Tribhuvan University

Institute of Science and Technology

SCHOOL OF MATHEMATICAL SCIENCES

CURRICULUM STRUCTURE

Bachelor Degree in Data Science (BDS) - Program

1. Introduction

Data Science is a field that is growing significantly across all industries that advancing with time and technology. Data science program has become a fundamental discipline in most of the universities as applied research in Statistics and Computer Science. Data Science experts are needed in most government agencies. Businesses depend on big data to better serve their customers. Data Science careers are in high demand and this trend will grow exponentially.

Data Science program is a multi-disciplinary subject that includes the use of **Mathematics, Statistics, and Computer Science** and **Information Technology** to study and evaluate data. The key objective of Data Science is to extract valuable information for use in strategic decision making, product development, trend analysis, and forecasting. By considering the importance and value of data science, the School of Mathematical Sciences, Institute of Science and Technology, Tribhuvan University is planning to run a Bachelor in Data Science (BDS) program.

The BDS curriculum is designed to provide the breadth and depth of knowledge needed for a successful career in data science. It emphasizes practical proficiency in applying the relevant skills through courses in statistical modelling, data management, machine learning, data visualization, and other related areas.

2. Objectives

This is an interdisciplinary program. After graduation, the students will be able to

- Provide students with knowledge and skills in both computer science and statistical modelling for data-intensive problem solving;
- Train students for careers with software engineering and machine learning skills to design and implement efficient, data-driven solutions to real-world problems; and
- Prepare to proceed Master Level study in a wide range of Data Science, Applied Computer Science and Business.

3. Duration and Nature of Course

BDS is a full time program, of eight Semesters in four years in duration. This program basically comprises of some foundational courses consisting of fundamentals of Mathematics, Statistics, Computer Science and Technology including algorithms,

machine learning techniques , computer and statistical programming, data analysis, database systems, and web development and other data science related subjects.

Total Credit hours: 121 Cr. Hrs

Nature of Courses: Theoretical, Practical, Project, Seminar, Intern.

4. Eligibility

The candidate applying for admission to the BDS program must have completed 10+2 or equivalent examinations from any stream (Science / Management / Education / Arts) with minimum second division (securing 45% and above) or Minimum 'C' grade in all subjects of grade 11 and 12 by taking at least one Mathematics or Business Mathematics of 100 marks or 5 Credit hrs.

5. Evaluation System

All evaluation schemes will be as per the rule of TU semester system rules and regulations.

a) Internal evaluation: In each subject there will be internal evaluation of 40% of total credits (or 40% marks). Internal exams will be based on: Term Assessments, Attendance, Assignment work, Oral test, Presentation / Class seminar / Project work etc.

b) Semester end exam: In each subject there will be final exam at the end of each semester of 60% of total credits (or 60% marks). End semester exam will be conducted by Institute of Science and Technology or by School in permission of exam board of TU.

c) Evaluation of project: Research / project will be monitored by supervisor; pre viva by the school after submission; and then evaluation of project by one internal and one external examiner.

d) In each of the semester exam and internal assessment, the student must secure at least 50% marks in each subject in order to complete the course.

6. Teaching Pedagogy

The general teaching pedagogy of BDS includes class lectures, group discussions, case studies, guest lectures, research work, project work (individual and group), assignments (theoretical and practical), and term papers. The teaching faculty will determine the choice of teaching pedagogy as per the need of the course. The concerned faculty shall develop a detailed course outline and work plan at the beginning of each semester.

7. Course Structure

Semester	Papers	Credit
First	BDS 101 Communication Practice	3
	BDS 102 Calculus with Analytic Geometry I	3
	BDS 103 Programming with C	3
	BDS 104 Statistics for Data Science	3
	BDS 105 Fundamentals of Data Science	3
Total		**15**

Semester	Papers	Credit
	BDS 151 Technical Writing	2
	BDS 152 Calculus with Analytic Geometry II	3
	BDS 153 Programming with C++	3
	BDS 154 Probability	3
	BDS 155 Linear Algebra with Applications	3
	BDS 156 Data Science Seminar I	1
Total		**15**

Semester	Papers	Credit
Third	BDS 201 Multivariable Calculus	3
	BDS 202 Data Structure and Algorithm	3
	BDS 203 Inferential Statistics	3
	BDS 204 Database Management System	3
	BDS 205 Data Warehousing	3
Total		**15**

Semester	Papers	Credit
Fourth	BDS 251 Differential Equations	3
	BDS 252 Programming with Python	3
	BDS 253 Mathematical Statistics	3
	BDS 254 System Analysis and Design	3
	BDS 255 General Logic	3
	BDS 256 Data Science Seminar II	1
Total		**16**

Semester	Papers	Credit
Fifth	BDS 301 Discrete Mathematics	3
	BDS 302 Computer Graphics and Image Processing	3
	BDS 303 R- Programming	3
	BDS 304 Artificial Intelligence	3
	BDS 305 Economics	3
Total		15

Semester	Papers	Credit
Sixth	BDS 351 Mathematical Modelling	3
	BDS 352 Machine Learning	3
	BDS 353 Research Methodology	3
	BDS 354 Principles of Management	3
	BDS 355 Numerical Methods	3
Total		**15**

Semester	Papers	Credit
Seventh	BDS 401 Data Mining	3
	BDS 402 Data Visualization	3
	BDS 403 Cloud Computing	3
	BDS 404 Data Analytics Project	4
	BDS 405 Artificial Neural Network	3
	Total	**16**

Semester	Papers	Credit
Eight	BDS 451 Natural Language Processing	3
	BDS 452 Information Security	3
	BDS 453 Big Data Analytics	3
	BDS 454 Data Science Internship	4
	Elective (Any One offered by the School)	
	BDS 455 Social Network Analysis BDS 456 Information Retrieval BDS 457 Forecasting Analysis	3
	Total	16

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