4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

COURSE STRUCTURE

SEMESTER I

Code	Course Name	L-T-P-Credits
BO CDA 101	**Mathematics - I**	3-1-0-4
BO CDA 103	**Foundations of Computer Science**	3-1-2-5
BO CDA 105	**Foundations of Data Analytics**	3-1-2-5
BO CDA 107	**Foundations of English for Professionals**	3-2-0-5
	Total Credits	19

SEMESTER II

Code	Course Name	L-T-P-Credits
BO CDA 102	**Mathematics - II**	3-1-0-4
BO CDA 104	**Programming and Data Structures with Python**	3-1-2-5
BO CDA 106	**Numerical Methods for Data Science**	3-1-2-5
BO CDA 108	**Capstone Project - I**	0-0-12-6
	Total Credits	20

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

SEMESTER III

Code	Course Name	L-T-P-Credits
BO CDA 201	**Statistics for Data Science**	3-1-2-5
BO CDA 203	**Design of Algorithms**	3-1-2-5
BO CDA 205	**Machine Learning Techniques**	3-1-2-5
BO CDA 207	**Financial Economics**	3-1-0-4
	Total Credits	19

SEMESTER IV

Code	Course Name	L-T-P-Credits
BO CDA 202	**Database Management**	3-1-2-5
BO CDA 204	**Computer Organization**	3-1-2-5
BO CDA 206	**Advanced Machine Learning Techniques**	3-1-2-5
BO CDA 208	**Web Development and App Design**	3-1-2-5
	Total Credits	20

Mandatory **BO CDA 210: Summer Industry Project (12 credits)**: To work on a project relevant to Industry/contemporary problems of Industrial significance for award of Diploma and/or entering to the third year for the degree module.

This project aims to enable a candidate to identify a fundamental problem of valuable practical significance for the industry and work towards its viable solution. Students will work on a specified project, in online/offline mode, under a mentor from academia and/or industry for a period expending up to three months after completion of the fourth semester. There will be a project evaluation committee which will examine the students after completion of his/her project for awarding grades. The instruments of assessment will be the final project report and a presentation.

Students are encouraged to explore and identify suitable industries/institutions for the project, and the IIT Patna placement cell would like to guide and facilitate their efforts. The project abstract defining aim, methodology, and deliverable has to be submitted to IIT Patna with due approval of the *project evaluation committee* for further monitoring on the progress of the work.

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

SEMESTER V

Code	Course Name	L-T-P-Credits
BO CDA 301	**Computer and Network Security**	3-1-2-5
BO CDA 303	**Operating Systems**	3-1-2-5
BO CDA 305	**Artificial Intelligence Techniques**	3-1-2-5
BO CDA 307	**Industrial and Organizational Psychology**	3-0-0-3
BO CDA 3xx	**Elective I**	3-0-0-3
	Total Credits	21

SEMESTER VI

Code	Course Name	L-T-P-Credits
BO CDA 302	**Big Data Analytics**	3-1-2-5
BO CDA 304	**Capstone Project II**	0-0-16-8
BO CDA 3xx	**Elective II**	3-0-0-3
BO CDA 3xx	**Elective III**	3-0-0-3
	Total Credits	19

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

SEMESTER VII

Code	**Course Name**	**L-T-P-C**
BO CDA 401	Ethics and Technology	3-0-0-3
BO CDA 4xx	Elective - IV	3-0-0-3
BO CDA 4xx	Elective - V	3-0-0-3
BO CDA 403	Project - I	0-0-12-6
BO CDA 405	Indian Knowledge System (IKS)	3-0-0-3
	Total Credits	**18**

SEMESTER VIII

Code	**Course Name**	**L-T-P-C**
BO CDA 4xx	Elective - VI	3-0-0-3
BO CDA 4xx	Elective - VII	3-0-0-3
BO CDA 4xx	Elective - VIII	3-0-0-3
BO CDA 404	Project - II	0-0-16-8
	Total Credits	**17**

Total Minimum Credits =153 + 12* = 165

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

ELECTIVE - I

Code	**Course Name**	**L-T-P-C**
BO CDA 309	Data Mining	3-0-0-3
BO CDA 311	Cloud Computing	3-0-0-3
BO CDA 313	High Performance Computing	3-0-0-3

ELECTIVE - II

Code	**Course Name**	**L-T-P-C**
BO CDA 306	Image and Video Analytics	3-0-0-3
BO CDA 308	Big Data Security	3-0-0-3
BO CDA 310	Introduction to Deep Learning	3-0-0-3

ELECTIVE - III

Code	**Course Name**	**L-T-P-C**
BO CDA 312	Social Network Analysis	3-0-0-3
BO CDA 314	Machine Learning and Security	3-0-0-3
BO CDA 316	Natural Language Processing	3-0-0-3

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

ELECTIVE - IV

Code	**Course Name**	**L-T-P-C**
BO CDA 407	Statistical Modeling and Inference	3-0-0-3
BO CDA 409	Time Series Analysis and Forecasting	3-0-0-3
BO CDA 411	Computer Vision	3-0-0-3
BO CDA 413	Pattern Recognition	3-0-0-3
BO CDA 415	Principles of Programming Languages	3-0-0-3
BO CDA 417	Social Networks	3-0-0-3
BO CDA 419	Multimedia System	3-0-0-3
BO CDA 421	Program Analysis and Verification	3-0-0-3

ELECTIVE – V

Code	**Course Name**	**L-T-P-C**
BO CDA 423	Data Visualization and Communication	3-0-0-3
BO CDA 425	Data Engineering and Pipeline Design	3-0-0-3
BO CDA 427	Reinforcement Learning	3-0-0-3
BO CDA 429	Graph Machine Learning	3-0-0-3
BO CDA 431	Bioinformatics	3-0-0-3
BO CDA 433	Computational Data Analysis	3-0-0-3
BO CDA 435	Blockchain Technology	3-0-0-3
BO CDA 437	Graph Theory	3-0-0-3

4 Years B.S Programme in

Computer Science and Data Analytics (CSDA)

ELECTIVE – VI

Code	**Course Name**	**L-T-P-C**
BO CDA 406	Software Engineering and DevOps Practices	3-0-0-3
BO CDA 408	Information Security Principles	3-0-0-3
BO CDA 410	Game Theory	3-0-0-3
BO CDA 412	Multivariate Analysis	3-0-0-3
BO CDA 414	Statistical Machine Learning	3-0-0-3
BO CDA 416	Combinatorial Optimization	3-0-0-3

ELECTIVE – VII

Code	**Course Name**	**L-T-P-C**
BO CDA 418	Generative Artificial Intelligence	3-0-0-3
BO CDA 420	Large Language Model (LLM)	3-0-0-3
BO CDA 422	Mathematical Finance	3-0-0-3
BO CDA 424	Quantum Computing	3-0-0-3
BO CDA 426	Drone Data Processing	3-0-0-3
BO CDA 428	Edge Computing	3-0-0-3
BO CDA 430	Distributed Computing	3-0-0-3
BO CDA 432	Parallel Computing	3-0-0-3

ELECTIVE – VIII

Code	**Course Name**	**L-T-P-C**
BO CDA 434	Text Mining	3-0-0-3
BO CDA 436	Cryptography	3-0-0-3
BO CDA 438	Wireless Networks	3-0-0-3