Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

COURSE PLAN & COURSE DATA SHEET

PROGRAM: Btech	DEGREE: UG
COURSE: Business Intelligence & Analytics	SEMESTER: VI CREDITS: 3
COURSE CODE: CS-316 REGULATION: NA	COURSE TYPE: CORE
COURSE AREA/DOMAIN: IT	CONTACT HOURS: 3+1 (Tutorial) hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): NA	LAB COURSE NAME (IF ANY): NA

PROGRAM EDUCATIONAL OBJECTIVES:

- Graduates will possess strong data analysis skills, enabling them to extract actionable insights from complex datasets.

- Graduates will be proficient in using a variety of Business Intelligence tools and platforms for data visualization and reporting.

- Graduates will communicate data-driven insights effectively to both technical and non-technical stakeholders.

- Graduates will apply data analysis to support strategic decision-making processes in organizations.

- Graduates will understand and apply ethical considerations in data collection, analysis, and reporting.

- Graduates will be skilled in integrating data from various sources for comprehensive analysis.

- Graduates will possess a deep understanding of business concepts and how data analytics contributes to business success.

- Graduates will have the ability to apply data analytics to solve complex business problems.

- Graduates will engage in lifelong learning to stay updated with evolving BI and analytics technologies.

- Leadership and Teamwork: Graduates will demonstrate leadership skills and work effectively as part of multidisciplinary teams.

- Graduates will have the mindset and skills to identify business opportunities through data analytics.

- Graduates will appreciate the global impact of BI and analytics and consider cultural and international factors in their work.

SYLLABUS:

UNIT	DETAILS	HOURS
I	**INTRODUCTION TO BUSINESS INTELLIGENCE:** BI concept, BI architecture, BI in today's perspective, BI Process, Applications of BI like Financial analysis, statistical analysis, sales analysis, CRM, result pattern and ranking analysis, Balanced Scorecard, BI in Decision Modelling: Optimization, Decision making under uncertainty. Ethics and business intelligence.	7
II	**BUSINESS INTELLIGENCE COUNTERPARTS:** Data Warehousing, Data Marts and Analytical Data, Organization of the Data Warehouse, Enterprise Resource Planning, Distributing the Enterprise, First ERP, Customer Decisions, Decisions About Customers,	6

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

	Business Intelligence and Financial Information.	
III	**ON-LINE ANALYTICAL PROCESSING (OLAP):** What Is OLAP?, OLAP and OLTP, Operational Data Stores, Variations in Data and Approach, OLAP Applications and Functionality, Multi-Dimensions, Thinking in More Than Two Dimensions, What Are the Possibilities? Drilling and Pivoting, OLAP Architecture, Cubism, Tools, ROLAP, MOLAP, HOLAP, Data Mining, What Is in the Mine?	5
IV	**DATA SCIENCES FUTURE OF BUSINESS INTELLIGENCE:** Emerging Technologies, Machine Learning, Predicting the Future with the help of Data Analysis, BI Search & Text Analytics, Data Mining and Knowledge Discovery in Databases. Methodological and practical aspects of knowledge discovery algorithms including, Data Preprocessing, Supervised and Unsupervised Machine Learning algorithms such as K Means, k-Nearest Neighborhood algorithm, Decision Trees, Support Vector Machine, Artificial Neural Networks, and Deep Learning.	8
V	**DATA VISUALIZATION AND DASHBOARD DESIGN:** Responsibilities of BI analysts by focusing on creating data visualizations and dashboards. Importance of data visualization, basic and composite charts such as scatter plots, line graphs, pie charts, bar charts, heat maps, area charts, bubble chart, density curve and histograms.	7
	TOTAL HOURS	33

Teacher Centric Approach

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

TC1: Chalk and Talk, Blended learning	TC2: PPT,	TC3: Video Lectures	TC4:

Learner Centric Approach:

LC1: Assignment. LC2: Mini project. LC3: Quiz/Class test. LC 4: Seminar on recent trends.

LC5: Group Task. LC6: Others

DETAILED SESSION PLAN

Lecture session/ Number	Topics to be covered	CO addressed	Teacher Centric Approach	Learner Centric Approach	References	Relevance with POs and PSOs
1	INTRODUCTION TO BUSINESS INTELLIGENCE: BI concept, BI architecture	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2
2	BI in today's perspective, BI Process	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
3	Applications of BI like Financial analysis, statistical analysis, sales analysis, CRM	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
4	result pattern and ranking analysis	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2
5	Balanced Scorecard, BI in Decision Modelling	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
6	Optimization, Decision making under uncertainty	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
7	Ethics and business intelligence	1	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

8	BUSINESS INTELLIGENCE COUNTERPARTS: Data Warehousing, Data Marts and Analytical Data, Organization of the Data Warehouse	2	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
9	Enterprise Resource Planning, Distributing the Enterprise, First ERP, then Business Intelligence	2	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
10	The Current State of Affairs, Customer Relationship Management	2	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2
11	CRM, ERP	2	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
12	Business Intelligence, Customer Decisions	2	TC1, TC2	LC3	T1/T2/R1	2
13	Decisions About Customers, Business Intelligence and Financial Information	2	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
14	ON-LINE ANALYTICAL PROCESSING (OLAP): What Is OLAP?, OLAP and OLTP	3	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	3
15	Operational Data Stores, Variations in Data and Approach, OLAP Applications and Functionality	3	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

