Tribhuvan University

Institute of Science and Technology

SCHOOL OF MATHEMATICAL SCIENCES

Course Structure

Master's in Data Sciences (MDS)

1. Introduction

The Modern Computerized World demands the human resource having all three – analytical ability, data processing capability and fast computing efficiency, i.e., the combined knowledge of **Mathematics, Statistics, and Computer Science and Information Technology**. Tribhuvan University has taken up this as a challenge and has decided to run Bachelor's and Master's Degree Program in Mathematical Sciences that will help produce at least a critical mass of experts with sound knowledge of fundamentals of Mathematics, Statistical and Analytical capability and fluent computational skills. To run these programs, Tribhuvan University established School of Mathematical Sciences under Institute of Science and Technology in 2016 at Kirtipur as its autonomous body.

Computational simulations are everywhere and the amount of data available for many enterprises is increasing exponentially. The internet makes these large quantities of data readily available for many enterprises. Many areas of science, engineering, and industry are now concerned with building and evaluating mathematical models, exploring them computationally, and analyzing enormous amounts of observed and computed data. These activities are all inherently mathematical in nature. Thus, Master's Program in Data Science is an ideal program to start at SMS TU.

2. Objectives

This interdisciplinary program is the first of its kind in the country. After graduation, the students will be able to

- Collect, clean, store and query data from a variety of private and public data sources.
- Assess, evaluate and respond to decision-making needs and requirements.
- Apply appropriate analytic techniques to provide estimates that support decision-making and action.
- Communicate actionable information and findings in easy-to-understand written, oral and visual formats.

3. Duration and Nature of Course

Master in Data Science is full time, of 4 Semesters in 2 years in duration. This program basically comprises of some compulsory foundational courses consisting of fundamentals of Mathematics, Statistics, and Computer Science and Information Technology plus some elective courses from a list of courses which may vary from year to year as a multi-exit model decided by the subject committee.

Total Credit: 60

Nature of course: Theory, Practical, Project, Seminar, Intern, Thesis.

4. Evaluation System

a) 40% internal evaluation and 60% external exam. Internal exams are based on: Attendance/Assignment work / Oral test / Class test / Presentation / Class seminar / Project work/ Term exam etc. End semester exam by School in permission of exam board of TU.

b) Evaluation of project or thesis: research / project monitoring by supervisor; Pre viva by the school after submission; evaluation of thesis by the Research Committee of the School with consent of the supervisor and the external.

c) In each of the semester Exam and Internal Assessment, the student must secure at least 50% in order to complete the course.

5. Eligibility:

Students applying to the program are expected to have a Bachelor's Degree with a strong quantitative and computational background including coursework in calculus, linear algebra and introductory statistics. So students with B Sc CSIT, B Math Sc, B Sc. (Math), B Sc (Stat), B Sc/BA with Math / Stat in the first 2 years, BE, BIT, BCA (with two Math and one Stat).

6. Course Structure

In the **First and Second Semester,** students must take four compulsory courses in each semester and one course from elective courses (the necessary and relevant to them). In the **Third Semester**, student must take three compulsory courses and two courses from elective courses**.** In the **Fourth Semester,** students must take two compulsory courses and two courses from elective course.

FIRST SEMESTER

Compulsory Courses

Course Code	Course Titles	Credits	Nature
MDS 501	Fundamentals of Data Science	3	Th.
MDS 502	Data Structure and Algorithms	3	Th.+ Pr.
MDS 503	Statistical Computing with R	3	Th.+ Pr.
MDS 504	Mathematics for Data Science	3	Th.

Elective Courses (Any One Available on School)

Course Code	Course Titles	Credits	Nature
MDS 505	Data Base Management Systems	3	Th.+ Pr.
MDS 506	Programming Concepts and Techniques	3	Th.+ Pr.
MDS 507	Linear and Integer Programming	3	Th.+ Pr.

SECOND SEMESTER

Compulsory Courses

Course Code	Course Titles	Credits	Nature
MDS 551	Programming with Python	3	Th.+ Pr.
MDS 552	Applied Machine Learning	3	Th.+ Pr.
MDS 553	Statistical Methods for Data Science	3	Th.+ Pr.

MDS 554	Multivariable Calculus for Data Science	3	Th.

Elective Courses (Any One Available on School)

Course Code	Course Titles	Credits	Th.+ Pr.
MDS 555	Natural Language Processing	3	Th.+ Pr.
MDS 556	Artificial Intelligence	3	Th.+ Pr.
MDS 557	Learning Structure and Time Series	3	Th.+ Pr.

THIRD SEMESTER

Compulsory Courses

Course Code	Course Titles	Credits	Nature
MDS 601	Research Methodology	3	Th.
MDS 602	Advanced Data Mining	3	Th.+ Pr.
MDS 603	Techniques for Big Data	3	Th.+ Pr.

Elective Courses (Any Two Available on School)

Course Code	Course Titles	Credits	Nature
MDS 604	Cloud Computing	3	Th.+ Pr.
MDS 605	Regression Analysis	3	Th.+ Pr.
MDS 606	Decision Analysis	3	Th.+ Pr.
MDS 607	Monte Carlo Methods	3	Th.

FOURTH SEMESTER

Compulsory Courses

Course Code	Course Titles	Credits	Nature
MDS 651	Data Visualization	3	Th.
MDS 652	Capstone Project / Thesis	6	Project + Report

Elective Courses (Any Two Available on School)

Course Code	Course Titles	Credits	Nature
MDS 653	Social Network Analysis	3	Th.+ Pr.
MDS 654	Actuarial Data Analysis	3	Th.+ Pr.
MDS 655	Deep Learning	3	Th.+ Pr.
MDS 656	Business Analytics	3	Th.+ Pr.
MDS 657	Bioinformatics	3	Th.+ Pr.
MDS 658	Economic Analysis	3	Th.+ Pr.

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