GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

Guru Gobind Singh Indraprastha University
Sector – 16C Dwarka, New Delhi – 110078

(Coordination Branch)
Ph:011-25302135-136, Email: coordination112@gmail.com, Website: www.ipu.ac.in

F.No.: GGSIPU/Co-ord./50th AC/2021/ 121 **Dated:** 2nd **July, 2021**

Circular

Please find enclosed herewith the final Minutes of the 50th meeting of the Academic Council of the Guru Gobind Singh Indraprastha University held on **11/06/2021 at 11:00 AM** on Cisco Webex platform.

Ravi Dadhich

(Ravi Dadhich)
Registrar

To,

1 Dean- USBAS/ USBT/ USCT/ USEM/ USICT/ USHSS/ USMC/ USLLS/ USM&PMHS/ USMS/ USAP/ USE, GGSIP University.
2 Director- Academic Affairs/ Coordination/ Students' Welfare/ CDMS/ Development/ International Affairs/ CEPS/ Research and Consultancy/ Legal Aid / IUIIC, GGSIP University
3 Librarian, GGSIP University
4 Prof. P.K. Jhulka, (Retired), Max Institute of Cancer Care, 26-A Ring Road, Nirmal Puri, Nirmal Colony, Block -2, Lajpat Nagar-IV, New Delhi-110024
5 Prof. M.C. Sharma, 109, Nav Shakti Sadan, Sector 13, Rohini, New Delhi-110085
6 Prof. Karmeshu, (Retired), 150, Deepali, Road No. 42, Pitampura, Delhi-110034
7 Sh. Arvind Misra, 5/101, Mathura Road, Agra-282002
8 Shri. Sandeep Gupta, 100 UB Jawahar Nagar, Delhi-110007
9 Prof. Rajiv Bhat, School of Biotechnology, Jawaharlal Nehru University, New Delhi
10 Prof. (Dr.) Pradeep Kulshrestha, Dean, School of Law, Sharda University, Plot No. 32 & 34, Knowledge Part-III, Greater Noida-201306 (UP)
11 Ar. Rupal S. Randhawa, 204-A, Pocket B, Mayur Vihar, P hase-2, New Delhi-110091
12 Dr. Jagdish Lal Gupta, CP-18, Maurya Enclave, Pitam Pura, Delhi-110034.
13 Prof. M. Afzal Wani, University School of Law and Legal Studies, GGSIP University
14 Prof. Prodyut Bhattacharya, University School of Environment Management, GGSIP University
15 Prof. Amit Prakash Singh, University School of Information Communication & Technology, GGSIP University
16 Prof. Shalini Garg, University School of Management Studies, GGSIP University.
17 Prof. Lisa P. Lukose, University School of Law and Legal Studies, GGSIP University.
18 Prof. M.N. Hoda, Director, Bharti Vidhyapeeth's Institute of Computer Application & Management, A-4, Paschim Vihar, Rohtak Road, New Delhi-63.
19 Prof. Sonia Jindal, Principal, Gitarattan Institute of Advanced Studies and Training, Rohini, Delhi-85.
20 Prof. Ravi K. Dhar, Director, Jagannath International Management School, OCF, Pocket-9, Sector-B, Vasant Kunj, New Delhi-110070.
21 Prof. Maharaj Krishen Bhat, Director, Maharaja Agrasen Institute of Management Studies, Maharaja Agrasen Camp, Plot No. 1, Sec-22, Rohini, Delhi.

Copy for information of the Competent Authority:

(i) AR to the Vice Chancellor Secretariat for kind information of Hon'ble Vice Chancellor, GGSIP University.
(ii) AR to the Registrar office for information of Registrar, GGSIP University

Shikha

(Shikha Agarwal)
Dy. Registrar (Coordination)

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
SECTOR – 16 C, DWARKA, NEW DELHI - 110078

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

FIFTIETH (50th) MEETING OF THE ACADEMIC COUNCIL

DATE : 11.06.2021

TIME : 11:00 AM

MINUTES OF 50th MEETING OF THE ACADEMIC COUNCIL

Ravi

INDEX

Agenda Item No. AC 50.11: **To ratify the change in the Scheme of Entrance Examination (CET) in B. Pharma Programme.**

The Academic Council ratified the change in the Scheme of Entrance Examination (CET) in B. Pharma Programme from Academic Session 2021-22.

Agenda Item No. AC 50.12: **To ratify the Eligibility Criteria, Admission Criteria and Syllabus of Entrance Examination of CET of Bachelor of Science (Medical Imaging Technology) Programme.**

The Academic Council ratified the Eligibility Criteria, Admission Criteria and Syllabus of Entrance Examination of CET of Bachelor of Science (Medical Imaging Technology) Programme from Academic Session 2021-22.

Agenda Item No. AC 50.13: **To ratify the Scheme & Syllabus of Bachelor of Science (Medical Imaging Technology) w.e.f batch 2020-21.**

The Academic Council ratified the Scheme & Syllabus of Bachelor of Science (Medical Imaging Technology) w.e.f batch 2020-21.