16	Multi-Dimensions, Thinking in More Than Two Dimensions, What Are the Possibilities?	3	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2
17	Drilling and Pivoting, OLAP Architecture, Cubism, Tools	3	TC1, TC2	LC3	R1/R2/R3	2
18	ROLAP, MOLAP, HOLAP, Data Mining, What Is in the Mine?	3	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3
19	DATA SCIENCES FUTURE OF BUSINESS INTELLIGENCE: Emerging Technologies, Machine Learning,	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2
20	the Future with the help of Data Analysis, BI Search & Text Analytics	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3
21	Data Mining and Knowledge Discovery in Databases	4	TC1, TC2	LC1,LC2,LC3,LC4	R1/R2/R3	2
22	Methodological and practical aspects of knowledge discovery algorithms including, Data Preprocessing	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

23	Supervised and Unsupervised Machine Learning algorithms such as K Means, k-Nearest Neighborhood algorithm	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2
24	Trees, Support Vector Machine	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3
25	Artificial Neural Networks	4	TC1, TC2	LC3	R1/R2/R3	2
26	Deep Learning	4	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2
27	DATA VISUALIZATION AND DASHBOARD DESIGN	5	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3
28	Responsibilities of BI analysts by focusing on creating data visualizations and dashboards	5	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	3
29	Responsibilities of BI analysts by focusing on creating dashboards	5	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2
30	Importance of data visualization	5	TC1, TC2	LC1,LC2,LC3,LC4	R1/R2/R3	3
31	basic and composite charts such as scatter plots, line graphs	5	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2
32	basic and composite charts such as pie charts, bar charts, heat maps, area charts	5	TC1, TC2	LC1,LC2,LC3	R1/R2/R3	2

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

33	basic and composite charts such as bubble chart, density curve and histograms	5	TC1, TC2	LC1,LC2,LC3	T1/T2/R1	2
34	Quiz		TC1, TC2	LC3	T1/T2/R1	3

TEXT/REFERENCE BOOKS:

T/R	
1	Data Strategy: How To Profit From A World Of Big Data, Analytics And The Internet Of Things" by Bernard Marr
2	Data Analytics For Beginners: Your Ultimate Guide To Learn And Master Data Analysis. Get Your Business Intelligence Right – Accelerate Growth And Close More Sales" by Victor Finch.
3	Performance Dashboards – Measuring, Monitoring, And Managing Your Business" by Wayne Eckerson
4	Data Science For Business: What You Need To Know About Data Mining And Data-Analytic Thinking" by Foster Provost & Tom Fawcett

 # WEB SOURCE REFERENCES (W):

1	https://www.javatpoint.com/software-engineering-tutorial
2	https://www.tutorialspoint.com/software_engineering/index.htm
3	W3schools.com

COURSE PRE-REQUISITES: Data Structure, Electronics and Mechanics Concepts

C.CODE	COURSE NAME	DESCRIPTION	SEM
MCA-128	Artificial Intelligence & Robotics	This course explores AI fundamentals, machine learning, robotics development, and ethical considerations, preparing students for cutting-edge technology applications.	II

COURSE OBJECTIVES:

1	To introduce foundational knowledge about robotics and application of robotics
2	To make the students familiar with concepts of Artificial Intelligence and reasoning.
3	To discuss the implementation of robots
4	To provide students with a solid foundation in the core principles, algorithms, and techniques of artificial intelligence, including machine learning, natural language processing, and computer vision.
5	To equip students with the practical skills necessary for designing, building, and programming robotic systems.

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

COURSE OUTCOMES:

S.NO	DESCRIPTION	PO(1..12) MAPPING	PSO(1..3) MAPPING
CO1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems. Solve basic AI based problems	PO1, PO2, PO5, PO9	PSO1
CO2	Define the concept of Artificial Intelligence and Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	PO3, PO4, PO5, PO6	PSO3
CO3	Understand the basic concepts of working of robot.	PO3, PO4, PO5, PO6	PSO3
CO4	Understand the various robot programming languages.	PO10, PO11	PSO2, PSO3
CO5	Use and apply techniques for robot programming.	PO1, PO2, PO5, PO9	PSO1
COURSE OVERALL PO/PSO MAPPING: 2/2			

COURSE OUTCOMES VS POs MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1**):**

S.NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1								2		2		
CO2	1	1	1								1		1	2	
CO3	2	1									1			1	1
CO4	1	1									1		1		1
CO5	1	1									1				1
CO1	1	1	1								2		2		

* For Entire Course, PO & PSO Mapping

POs & PSO REFERENCE:

PO 1	Apply the knowledge of mathematics, science, engineering and Application fundamentals, and an engineering and Application specialization to the solution of complex engineering problems.	PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PSO1	To equip the students with theoretical and implementation knowledgebase in all the latest areas of Computer Science & Engineering for a successful career in software industries, pursuing higher studies, or entrepreneurial establishments.
PO 2	Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering	PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	PSO2	To nurture the students with the critical thinking abilities for better decision making by offering them a socially acceptable solutions to real life problems through computing paradigm.

