TECHNO INDIA UNIVERSITY

Techno India University, West Bengal

4TH Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIU-UTR-T200	**Career Advancement & Skill Development- (Angular Java Script and No SQL Database with Mongo dB)**	2	0	0	2
TIU-PCA-T212	**Advanced Data Science through R and Python**	3	1	0	4
TIU-PCA-T210	**Big Data Analytics**	2	1	0	3
TIU-PCA-T208	**Application Development of Smart Devices**	2	1	0	3
Practical					
TIU-PCA-L212	**Advanced Data Science through R and Python programming Lab**	0	0	3	2
TIU-PCA-L208	**Android development lab**	0	0	3	2
Sessional					
TIU-PES-S298	**Entrepreneurship Skill Development**	0	0	3	3
TIU-PCA-P296	**Major Project using J2EE/Python**	0	0	3	10
TIU-PCA-G298	**Grand Viva**	0	0	0	2
Total Credits					31

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Approved by:

    External Expert-1   (Prof. Subhadip Basu, J.U.)

    External Expert-2   (Prof. Amlan Chakraborty, C.U.)

    HOD -   (Prof. A.B. Chaudhuri)   **Industry Expert(Mr. J. Rudra,CTL):**

TECHNO INDIA UNIVERSITY

Detailed Syllabus

6ᵗʰ Semester

Career Advancement & Skill Development

TIU-UTR-T200

L-T-P: 2-0-0   **Credit 2**

SAP – ABAP(MCA) & Pl/Sql(MCA)

Advanced Data Science through R and Python
TIU-PCA-T212

L-T-P: 3-1-0   **Credit: 4**

Course Objective:

1. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.

2. Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication.

Course Outcomes:

- Describe what Data Science is and the skill sets needed to be a data scientist.

- Explain in basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.
- Use R to carry out basic statistical modeling and analysis.
- Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
- Describe the Data Science Process and how its components interact.
- Use APIs and other tools to scrap the Web and collect data.
- Apply EDA and the Data Science process in a case study. 1
- Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes) for predictive modeling. Explain why Linear Regression and k-NN are poor choices for Filtering Spam. Explain why Naive Bayes is a better alternative.
- Identify common approaches used for Feature Generation. Identify basic Feature Selection algorithms (Filters, Wrappers, Decision Trees, Random Forests) and use in applications.

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- Identify and explain fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine (dimensionality reduction, singular value decomposition, principal component analysis). Build their own recommendation system using existing components.
- Create effective visualization of given data (to communicate or persuade).
- Work effectively (and synergic ally) in teams on data science projects.

Detailed Topics:

Unit 1:   **Introduction to Business Analytics:** Overview, Business Decisions and Analytics, Types of Business Analytics, Applications of Business Analytics, Data Science Overview.

Unit 2:   **Data Collection and Data Blending:**   Basic Concepts, Business Intelligence and Data Warehousing, Data Science Project   Life Cycle, Web Scrapping, Case Study 1- Collecting Data from **Twitte**r, Case Study 2 - Analyzing data from **Movie Lens**.

Unit 3:   Accessing RDBMS thru R and Python

Unit 4:   Text Mining

Unit 5:   **Statistics for Data Science-1: Introduction to the measures of Central Tendency and Dispersion. Computations of the measures using R and Python.**

Unit 6:   **Statistics for Data Science-2: Introduction to Probability Distributions. Implementation of Probability and Statistics for interpretation of data using R and Python**

Unit 7:   **Statistics for Data Science-3: Correlation and Regression Analysis:** Correlation and its measurements, Multiple Correlations. Introduction to Regression Analysis, Types of Regression Analysis Models, Linear Regression, Non-Linear Regression, Regression Analysis with Multiple Variables, Cross Validation, Logistic regression, Non-Linear to Linear Models.

   Statistics for Data Science-4:   Testing of Hypothesis: Introduction to Hypothesis, Types of Hypotheses, Data Sampling, Confidence and Significance Levels, Hypothesis Testing, Parametric Test, Non-Parametric Test, Hypothesis Tests about Population Means, Hypothesis Tests about Population Variance, Hypothesis Tests about Population Proportions.

