysis, Traditional vs. Big Data business approach, Case Study of Big Data Solutions.	8	
2	Hadoop History of Hadoop, Hadoop Distributed File System: Physical organization of Compute Nodes, Components of Hadoop Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features, Hadoop environment. Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, security in Hadoop, Administering Hadoop, Monitoring-Maintenance, Hadoop benchmarks, Hadoop in the cloud	15	

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
3	NoSQL What is NoSQL? NoSQL business drivers; NoSQL case studies; NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns; Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer; Four ways that NoSQL systems handle big data problems	10	
4	Mining Data Stream Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating moments, Counting oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) applications, Case Studies, Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	10	
5	Frameworks Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of HBase and ZooKeeper, IBM InfoSphere BigInsights and Streams., Spark: Introduction to Data Analysis with Spark, In-Memory Computing with Spark, Spark Basics, Interactive Spark with PySpark, Writing Spark Applications	5	
Total Hours		48	

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

Distribution of Theory Marks					
Remember	Understand	Apply	Analyze	Evaluate	Create
10.00	15.00	15.00	10.00	5.00	5.00

Legends :

R : Remembrance

U : Understanding

A : Application

N : Analyze and

E : Evaluate

C : Create and Above Levels

Note : This Specification table shall be treated as a general guideline for student and teacher. The actual distribution of marks in question paper may vary slightly from above table.

8 . REFERENCES BOOKS :

- 1 Intelligent Data Analysis, Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 0

9 . LIST OF EXPERIMENTS :

- 1 **Practicals**
P1, P2, P3, P4, P5, P6

10. LIST OF OPEN-SOURCE SOFTWARE/LEARNING WEBSITE :

- 1 <http://in.reuters.com/tools/rss>

INSTRUCTIONAL METHOD :

- 1 PPT



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Syllabus for 3 Semester MACHINE LEARNING - MCA1304

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : Basics of computer science including algorithms, data structure, Probability theory and Bayesian Concept Learning

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
3	0	2	4.00	60	40	20	30	150

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
1	Preparing to Model , Feature Engineering Machine Learning activities, Basic Types of data in Machine Learning, Structures of data, Data Quality and Remediation, Data Pre-Processing, Introduction to Feature Engineering, Feature Transformation, Feature Subset Selection	10	
2	Modelling and Evaluation Selecting a Model, Training a Model, Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model	8	
3	Supervised Learning Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms Example of Regression, Common regression Algorithms	10	
4	Unsupervised Learning Unsupervised Learning versus Supervised Learning, Applications of Unsupervised Learning, Clustering, Finding Pattern using Association Rules	8	
Total Hours		36	

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

Distribution of Theory Marks					
Remember	Understand	Apply	Analyze	Evaluate	Create
10.00	15.00	15.00	10.00	5.00	5.00

Legends :

R : Remembrance

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A : Application

N : Analyze and

E : Evaluate

C : Create and Above Levels

Note : This Specification table shall be treated as a general guideline for student and teacher. The actual distribution of marks in question paper may vary slightly from above table.

8 . REFERENCES BOOKS :

- 1 Machine Learning, Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson Education, 0

9 . LIST OF EXPERIMENTS :

- 1 **Practicals**
P1, P2, P3, P4, P5

10. LIST OF OPEN-SOURCE SOFTWARE/LEARNING WEBSITE :

- 1 <https://www.simplilearn.com/>

INSTRUCTIONAL METHOD :

- 1 PPT



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Syllabus for 3 Semester

DATA SCIENCE WITH PYTHON - MCA1303

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : This course typically covers fundamental to advanced concepts of Python programming, along with its application in data science

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
2	0	4	4.00	60	40	20	30	150

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
1	Overview of Python and Data Structures Basics of Python including data types, variables, expressions, objects and functions. Python data structures including String, Array, List, Tuple, Set, Dictionary and operations them.	10	
2	Data Science and Python Discovering the match between data science and python: Considering the emergence of data science, Outlining the core competencies of a data scientist, Linking data science, big data, and AI , Understanding the role of programming, Creating the Data Science Pipeline, Preparing the data, Performing exploratory data analysis, 15 30 Learning from data, Visualizing,, Obtaining insights and data products Understanding Python's Role in Data Science: Introducing Python's Capabilities and Wonders:Why Python?, Grasping Python's Core Philosophy, Contributing to data science, Discovering present and future development goals, Working with Python, Getting a taste of the language, Understanding the need for indentation, Working at the command line or in the IDE	15	
3	Getting Your Hands Dirty With Data Using the Jupyter Console, Interacting with screen text, Changing the window appearance, Getting Python help, Getting IPython help, Using magic functions, Discovering objects, Using Jupyter Notebook, Working with styles,, Restarting the kernel, Restoring a checkpoint, Performing Multimedia and Graphic Integration, Embedding plots and other images, Loading examples from online sites, Obtaining online graphics and multimedia.	15	