Agenda Item No. AC 50.14: **To ratify the revised syllabus of M.Ch. Plastic & Reconstructive Surgery programme w.e.f Academic Session 2021-22.**

The Academic Council ratified the revised syllabus of M.Ch. Plastic & Reconstructive Surgery programme w.e.f. Academic Session 2021-22.

Agenda Item No. AC 50.15: **To consider and approve the Scheme & Syllabus of Post Graduate Diploma in Data Analytics.**

The Academic Council considered and approved the Scheme & Syllabus of Post Graduate Diploma in Data Analytics w.e.f. Academic Session 2020-21.

Agenda Item No. AC 50.16: **To consider and approve the Scheme & Syllabus of Post Graduate Diploma in Entrepreneurship and Start-Up (PGDES) w.e.f 2020-21.**

The Academic Council considered and approved the Scheme & Syllabus of Post Graduate Diploma in Entrepreneurship and Start-Up (PGDES) w.e.f. Academic Session 2020-21.

Agenda Item No. AC 50.17: **To consider and approve the syllabus of Mandatory Course Entrepreneurial Mindset (USMS-112) in USMS.**

SCHEME OF EXAMINATION

AND

SYLLABUS

FOR

POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

APPROVED BY

UNIVERSITY GRANTS COMMISSION (UGC)

UNDER

NATIONAL SKILL QUALIFICATIONS FRAMEWORK (NSQF)

(LEVEL – 8)

WITH EFFECT FROM 2020-21 ONWARDS

UNIVERSITY SCHOOL OF MANAGEMENT STUDIES

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

SECTOR 16 C, DWARKA, NEW DELHI

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Entrepreneurship | Employability | Skill Development

Approved in the Academic Council 50th meeting held on 02/07/2021 vide agenda item 50.15 w.e.f. 2020

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI

POST-GRADUATE DIPLOMA IN DATA ANALYTICS

(PGDDA)

Evaluation

The evaluation shall involve 25 marks for continuous evaluation and 75 marks for final examination.

Criteria for Continuous Evaluation

The continuous evaluation of the students shall be marked out of 25 marks. The criteria for continuous evaluation shall be decided by the faculty delivering the course under intimation to the Dean (USMS)/ Coordinator (PG Diploma Programs, USMS). Conducting one written exam shall be mandatory for each course.

Final Examination

The final examination for the courses involving only the practical component shall be conducted by the industry partner(s). The final examination for the courses involving only the theory component or involving both theory and practical component shall be conducted by the university in consultation with the industry partner(s). The MOOC/NPTEL/Similar courses shall be completed by the student on his/her own, and the documentary proof of completion shall be submitted to the university.

Maximum and Minimum Credits for the Program

Total number of Credits for the PGDDA program is 60. For the award of the diploma, the student is required to complete 56 credits.

Multiple Exit

The student who completes the first semester (with at least 28 credits) may opt to exit from the program. Such student shall be awarded 'Six-Month Certificate Course in Data Analytics'.

Note: The scheme and Syllabus is as per the ordinance 11 of the University

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI

POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

SEMESTER I **Total number of Credits: 30**

Code	Course			Credits
		Theory	**Practical**	**Total**
PGDDA-101	Information Systems Management	**2**	**0**	**2**
PGDDA-103	Database Management Systems	2	0	2
PGDDA-151	Database Management Systems (Lab)	0	1	1
PGDDA-105	Data Preparation (Importing Data and Pre-Processing Data)	1	2	3
PGDDA-107	Data Exploration	2	2	4
PGDDA-109	Decision Sciences	2	2	4
PGDDA-111	Introduction to Analytics and R Programming	1	3	4
PGDDA-113	Inter-personal Communication (Work effectively with colleagues)	1	1	2
PGDDA-115	Choice based Online Open Course (MOOCs/NPTEL/ similar course)	0	2	2
PGDDA-117	Project-1		6	6
	Semester Credits	11	19	30
	Theory-11 Credits, Skill-based 19 Credits			154 hrs (Theory) 532 hrs (Practical)

SEMESTER II **Total number of Credits: 30**

Code	Course	Hour / Week		Credits
		Lecture	Practical	Total
PGDDA-102	Advanced Business Analytics and Predictive Modelling	2	2	4
PGDDA-104	Data Modelling with Python	1	3	4
PGDDA-106	Risk Assessment and Mitigation	2	1	3
PGDDA-108	Business Performance Modelling	2	2	4
PGDDA-110	Creating Visualisations (using Visualisation Tools)	1	2	3
PGDDA-112	Choice based Online Open Course (MOOCs/NPTEL/ similar course)	0	2	2
PGDDA-114	Managing Client Communication	2	0	2
PGDDA-116	Project – 2	0	8	8
	Semester Credits	10	20	30
	Theory-10 Credits, Skill based 20 Credits			140 hrs (Theory) 560 hrs (Practical)

Total Programme Credits:30+30=60 **Total Programme Hrs. 1386**

Note: 1 credit=1 hour of teaching per week. The semester will spread over 14 weeks.

POSTGRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Programme Outcome:

PO1**:** Understand and analyse principles applied to contexts and environments of data analytics.
PO2: Design tested and effective advanced analytics models and simulations for decision making.
PO3: Create integrated views of data collected from multiple sources of an enterprise.
PO4: Understand and effectively communicate the results of data analytics to decision makers.