Unit 8:   **Data Mining Applications:** Data Exploration and Visualization, Decision Trees and their applications, Theory of Information, **Classification:** Supervised classification algorithms, **Clustering:** Overview, Introduction to Clustering, Clustering Example, Clustering Methods: Prototype Based Clustering, K-means Clustering, Clustering Methods: Hierarchical Clustering, Hierarchical Clustering, Clustering ,Methods: DBSCAN, Principal Component Analysis, **Association:** Overview, Association Rule, Apriori Algorithm, Apriori Algorithm; Dimensionality Reduction, Clustering, Association Rules, Anomaly Detection, Network Analysis and Recommender Systems.

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Unit 9: **Machine Learning for Data Science-1:** Overview, Applications of Machine Learning, Types of Machine Learning, Examples and applications of each type, Case studies of different types of machine learning.

Unit 10: **Machine Learning for Data Science-2:** Case Study 3 – Creating a Data Product using some Machine Learning Algorithm; Introduction to **Big Data** Analytics.

Unit 11: **Introduction to Specialty Topics:** Data Engineering, Natural Language Processing, and Web Applications.

Unit 12: Deep Learning

Big Data Analytics
TIU-PCA-T210

L-T-P: 2-1-0 **Credit 3**
COURSE OBJECTIVE:

1. Student will develop your knowledge of big data analytics and enhance your programming and mathematical skills.
2. Student will learn to use essential analytic tools such as Apache Spark and R.analysis of problem space and **data** needs.

COURSE OUTCOME:

After completion of this course the student should be able to:

CO1: Define the basic ideas of Big Data and the problem of classical data analysis techniques.
CO2: Describe the benefits how Big Data can offer to businesses and organizations.
CO3: Analyze conceptually how Big Data is stored.
CO4: Implement how Big Data can be analyzed to extract knowledge.

Detailed syllabus

1 INTRODUCTION TO BIG DATA: Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, big data analytics, Big data applications. Algorithms using map reduce .

2 INTRODUCTIONS TO HADOOP AND HADOOP ARCHITECTURE: Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization.

3 HDFS, HIVE AND HIVEQL, HBASE HDFS: Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

4 SPARK: Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLib

5. SQOOP, Zookeeper.

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6. NoSQL What is it?, Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL .

7. Data Base for the Modern Web Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language

Books for Main Reading:

1. Chris Eaton,Dirk derooset al. , "Understanding Big data ", McGraw Hill, 2012.

2. BIG Data and Analytics , Sima Acharya, Subhashini Chhellappan, Willey

3. MongoDB in Action, Kyle Banker,Piter Bakkum , Shaun Verch, Dreamtech Press

4. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.

Application Development of Smart Devices
TIU-PCA-T208

L-T-P: 2-1-0   **Credit: 3**

COURSE OBJECTIVE:
1. Learner will be able to know application of android
2. Learner will know multithreading intent filtering and its application.

COURSE OUTCOME:

After completion of this course the student should be able to:

CO1: Install and configure application development tools.

CO2: Design and develop user Interfaces for the Application platform.

CO3: Save state information across important operating system events.

CO4: Apply OOP concepts for application development.

CO5: Develop an application independently for a smart device.

Detailed syllabus

1) Introduction To Mobile Apps
I. Why we Need Mobile Apps
II. Different Kinds of Mobile Apps
III. Briefly about Android
2) Introduction Android
I. History Behind Android Development
II. What is Android?
III. Pre-requisites to learn Android
IV. Brief Discussion on Java Programming