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

	sciences.				
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PSO3	To nurture the students with the comprehensive analytical and design abilities by offering them techno-commercially feasible solutions of real business problems through computing.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.		
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.		
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.		

COs VS POs MAPPING JUSTIFICATION:

S.NO	PO/PSO MAPPED	LEVEL OF MAPPING	JUSTIFICATION
CO1	2/1	1	It ensures students establish a foundational understanding of business intelligence and analytics concepts, preparing them for further skill development and learning.
CO2	3/3	2	It ensures graduates possess advanced analytical and strategic skills, allowing them to lead data-driven initiatives, innovate, and drive organizational success effectively.
CO3	3/3	2	It ensures graduates possess advanced analytical and strategic skills, enabling them to lead and innovate in the dynamic field of Business Intelligence & Analytics.
CO4	2/3	1	It ensures students establish a solid foundation in business intelligence and analytics, providing essential knowledge and skills for further learning and

Head Office: P-2, Kh. No. 30, Saiduljaab, Near Saket Metro Station, M.B. Road, New Delhi-110030 | Ph.: 011-40719000
Admmn. Office Vijaywada: 1st Floor, Sai Odyssey, Opp. Executive Club, Gurunanak Nagar Road, NH-5, Vijaywada-520008

www.lingayasgroup.org   *"Par Excellence With Human Touch"*

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

			growth.
CO5	2/1	2	It signifies that graduates possess advanced analytical skills, strategic thinking, and industry-relevant knowledge to excel in complex business intelligence and analytics roles.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS, POs & PSOs:

SNO	DESCRIPTION	PROPOSED ACTIONS
1	Lack of Real-time Data Analysis: The syllabus may not emphasize real-time data analysis, a crucial aspect in today's fast-paced business environment.	Introduce coursework or projects that involve the analysis of streaming data and real-time dashboards.
2	Limited Exposure to Big Data Technologies: The course content may not cover big data technologies like Hadoop, Spark, or NoSQL databases.	Include modules on big data technologies and distributed computing to prepare students for handling large-scale data.
3	Insufficient Data Governance Emphasis: Data governance, data quality, and data ethics may not receive enough attention.	Integrate data governance principles, ethics, and data quality practices into the curriculum to ensure responsible data management.
4	Lack of Practical BI Tool Training: The syllabus might not include hands-on training with industry-standard BI tools like Tableau or Power BI.	Incorporate practical

		sessions where students learn to use BI tools for data visualization and reporting.
5	Industry Projects and Internships: Limited exposure to industry projects and internships may hinder practical experience.	Establish partnerships with industry organizations to offer students opportunities for internships and real-world projects.

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Predictive Analytics and Machine Learning in BI
2	Natural Language Processing (NLP) for Text Analytics
3	Deep Learning for Image and Video Analytics
4	Big Data Analytics with NoSQL Databases
5	Advanced Data Visualization Techniques
6	Blockchain and Data Security
7	Industry-Specific Analytics

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☐ CHALK & TALK	☐ STUD. ASSIGNMENT	☐ WEB RESOURCES	☐ NPTEL/OTHERS
☐ LCD/SMART BOARDS	☐ STUD. SEMINARS	☐ ADD-ON COURSES	☐ WEBNIARS

ASSESSMENT METHODOLOGIES-DIRECT

☐ ASSIGNMENTS	☐ STUD. SEMINARS	☐ TESTS/MODEL EXAMS	☐ UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☐ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☐ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India
NAAC ACCREDITED
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE
Nachauli, Jasana Road, Faridabad- 121002 (Haryana)
Website: www.lingayasvidyapeeth.edu.in | Ph: 0129-2598200-05

INNOVATIONS IN TEACHING/LEARNING/EVALUATION PROCESSES:

1. Incorporate gamified elements into data analysis assignments and projects, where students use analytics skills to solve interactive challenges. Enhances engagement, problem-solving skills, and competitiveness among students.

2. Provide access to virtual labs that simulate real-world BI scenarios, allowing students to practice data analysis and reporting in a controlled environment. Facilitates hands-on learning without the need for physical labs, fostering practical skills.

3. Organize collaborative data challenges where students work in teams to analyze and present insights from complex datasets. Promotes teamwork, communication, and creative problem-solving in data analysis.

4. Implement AI-driven learning platforms that adapt content and assignments based on individual student progress and needs. Tailors learning experiences, ensures mastery of concepts, and provides immediate feedback.

5. Host data analytics hackathons or competitions where students compete to solve real-world business problems using BI and analytics tools. Encourages innovation, real-time problem-solving, and showcases practical skills to potential employers.

Prepared by   **Approved by**
Dr. Tapsi Nagpal   **A.Dean &HOD**

Additionally, the details to be compiled separately by the Departmental Coordinator for the entire Department.