FIRST SEMESTER

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Information Systems Management

Course Code: PGDDA-101 **T-2 P-0 Credits-2**

Objective: The objective of this course is to expose the students to the managerial issues relating to information systems planning, design, development, and its linkage with the business strategyand help them identify and evaluate various options in this regard.

Course Outcome:
Students who have completed this course would have learned to:

CO1: Understand the concept of information system and its importance for the business analytics.
CO2: Understand concept of data management , telecommunication, internet, and wireless technology.
CO3: Analyse key information systems and enterprise applications, concept of E-commerce and Decision making.
CO4: Analyze and understand building information systems - system analysis and design, and business value of information system.

Course Contents:

Unit-I
Meaning and Role of Information Systems: Information Systems: Digital Enterprises, Role of Information Systems, Types of Information Systems: Operations Support Systems, Management Support Systems, Expert Systems and Knowledge Management Systems. Competitive Strategy Concepts, Strategic Role of Information Systems. (7 Hours)

Unit-II
Planning for Information Systems: Identification of Applications, Business Planning Systems and Critical Success Factors, Method of Identifying Applications, Procurement Options – Make or Buy decisions, Outsourcing as an Option. (7 Hours)

Unit-III
Building Information Systems: Concepts of Systems Analysis and Design, SDLC Approach, Prototyping, Spiral method. Logical and Physical Design. Implementation Strategies of Information Systems. (7 hours)

Unit-IV
Emerging Concepts and Issues in Information Systems: Enterprise Systems: Supply Chain Management, Customer Relationship Management, ERP, Knowledge Management, Benefits and Challenges of Enterprise Systems. Enhancing Decision Making. (7 Hours)

Text Books:

1. James A O'Brien, George M Marakas and Ramesh Behl (2013). Management Information Systems, Tenth Edition, Tata McGraw Hill Education, New Delhi.
2. Kenneth C. Laudon and Jane P. Laudon (2016). Management Information Systems, Fourteenth Edition, Pearson, New Delhi.

References Books:

1. Turban, E., and Linda Volonino (2017). Information Technology for Management:Transforming Organizations in the Digital Economy, Seventh Edition. Wiley.
2. D.P.Goyal (2014). Management Information Systems-Managerial Perspectives, Third Edition, Macmillan, New Delhi.
3. S.A.Kelkar (2019). Management Information Systems-A concise Study, Second Edition, PHI Learning, New Delhi. (eBook)
4. Sahil Raj (2013), Management Information Systems, Pearson Education, New Delhi

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Database Management Systems

Course Code: PGDDA-103 **T-2 P-0 Credits-2**

Objective: This course will help students to understand how databases can be used to store an organization's information.

Course Outcome:

Students who have completed this course would have learned to:

CO1: To understand the different types of databases DBMS, their purposes, advantages, and relative importance of different database models.

CO2: To implement SQL for creation, modify and display data from DBMS, understand the basic concept of ER Models, design issues and key constraints, also Reduction of E-R Schema to Tables.

CO3: To impart knowledge about Oracle, its structure and PL/SQL commands, cursors, triggers procedure and functions.

CO4: To impart knowledge about the structure of relational database, normalization, functional dependencies, and their application, and learn database transaction, concurrency control and methods to manage data integrity.

Course Contents

Unit-I

Purpose, Advantages and Disadvantages of DBMS: Data Models, Schemas and Instances, DBMS Architecture and Data Independence, Types of DBMS – Hierarchical, Network, Relational, Object-Oriented and Object Relational. (06 Hours)

Unit-II

ER-Model: Basic concepts, Design Issues, Mapping Constraints, Keys, E-R Diagram, Design of an ER Database Schema, Reduction of E-R Schema to Tables. SQL: Background, Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Sub Queries, Derived Relations, Views, Modification of Database, Joined Relations, Data Definition Language, Domain Constraints, Referential Integrity. (08 Hours)

Unit-III

Oracle: Basic Architecture, Data Definition, Data Manipulation (LIKE Operator, String Commands, Numeric Function, Date Function, Translate and Decode Function), Introduction to PL/SQL (Conditional, Logic, Loops, Go to Statements, Exceptional Handling, Triggers, Procedures, Functions, Cursor, LOB's). (08 Hours)

Unit-IV

Structure of Relational Databases, Relational Algebra, Functional Dependencies, Normal forms NF1, NF2, NF3 and BCNF, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Transaction, Concurrency: ACID Properties, Transaction State, Locks, Deadlock Condition, Two-Phase Locking Protocol.(06 Hours)

Text Books

1. Silberschatz, A, Korth H and Sudarshan S (2013), Database System Concepts, 6/e, McGraw- Hill Education.
2. Elmsari R. and Navathe S. (2013), Fundamentals of Database Systems, 6/e, Pearson Education.

Reference Books

1. Koch, G. & Loney, K. (2008), Oracle 11g, The complete reference. Mc GrawHill Education.
2. Bipin C. Desai (2000), Introduction to Database Management System, Galgotia Publication.
3. Singh, Shio Kumar, Database Systems: Concepts, Design and Applications, 2/e, Pearson Education.
4. Rob. Peter (2010), Data base system concepts, 1/e, Cengage Learning India Pvt. Ltd.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Database Management Systems Lab.