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3) Android Architecture

I. Overview of Android Stack

II. Android Features

III. Introduction to OS layers

4) Deep Overview in Android Stack

I. Linux Kernel

II. Libraries

III. Android Runtime

IV. Application Framework

V. Dalvik VM

5) Installing Android Machine

I. Configuring Android Stack

II. Setting up Android Studio

III. Working with Android Studio

IV. Using Older Android Tools

6) Creating First Android Application

I. Creating Android Project

II. Debugging Application through DDMS

III. setting up environment

IV. AVD Creation

V. Executing Project on Android Screen

7) Android Components

I. Activities

II. Services

III. Broadcast Receivers

IV. Content Providers

8) Hello World App

I. Creating your first project

II. The manifest file

III. Layout resource

IV. Running your app on Emulator

9) Building UI with Activities

I. Activities

II. Views, layouts and Common UI components

III. Creating UI through code and XML

IV. Activity lifecycle

V. Intents

VI. Communicating data among Activities

10) Advanced UI

I. Selection components (GridView, ListView, Spinner)

II. Adapters, Custom Adapters

III. Complex UI components

IV. Building UI for performance

V. Menus

VI. Creating custom and compound Views

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11) Notifications

I. Toast, Custom Toast

II. Dialogs

III. Status bar Notifications

12) Multithreading

I. Using Java Mutithreading classes

II. AsyncTask

III. Handler

IV. Post

V. Writing an animated game

13) Styles And Themes

I. Creating and Applying simple Style

II. Inheriting built-in Style and User defined style

III. Using Styles as themes

14) Resources and Assets

I. Android Resource

II. Using resources in XML and code

III. Localization

IV. Handling Runtime configuration changes

15) Intent, Intent Filters and Broadcast Receivers

I. Role of filters

II. Intent-matching rules

III. Filters in your manifest

IV. Filters in dynamic Broadcast Receivers

V. Creating Broadcast receiver

Receiving System Broadcast

VI. Understanding Broadcast action, category and data

VII. Registering Broadcast receiver through code and through XML

VIII. Sending Broadcast

16) Data Storage

I. Shared Preferences

II. Android File System

III. Internal storage

IV. External storage

V. SQLite

a. IntroducingSQLite

b. SQLiteOpenHelper and creating a database

c. Opening and closing adatabase

d. Working with cursors Inserts, updates, and deletes

VI. Network

17) Content Providers

I. Accessing built in content providers

II. Content provider MIME types

III. Searching for content

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IV. Adding, changing, and removing content

V. Creating content provider

VI. Working with content files

18)Services

I. Overview of services in Android

II. Implementing a Service

III. Service lifecycle

IV. Inter Process Communication (AIDL Services)

19) Multimedia in Android

I. Multimedia Supported audio formats

II. Simple media playback

III. Supported video formats

IV. Simple video playback

20) Location Based Services and Google Maps

I. Using Location Based Services

II. Finding current location and listening for changes in location

III. Proximity alerts

IV. Working with Google Maps

i. Showing google map in an Activity

ii. Map Overlays

iii. Itemized overlays

iv. Geocoder

v. Displaying route on map

21) Web Services and WebView

I. Consuming web services

II. Receiving HTTP Response (XML, JSON)

III. Parsing JSON and XML

IV. Using WebView

22) Sensors

I. How Sensors work

II. Using Orientation and Accelerometer sensors

III. Best practices for performance

23) WiFi

I. Monitoring and managing Internet connectivity

II. Managing active connections

III. Managing WiFi networks

24) Telephony Services

I. Making calls

II. Monitoring data connectivity and activity

III. Accessing phone properties and status

IV. Controlling the phone

V. Sending messages

25) Camera

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I. Taking pictures

II. Media Recorder

III. Rendering previews

26) Bluetooth

I. Controlling local Bluetooth device

II. Discovering and bonding with Bluetooth devices

III. Managing Bluetooth connections

IV. Communicating with Bluetooth

26) More

I. Fragments

II. Material Design

III. Gradle

IV. NEW TOPICS: Since each new version of Android has new features, we keep extra time for adding custom topics in every batch. You can request any Android Topic.

28) Android Application Deployment

I. Android Application Deployment on device with Linux and Windows

II. Android Application Deployment on Android Market

Advanced Data Science through R programming Lab
TIU-PCA-L212

L-T-P: 0-0-3   **Credit 2**

As taught by the respective faculty.

Android Development Lab
TIU-PCA-L208

L-T-P: 0-0-3   **Credit 2**

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