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
4	Data Visualization Visualizing Information: Starting with a Graph, Defining the plot, Drawing multiple lines and plots, Saving your work to disk, Setting the Axis, Ticks, Grids, Getting the axes, Formatting the axes, Adding grids, Defining the Line Appearance, Working with line style, Using colors, Adding markers, Using Labels, Annotations, and Legends, Adding labels, Annotating the chart, Creating a legend., Visualizing the Data: Choosing the Right Graph, Showing parts of a whole with pie charts, Creating comparisons with bar charts, Showing distributions using histograms, Depicting groups using boxplots, Seeing data patterns using scatterplots, Creating Advanced Scatterplots, Depicting groups, Showing correlations, Plotting Time Series, Representing time on axes, Plotting trends over time, Plotting Geographical Data, Using an environment in Notebook, Getting the Basemap toolkit, Dealing with deprecated library issues, Using Basemap to plot geographic data, Visualizing Graphs, Developing undirected graphs, Developing directed graphs.	10	
Total Hours		50	

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

Distribution of Theory Marks					
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10.00	15.00	15.00	10.00	5.00	5.00

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Note : This Specification table shall be treated as a general guideline for student and teacher. The actual distribution of marks in question paper may vary slightly from above table.

8 . REFERENCES BOOKS :

- 1 Python for data science for dummies, Python for data science for dummies, John Paul Mueller, Luca Massaron, Wiley, 0000

9 . LIST OF EXPERIMENTS :

- 1 **Practicals**
P1, P2, P3, P4, P5

10. LIST OF OPEN-SOURCE SOFTWARE/LEARNING WEBSITE :

- 1 https://onlinecourses.swayam2.ac.in/nou21_ge41/preview

INSTRUCTIONAL METHOD :

- 1 PPT



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Syllabus for 3 Semester

ARTIFICIAL INTELLIGENCE - MCA1302

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : The objective of the course is to Introduce the necessary understanding of human intelligence and to explore the mechanisms that enables the intelligent thought and action. Understand and learn effective ways for representing knowledge, applying intelligent problem solving techniques & searching techniques.

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
2	0	4	4.00	60	40	20	30	150

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction The AI Problems, The Underlying Assumption, AI techniques, The Level of The Model, Criteria For Success, Problems, State Space Search & Heuristic Search Techniques ? Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.	8	
2	Knowledge Representation Representations And Mappings, Approaches To Knowledge Representation, Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions and Predicates, Resolution, Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning., Symbolic Reasoning Under Uncertainty: ? Introduction To Nonmonotonic Reasoning, Logics For Non-monotonic Reasoning., Probabilistic Reasoning: ? Probability And Bays' Theorem, Certainty Factors And Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic	10	

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
3	Game Playing Overview, MiniMax Search Procedure, Alpha-Beta Cut-offs, Refinements, Iterative deepening., Planning: The Blocks World, Components Of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking	10	
4	Connectionist Models Introduction: Hopfield Network, Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Symbolic AI., Expert Systems: ? Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition., Genetic Algorithms: ? A Peek into the Biological World, Genetic Algorithms (GAs), Significance of the Genetic Operators, Termination Parameters., Introduction to Prolog: ? Introduction, Converting English to Prolog Facts and Rules, Goals, Prolog Terminology, Variables, Control Structures, Arithmetic Operators, Matching in Prolog, Backtracking, Cuts, Recursion, Lists.	15	
Total Hours		43	

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

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10.00	15.00	15.00	10.00	5.00	5.00

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8 . REFERENCES BOOKS :

- 1 Artificial Intelligence, Artificial Intelligence, Elaine Rich And Kevin Knight (2nd Edition), Tata Mcgraw-Hill, 0

10. LIST OF OPEN-SOURCE SOFTWARE/LEARNING WEBSITE :

- 1 <https://nptel.ac.in/courses/106/105/106105077/>

INSTRUCTIONAL METHOD :

- 1 PPT



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Syllabus for 3 Semester

MOBILE APPLICATION USING FLUTTER - MCA1301

Name of Department in which this course is offered	Semester in Which offered
MCA	3

1. Type of Course :

2. Prerequisite : This Course will enable students to create mobile applications across the mobile operating systems - Android and iOS. Students understand how to implement OOPS concept to create efficient and Implementable applications. Smartphones and mobile applications have grown in popularity in recent years. This trend is expected to continue, resulting in an increased demand for professionals who can create mobile applications. This course will help students to build core competencies in mobile application development with relevant skills and knowledge, practical experience, and career opportunities in a growing and dynamic industry. At the end of this course, students will be able to: describe Flutter architecture, widgets and their life cycle. practice the designing a well interface using Widgets and Components. perform CRUD Operations Using Local Database and Rest API's. use navigation between different pages and refresh screens with data.