Course Code: PGDDA-151 T –0 P-02 Credits: 01

Course Contents This course will be based on PGDDA-103 Database Management Systems Course and is part of it.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Data Preparation (Importing Data and Pre-Processing Data)
Course Code: PGDDA-105 T-1 P-2 Credits-3

Course Outcome:
Students who have completed this course would have learned to:

CO1: Explain a typical process for data collection and transformation methods from different sources.
CO2: Set informed and realistic utilization of meta data.
CO3: Collect raw data and construct a data set.
CO4: Sample and split your data set with considerations for imbalanced data.
CO5: Transform numerical and categorical data.

Unit-I
Data Preparation - Data import: Open Sources of data, paid data sources, uses and characteristics of open and paid data sources, knowledge development, types of data, enterprise data, consumer data. Reading and importing data from different formats, metadata – meaning and purpose.
(3T+6P Hours)

Unit-II
Organising and mapping metadata as per analysis requirement, tools for importing data from databases and data stores, storing data in datasets and data frames, data measurement, features of data.
(3T+6P Hours)

Unit-III
Data Pre-processing – Processed and unprocessed data, difference, anomalies in the unprocessed data, impact of unprocessed data on analytical operations, tools for pre-processing data, properties of processing tools (4T+8P Hours)

Unit-IV
Identification and removal of missing values, incorrect data types, techniques and functions for cleaning unprocessed data, transforming incorrect data, approaches to normalize datasets, feature scaling.
(4T+8P Hours)

Text Books

1. Pyle, Dorian Data Preparation for Data Mining, Morgan Koufmann Publishers (Latest Edition)

Reference Books

1. Robert Hoyt and Robert Muenchen (2020). Data Preparation and Exploration, Informatics Education.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Data Exploration

Course Code: PGDDA-107 **T-2 P-2 Credits-4**

Course Outcome:

Students who have completed this course would have learned to

CO1: Understand the basic principles of exploratory analysis.
CO2: Know modern extensions to data exploration, including working with "problem data".
CO3: Know the basic principles behind working with all types of data for building all types of models.
CO4: Be able to criticize constructively and determine existing issues with applied linear models in published work.
CO5: Be able to explore the advantages and disadvantages of various approaches to exploratory analysis.

Unit I

Data Exploration – meaning, importance, limitations in exploring, types of data, tools for data exploration, properties of exploration tools, selection of right tolls for data exploration for different types of data, guidelines for data exploration (7T+7P Hours)

Unit II

Data summarization, descriptive statistics - mean, median, mode, range, variance, frequency, skewness, normality of data, dimension reduction approaches – Principal Component Analysis, Linear Discriminant Analysis and Non-negative Matrix Factorization (7T+7P Hours)

Unit III

Analysing data relationship using scatter diagrams and other graphical techniques, using clustering to evaluate correlations between different data points, principles of hypothesis testing, drawing inferences from the results of data analysis. (7T+7P Hours)

Unit IV

Prescriptive actions – meaning, importance, types of prescriptive actions based on data analysis, recommendations of prescriptive actions. (7T+7P Hours)

Text Books:

1. Pimpler, Eric. Data Visualization and Exploration with R: A Practical Guide to Using R, RStudio and Tidyverse for Data Visualization Exploration and Data Science Applications (2017). Geospatial Training Services.
2. Robert Hoyt and Robert Muenchen (2020). Data Preparation and Exploration, Informatics Education

Reference Books:

1. Kumar, Suresh Mukhiya and Ahmed, Usman. Hands-On Exploratory Data Analysis with Python: Perform EDA techniques to understand, summarize, and investigate your data
2. Pyle, Dorian Data Preparation for Data Mining, Morgan Koufmann Publishers (Latest Edition)

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Decision Sciences

Course Code: PGDDA-109 **T-2 P-2 Credits-4**

Course Outcome:

Students who have completed this course would have learned to:

CO1: Greater insight into decision-making processes by use of decision models
CO2: Effective decisions making to solves real-world problems safely and efficiently thru Simulation techniques.
CO3: Possess a range of different perspectives on what counts as an 'effective' decision
CO4: Be better equipped to understand and influence the decision-making processes of other individuals and groups
CO5: understand better how people perceive and decide about risk.

Unit-I
Decision Models – Quantitative, Qualitative. Simulation, Forecasting, Prescriptive Model (Quantitative), Linear Programming, Problem Formulation and Solution, Duality,Sensitivity Analysis, Goal Programming.
(7T + 7P Hours)

Unit-II
Simulation modeling, Nature of Simulation Systems, Models and Simulation, Simulation Process Simulation of a Single Server Queuing System, Simulation of an Inventory System, Parallel /Distributed Simulation, Steps in a Simulation Study, Other types of Simulation,Forecasting Process, Forecasting Techniques, Moving Averages and Exponential Smoothing, Forecasting with Regression Methods (elementary)
(7T + 7P Hours)

Unit-III
Qualitative Modeling Concepts - Multicriteria Decision Making (MCDM), ISM (Interpretive Structural Model), IRP (Interpretive Ranking Process), AHP (Analytical Hierarchy Process), ANP (Analytical Network Process), TOPSIS (Technique for Order preference by Similarity to Ideal Solution)
(7T + 7P Hours)

Unit-IV
Supply Chain Management Decisions, Sourcing Analytics, Solving procurement, Manufacturing decisions
(7T + 7P Hours)

Text Books:

1. J. Holton Wilson and Barry Keating. **Business Forecasting, Fourth Edition,** (McGraw Hill/Irwin, 2001) **ISBN 0-07-252646-7**
2. Sharma, J.K. Operations Research, Sixth Edition (Luxmi Publications)

Reference Books:

1. Veerachamy, R. and Kumar, Ravi V. (2020). Operations Research, Wiley Publications
2. Hamdy, Taha. Operations research, Ninth Edition (Pearson Education)

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Introduction to Analytics and R - Programming

Course Code: PGDDA-111 **T-1 P-3 Credits-4**

Course Outcome:

Students who have completed this course would have learned to:

CO1: Critically thinking on import, manage and structure data files for using business analytics.
CO2: Apply analytical knowledge with the R interface and language for different fields.
CO3: Provide leadership in analytics in existing datasets into R or create new ones.
CO4: Cultivating cognitive skills acquired on existing data and performs all conventional statistical analysis tests. using R knowledge on data management.

METHODOLOGY

The methodology is predominantly by Problem Solving [using R Programming], supplemented by lecture mode and case discussion. The students have to undertake a project work in a topic of their interest and product, whereby apply the concepts studied in the course as their course evaluation submission.

Unit-I

Introducing to R - R Data Structures, Help functions in R Vectors _ Scalars Declarations recycling, Common Vector operations Using all and any Vectorised operations NA and NULL values Filtering Vectorised if-then else Vector Equality Vector Element names, data frames - Creating Data Frames Matrix-like operations in frames Merging Data Frames Applying functions to Data frames Factors and Tables factors and levels Common functions used with factors Working with tables - Other factors and table related functions - Control statements Arithmetic and Boolean operators and values Default values for arguments - Returning Boolean values functions are objects Environment and Scope issues Writing Upstairs - Recursion Replacement functions Tools for composing function code Math and Simulations in R.

(4T+12PHours)

Unit-II

MATRICES, ARRAYS AND LISTS - Creating matrices - Matrix operations, Applying Functions to Matrix Rows and Columns Adding and deleting rows and columns, Vector/Matrix Distinction, Avoiding Dimension Reduction, Higher Dimensional arrays, lists, creating lists, General list operations, accessing list components and values, applying functions to lists, recursive lists.

(4T+12P Hours)

Unit-III

STATISTICS - Descriptive Statistics (summary Measures) using R, Graphs and charts, Binomial distribution Poisson distribution, Normal distribution, Hypothesis Testing, Analysis of Variance (One way ANOVA, Two way ANOVA), Correlation, Simple and Multiple Linear Regression Analysis Logistic Regression, Time Series Analysis, Factor Analysis, Cluster Analysis - Reproductive Research using R and R-Studio (Knitr, rmarkdown, bookdown, interactive document, shiny presentation, shiny web application).

(3T+9P Hours)

Unit-IV

ADVANCED R PROGRAMMING - Interfacing R to Other Languages, Text mining, Neural Networks, Monte Carlo methods, Markov chains, classification, Market Basket Analysis.

(3T+9P Hours)

Text Books

1. Motwani, Bharti. (2019). *Data Analytics with R*, Wiley Publications.
2. Chellappen, Subhashini and Acharya, Seema (2019). *Big Data and Analytics,* 2nd Edition, Wiley Publications.

Reference Books

1. Ruiz, Diego Modejar (2020). *An Introduction to Data Analysis in R: Hands – on coding, Data Mining, Visualization and Statistics from Scratch*. Springer Publications
2. Heumann, Christian, Schomaker, Michael Shalabh (2020). *Introduction to Statistics and Data Analysis,* Springer Publication.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Inter-personal Communication (Work Effectively with Colleagues)

Course Code: PGDDA-113 **T-1 P-1 Credits-2**

Course Outcome:
Students who have completed this course would have learned to:
CO1: Effectively communicate through verbal/oral communication and improve the listening skills.
CO2: Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
CO3: Function effectively in multi-cultural and heterogeneous teams through the knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality.
CO4: Demonstrate the ability of effective persuasion and negotiation.

Objective: The course aims to provide basic concept, knowledge, and skills with regard to interpersonal communication.The course helps in exploring the inherent challenges and provides techniques to overcome hurdles in effective communication thereby expanding one's professional network and career opportunities.

Course Contents
Unit I
Introduction:Defining interpersonal communication, Foundations of Interpersonal Communication,The process of interpersonal communication, Models of interpersonal communication,Culture and Interpersonal Communication,Perception of the Self and Others.

(4T + 4P Hours)

Unit II
Interpersonal Messages & Interpersonal Relationships: Verbal & Non-verbal Messages,Conversational & Emotional Messages, Interpersonal Relationship Stages, Theories, and Communication,Interpersonal Conflict and Conflict Management,Interpersonal Power and Influence.