3. RATIONALE :

4. COURSE OUTCOME :

Sr. No	CO Statement
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5. TEACHING AND EXAMINATION SCHEME :

Teaching Schemes			Credit	Examination Scheme				
L	T	P	C	Theory		Practical		Total
				E-ESE	M-PA	V-ESE	I-PA	
3	0	4	5.00	60	40	20	30	150

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to Flutter • Features of Flutter • Advantages of Flutter • Disadvantages of Flutter. • Flutter Installation in Windows • Flutter Installation in MacOS • Architecture of FlutterApplications • Creating Simple Application in Android Studio, Introduction To OOPS Concept Using Dart • Variables and Data types, • Decision Making and Loops, • Functions(Named parameters, Optional positional parameters, Optional parameter with default values, Anonymous functions), • Class, Constructor, Object, • Abstraction, Encapsulation, Inheritance, • Polymorphism(Compile-time polymorphism, Runtime polymorphism).	15	
2	Flutter Architecture & Inbuilt Widgets • Flutter Architecture, • Project Structure (Pubspec File, Assets, Lib, Android, iOS), • Run Window, Inbuilt Widgets, • Stateless Widget, Statefull Widget, • Single Child Widget (Scaffold, Safearea, Text, TextField, TextFormField, Button, Container, Card, Padding), • Multi Child Widget (Row, Column, Stack), • SnackBar, App Bar, etc.	10	

6. CONTENT

Sr. No.	Content	Total Hrs	% Weightage
3	Scrollable Widgets, Dialogs & State Management • List View, Grid View, • Difference between Listview & Listview.builder, • Difference between Gridview & Gridview.builder, • PageView, Single Child Scroll View, Nested Scroll View, • Bottom Sheet, Drawer, BottomNavigatorBar, Date Picker Dialog, • Alert Dialog, Mixin, • What is state management, • Categories of State Management (Ephemeral State, App State), • State management approaches, Provider, setState, • CheckboxGroup and RadioButtonGroup	10	
4	Database Connectivity & Navigation • MaterialPageRoute, • Navigator.push(), Navigator.pop(), • Return Data to Previous Page using pop() & push().then(), • Routing, Future, FutureBuilder, • Async Await, Shared Preferences, • Database in Flutter, Sqlite Database, • CRUD Operations.	15	
Total Hours		50	

7. SUGGESTED SPECIFICATION TABLE WITH MARK (THEORY)

Distribution of Theory Marks					
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10.00	15.00	15.00	10.00	5.00	5.00

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8 . REFERENCES BOOKS :

- 1 Beginning App Development with Flutter, Beginning App Development with Flutter, Rap Payne, Apress, 0

9 . LIST OF EXPERIMENTS :

- 1 **Practicals**
Set-up of Android development environment, managing AVD and understanding its various components. Understanding of Various Components available in Android Application Develop a "Hello World" Application in Android and understand the structure of an Android Application Develop Android Application to demonstrate methods of Activity Life Cycle., Design Android Activities using LinearLayout, RelativeLayout, GridView, FrameLayout, and ConstraintLayout Develop code to demonstrate different ways of Handling different events (onClick, onLongClick etc.) over Button, EditText etc. to perform action in Android application at run-time. Develop code to demonstrate Event handling of CheckBox and RadioButton selection. Develop the code to implement the ListView and the Spinner views, perform add, update, remove items operations and implement the item selection event handling over ListView and Spinner for appropriate example., Develop android applications to demonstrate user interaction with the application using Options Menu, Context Menu and Popup Menu. Develop Android Application for local database connectivity and performing basic database operations (select, insert, update, delete) using SQLiteDatabase and SQLiteOpenHelper Classes Develop a simple application to display "Hello Application Name" using Kotlin Develop an android application using Kotlin having a Button "Click" and upon clicking on that Button a Toast message "Button Clicked" should be displayed on screen through Toast Message

10. LIST OF OPEN-SOURCE SOFTWARE/LEARNING WEBSITE :

- 1 https://onlinecourses.swayam2.ac.in/nou21_ge41/preview

INSTRUCTIONAL METHOD :

- 1 PPT