(4T + 4P Hours)

Unit III
Practical session on the art of self-disclosure, persuasion, negotiation, questioning and reflection, mindful listening and practicing assertiveness. (3T + 3P Hours)

Unit IV
Transactional Analysis, Interpersonal skills for the virtual world, Contemporary case studies.

(3T + 3P Hours)

Text Books:

1) DeVito, Joseph A. *The Interpersonal Communication Book,* 15th Edition, Pearson, 2018.
2) Hargie, O., *Skilled interpersonal communication: Research Theory and Practice* , 6th Edition, Routledge, 2016

References:

1) Wood, Julia T., *Interpersonal Communication: Everyday Encounters,* Cengage Learning, 9th Edition, 2018
2) Solomon, D., and Theiss, J., *Interpersonal communication: Putting Theory Into Practice*, Routledge, 2013
3) Berko, R., Aitken, Joan E., and Wolvin , A., *ICOMM : Interpersonal Concepts and Competencies : Foundations of Interpersonal Communication*, Rowman & Littlefield Publishers, 2010
4) Hartley, P., *Interpersonal communication*, 2nd Edition, Routledge, 2002.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Choice based Online Open Course
(MOOCs/NPTEL/ similar course)

Course Code: PGDDA-115 **T-2 P-0 Credits-2**

Objective- The purpose of the course is to give a flexibility to the student to adopt self-learning in a selected course of from any domain considered important for the program being pursued by the candidate. The details of the chosen course should be informed by the student well in time in the beginning of the semester to the concerned Dean/Coordinator of the Program. The selected course should have the similar structure and weightage. The decision of the Dean/Coordinator shall be final in this respect.

The student has to undertake the course from online digital resources and submit the successful completion certificate to the University to take the benefit of credits earned for completion of the program.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Project - I

Course Code: PGDDA-117 **T/P-6 Credits-6**

Objective- The objective of this minor project is to enable the students to apply the knowledge acquired during the semester through various courses, to be applied and prepared in the form of a project.

The suggested structure of the project is as under:

1. Descriptive title of the study
2. Nature of the study
    - Problem to be examined
    - Significance and need for the study
    - Background information available
    - Scope of the study – extent and limitations
    - To whom will it be useful?
3. Hypothesis, if any, to be tested
4. Data Sources and Collection procedure
5. Methodology for data analysis
6. Schedule – target dates for completing
    - Review of Literature (Library/Internet research)
    - Primary research
    - Data analysis
    - Findings and conclusions
    - Future scope
7. Bibliography

SECOND SEMESTER

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Advanced Business Analytics and Predictive Learning

Course Code: PGDDA-102 **T-2 P-2 Credits-4**

Objective

The students will be able to:

- Understand the process of formulating business objectives, data selection/collection, preparation, and process to successfully design, build, evaluate and implement predictive models for a various business application.
- Compare the underlying predictive modeling techniques.
- Select appropriate predictive modeling approaches to identify cases to progress with.
- Apply predictive modeling approaches using a suitable package such as SPSS Modeler

Course Outcome:

Students who have completed this course would have learned to:

CO1: Understand the process of formulating business objectives, data selection, and process to successfully design, build, evaluate and implement predictive models.
CO2: Compare the underlying predictive modelling techniques.
CO3: Select appropriate predictive modelling approaches to identify cases to progress with.
CO4: Apply predictive modelling approaches using a suitable packages.

Unit-I

Introduction to Data Mining Introduction, what is Data Mining? Concepts of Data mining Technologies Used, Data Mining Process, KDD Process Model, CRISP – DM, Mining on various kinds of data, Applications of Data Mining, Challenges of Data Mining (7T + 7P Hours)

Unit-II

Data Understanding and Preparation Introduction, Reading data from various sources, Data visualization, Distributions and summary statistics, Relationships among variables, Extent of Missing Data. Segmentation, Outlier detection, Automated Data Preparation, Combining data files, Aggregate Data, Duplicate Removal, Sampling DATA, Data Caching, Partitioning data, Missing Values.

(7T + 7P Hours)

Unit-III

Model development & techniques, Data Partitioning, Model selection, Model Development Techniques, Neural networks, Decision trees, Linear Regression, Cox Regression, Logistic regression, Discriminant analysis, Support vector machine, Bayesian Networks, Association rules.

(7T + 7P Hours)

Unit-IV

Model Evaluation and Deployment Introduction, Model Validation, Rule Induction Using CHAID, Automating Models for Categorical and Continuous targets, Comparing and Combining Models, Evaluation Charts for Model Comparison, Meta Level Modeling, Deploying Model, Assessing Model Performance, Updating a Model. (7T + 7P Hours)

Text Books:

1. Bari, A., Chaouchi, M., Jung, T. *Analytics for Dummies,* 2nd Edition, 2016.
2. Siegel, Eric, *Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die,* Wiley, 2016

References:

1. Theobald, Oliver,*Data Analytics for Absolute Beginners* Cengage Learning, 2ndEdition, 2019
2. Albright, Christian S., and Winston, Wayne, L., *Business Analytics: Data Analysis & Decision Making*, Cengage Learning, 6th Edition.

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, NEW DELHI
POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Data Modelling with PYTHON

Course Code: PGDDA-104 **T-1 P-3 Credits-4**

Objective

- To enable the students to know about the information needs of Management
- To introduce the concepts of data analysis methods
- To have hands-on training of Statistical Data Analysis through Python Programming

Course Outcome:

Students who have completed this course would have learned to:

CO1: Understand Python as a useful scripting language for data analysis.
CO2: To have hands-on training of Statistical Data Analysis through Python Programming
CO3: To Design and implement object-oriented applications.
CO4: To develop the ability to write data mining applications using Python

METHODOLOGY

The methodology is predominantly by Problem Solving [using Python Programming], supplemented by lecture mode and case discussion. The students have to undertake a project work in a topic of their interest and product, whereby apply the concepts studied in the course as their course evaluation submission.

Unit-I

Introducing to Python Installing Python and Anaconda Introduction to Jupyter(I-Python) notebook - Environment setup Datatypes Variables and Types Installing libraries Strings Lists Tuples Dictionaries List Comprehensions Dictionary Comprehensions Regular Expressions, Control Flow (if-then statements, looping) Organizing code (functions, modules, packages) _ Reading and writing data from local files (.txt,.csv,.xls,.json, etc) Scraping tables from webpages (.html) read table method Introduction to Numpy and 2D plotting Understanding the N-dimensional data structure Creating arrays Indexing arrays by slicing or more generally with indices or masks Basic operations and manipulations on N-dimensional arrays

(4T + 12P Hours)

Unit-II

Plotting with matplotlib (scatter plots, line plots, box plots, bar charts and histograms) Working with Pandas data structures: Series and Data Frames, Accessing your data: indexing, slicing, fancy indexing, Boolean indexing, Data wrangling, including dealing with dates and times and missing data, Adding, dropping, selecting, creating, and combining rows and columns, Pandas powerful group by method, Reshaping, pivoting, and transforming your data Simple and rolling statistics

(4T + 12P Hours)

Unit-III

Introduction to Machine Learning, & AI ML Concepts, Learning algorithms, Supervised learning Linear Regression, Logistic Regression, Decision Trees, Ensemble Learning, KNN, Bayesian Techniques, Support Vector Machines, Time Series Analysis, Neural Networks, Unsupervised learning, Cluster analysis

(3T + 9P Hours)

Unit-IV

Introduction to Text Mining Text Processing using Base Python and Pandas, Regular expressions Text Processing with specialized modules like NLTK, sklearn, etc., Sentiment Analysis, Word cloud analysis, Segmentation using K-Means/Hierarchical Clustering, Classification (Span/Not spam), Basics of deep learning and neural networks Optimizing a neural network with backward propagation Building deep learning models with keras, Fine-tuning keras models, Introduction toTensorFlow, Convolutional Neural Networks(CNN), Recurrent Neural Networks(RNN) _ Unsupervised Learning - Autoencoders

(3T + 9P Hours)

Text Books:

1. Miller, Thomas, W.*Modelling Techniques in Predictive Analytics with Python and R: A Guide to Data Science,* Pearson, 2014.
2. McKinney, William, *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython,* 2nd Edition, O'Reilly, 2017

References:

1. Downey, Allen and Elkner,*Jeffrey and Meyers, Chris Learning with Python,* Dreamtech Press, 2015.
2. Nageswara, Rao R. (2018). *Core Python Programming,* 2nd Edition, Dreamtech Publications.

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Risk Assessment and Mitigation

Course Code: PGDDA-106 **T-2 P-1 Credits-3**

Course Outcome:

Students who have completed this course would have learned to:

CO1: Demonstrate knowledge of the range of business and data related risks faced by organisations.
CO2: Understand the algorithm approach to risk management through risk identification, risk measurement and risk management (or mitigation)
CO3: Understand modelling risk mitigation measures.
CO4: Understand operational risk and how to counter measures to manage it.

Unit – I
Describe the various factors that contribute to algorithmic risk such as flawed data or assumptions, coding errors, insufficient sample sizes, Comprehend the impact that risk factors might have on the outcome of the algorithmic model

(7T +3P Hours)

Unit – II
Compute deviation from expected outcomes of model by testing it with multiple inputs; Apply different techniques to estimate the risks involved when the model deviates from expected outcomes

(7T +3P Hours)

Unit – III
Categorize the various mitigation measures that can be introduced to counter each type of model risk, select suitable checks and mitigation measures to counter the risk

(7T + 4P Hours)

Unit – IV
Translate mitigation measures into a structured corrective action that can be communicated to the rest of the organization

(7T + 4P Hours)

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POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Business Performance Modelling

Course Code: PGDDA-108 **T-2 P-2 Credits-4**

Course Outcome:

Students who have completed this course would have learned to:

CO1: To understand Performance metrics for algorithms on different business outcomes
CO2: To model performance computation as per specified business outcome and mapping it.
CO3: Understand Different Optimization algorithms and analysis.
CO4: Working on BPM uses cases.

Unit-I
Performance metrics for algorithms on different business outcomes, categorization of performance metrices

(7T +7P Hours)

Unit-II
Model performance computation as per specified business outcome; Hyperparameters description for maximizing model performance; techniques for identifying hyperparameters – grid search grid search, random search, Bayesian optimization

(7T +7P Hours)

Unit-III
Optimization algorithms – meaning, features, purpose, types - minibatch gradient descent, RMSprop, Adam

(7T +7P Hours)

Unit-IV
Hyperparameter tuning – meaning, concepts behind hyperparameter tuning and their application, batch normalization

(7T +7P Hours)

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POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Creating Visualisations (using Visualisation Tools)

Course Code: PGDDA-110 **T-1 P-2 Credits-3**

Course Outcome:

Students who have completed this course would have learned to:

CO1: Understand the importance of data visualization and the design and use of many visual components.
CO2: Learn to wisely use various visualization structures such as tables, spatial data, time-varying data, tree and network, etc.
CO3: Learn the basics of colours, views, and other popular and important visualization-based issues.
CO4: Learn basic algorithms in data visualization.

Unit - I

Visualisation – meaning, importance, results analysis, categorization of different business outcomes, contribution of result analysis to meeting business outcomes

(3T + 6P Hours)

Unit - II

Identification of target audience for reporting the results of a data analysis, Identifying the right delivery mode and format to report the results of a data analysis

(3T + 6P Hours)

Unit - III

Comprehending and identifying the need for change in content of a report as per target audience requirement, Summarizing the results into a clear narrative

(4T + 8P Hours)

Unit - IV

Identify the different visualizations that can be used to support the reporting of analysis results, distinguish between the pros and cons of using a specific visualization to represent certain types of data, Select the right tool to create the visualizations, Comprehend the importance of version control and uploading the report in a knowledge base

(4T + 8P Hours)

Text Books

1. Nussbaumer, Knaflic, Cole (2015). *Storytelling with Data: A Data Visualization,* Wiley Publication
2. Healy, Kieran (2019). *Data Visualization – A Practical Introduction,* Princeton University Press

Reference Books

1. Jones, Ben (2014). *Communicating Data with Tableau: Designing, Developing and Delivering Data,* O'Reilly Publications.
2. Wilke, Claus O. (2019). *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures,* O'Reilly Publications.

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POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Choice based Online Open Course
(MOOCs/NPTEL/ similar course)

Course Code: PGDDA-112 **T-2 P-0 Credits-2**

Objective- The purpose of the course is to give a flexibility to the student to adopt self-learning in a selected course of from any domain considered important for the program being pursued by the candidate. The details of the chosen course should be informed by the student well in time in the beginning of the semester to the concerned Dean/Coordinator of the Program. The selected course should have the similar structure and weightage. The decision of the Dean/Coordinator shall be final in this respect.

The student has to undertake the course from online digital resources and submit the successful completion certificate to the University to take the benefit of credits earned for completion of the program.

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POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)

Managing Client Communication

Course Code: PGDDA-114 **T-2 P-0 Credits-2**

Course Outcome:

Students who have completed this course would have learned to:

CO1: Demonstrate competence in verbal business communication.
CO2: Demonstrate competence in the fundamentals of business writing.
CO3: Demonstrate confidence in dealing with client.
CO4: Demonstrate the ability to negotiate with clients confidently and effectively.

Unit I:

Writing process- Understanding three steps- planning, writing and completing business messages. Writing routine, positive, negative, and persuasive messages. Exercises- on writing effective letters, emails, blogs, reports.

(7 Hours)

Unit II:

Business Presentations- Developing Presentations, Enhancing Presentations. Understanding how to deliver presentations. Practical sessions on how to deliver presentations keeping in mind, body language and other relevant nonverbal communication methods.

(7 Hours)

Unit III:

Employment Messages and preparing for an interview- Writing resumes and application letters.

(7 Hours)

Unit IV:

Practical sessions on mock interviews and group discussions

(7 Hours)

Textbooks:

1. Courtland L. Bovée et. al. (2017) Business Communication Today
2. Lesikar R et.al. (2017) Business Communication: Making Connections in a Digital World

Reference books:

1. Murphy H et.al. (2017) Effective Business Communication
2. Verma S (2014) Business Communication: Essential Strategies for 21st Century Managers

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POST-GRADUATE DIPLOMA IN DATA ANALYTICS (PGDDA)
Project - II

Course Code: PGDDA-116 **T/P-8 Credits-8**

Objective- The objective of this minor project is to enable the students to apply the knowledge acquired during the programme of study through various courses, to be applied and prepared in the form of a project.

The suggested structure of the project is as under:

2. Descriptive title of the study
2. Nature of the study
    - Problem to be examined
    - Significance and need for the study
    - Background information available
    - Scope of the study – extent and limitations
    - To whom will it be useful?
5. Hypothesis, if any, to be tested
6. Data Sources and Collection procedure
5. Methodology for data analysis
7. Schedule – target dates for completing
    - Review of Literature (Library/Internet research)
    - Primary research
    - Data analysis
    - Findings and conclusions
    - Future scope
7. Bibliography