ACADEMIC PROSPECTUS
2018-19

Ramakrishna Mission Vivekananda Educational and Research Institute
(Formerly known as Ramakrishna Mission Vivekananda University)
Deemed to be university under Section 3 of UGC Act, 1956
Belur Math, Howrah, West Bengal 711202, INDIA

Overview

Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI) at Belur Math signed a Memorandum of Understanding (MoU) with Tata Consultancy Services (TCS) to launch India's First **MSc degree programme in Big Data Analytics** programme designed by TCS. Swami Atmapriyananda, Vice Chancellor of RKMVERI and Ranjan Bandyopadhyay, Global Head –HR – BPO Services, TCS, signed the MoU in the presence of Prof. Bimal Roy, a renowned computer scientist, Padmashree awardee and former Director of Indian Statistical Institute, Kolkata, on 23 May 2016. The programme leverages the world-leading expertise in research at RKMVERI with our strategic partnership with TCS to offer the students a foundational MSc in the field of Data Analytics.

This programme is designed for those who want to pursue a career as data scientists, deriving valuable insights and potential business information from large volumes of data. The programme covers fundamental concepts and techniques from the areas of mathematics (statistics, operations research, etc.) and computer science (machine learning, data mining, big data algorithms, database, etc.) besides dealing with a range of enabling engineering technologies (e.g., cloud platforms, Hadoop, Spark, etc.) for large-scale data analysis. Appreciation of these concepts, techniques and technologies is enabled by the use of application oriented course design, project work, case studies in various domains such as finance, marketing, supply chain, life sciences, smart-cities among others. After the completion of the programme the students would be adequately equipped to pursue a career either in research or in industrial applications related to large scale data analysis.

Why Big Data Analytics?

The field of Big Data Analytics lies at the intersection of statistics, mathematics, computer science and engineering. In recent years, development of sophisticated *learning* algorithms coupled with the availability of massive datasets and facilitated by powerful and efficient computing infrastructures, have led to pioneering improvements in the field of analytical applications.

Corporates are making Big Data Analytics a key aspect of their business strategy at an extremely aggressive pace. Global big data market is expected to reach USD 48.3 billion by 2018. Data analytics jobs in India have grown by 100% over the last year adding tens of thousands of employment opportunities. However, the data analytics job market in India is currently in shortage of trained professionals with that set of skills, and the demand is expected to increase significantly over the following years.

Who is a Data Scientist?

A Data Scientist is a highly skilled professional, who is capable of combining state-of-the-art algorithmic techniques to process massive amounts of data with modern statistical methods for discovering hidden patterns, performing analysis and deriving insights based on interpretation of relevant information. There is an increasing need for skilled data scientists with the ability of leveraging data analytics for business growth and innovation, as well as those with the potential of developing new methods and algorithms.

Why RKMVERI?

- **Well designed, application oriented course structure developed by academic experts and industry practitioners.**
- **Faculties having prior associations with premier institutes such as ISI-Kolkata, IISc-Bengaluru, IIM-Bangalore etc.**
- **Opportunity to interact with academicians from other institutes**
- **Collaboration with TCS.**
- **Guaranteed industry internship in the 4th semester.**
- **It is student friendly, offering best course fee structure in terms of affordability.**

Course Description*

Our MSc in Big Data Analytics is a 4-semester PG degree programme. In the first three semesters the students are taught the core concepts, techniques and tools required for large-scale data analysis. The curriculum for these semesters is a mix of basic mathematics, statistics, operations research and state-of-the-art big data technologies such as, NoSQL, Hadoop, Spark, etc. Laboratory sessions and tutorials will put these elements to practice through the execution of use cases extracted from real life domains. The semester-wise courses are as follows:
(* *subject to minor changes*)

First Semester:

Core Courses:

- Linear Algebra and Linear Programming
- Probability
- Basic Statistics using R
- Data Structure and algorithm using Python
- Database management systems

Soft Skill Courses: Communicative English, Ethics and Values

Second Semester:

Core Courses:

- Advanced Statistical Methods
- Data Mining
- Foundations of Big Data Computing (BDC)
- Machine Learning
- Multivariate Statistics
- Operations Research

Third Semester:

Core Courses:

- Advanced Machine Learning and Deep Learning
- Time Series Analysis
- Enabling Technologies for BDC using Hadoop on Cloud, PIG, Hive, Spark, NoSQL etc.
- Operations Management Case studies in application domains

Soft Skill Courses:

- Value thinking

Optional Courses:

- Introduction to Econometrics and Finance
- Bioinformatics

Fourth Semester:

Internship based project

- Student may opt for internship in a company/other institute or for research dissertation under the supervision of our faculty members. In either of the cases a student has to submit a report.

Faculty Profile

- **Prof. Aditya Bagchi (Ex Dean of Studies, ISI Kolkata)**
  Area of Research : Data Management, Information Security, Social Media Data Analytics.
- **Dr. Sudeep Mallick (Fellow of IIM Bangalore)**
  Area of Research : Big Data Computing, Software Engineering and Operations Research
- **Dr. Sudipta Das (Ph.D. IISc Bengaluru)**
  Area of Research : Reliability, Stochastic Processes, Data Analytics, Real Time Systems
- **Dr. Tanmay Basu (Ph.D. ISI Kolkata)**
  Area of Research : Machine Learning, Biomedical NLP, Text Mining and Social Network Analysis
- **Swami Dhyanagamyananda (Ph.D candidate ISI Kolkata, M.E. IISc Bengaluru)**
  Area of Research : Graph Theory, Graph Coloring

Eligibility

B.Sc. (Hons.) in any of the following subjects: Mathematics, Statistics, Computer Science, Economics (with Econometrics), Physics (with Mathematics and Statistics as general subjects, preferred), with at least 60% marks in the Hons. subject.

OR

BE/BTech/AMIE/Grad IETE in Computer Science (or allied branches like Information Technology/Electronics & Communication Engineering) with first class, with an aggregate minimum of 60% marks.

Career Opportunities

MSc in Big Data Analytics at RKMVERI is a new programme with the first batch of students due to graduate in 2018. Our Big Data MSc programme is running in partnership with TCS and is designed to produce graduates with the skills that companies need. The summer internship in the curriculum allow students to gain work experience and explore career opportunities with different companies while earning their degrees. All of the final year students are pursuing their internship at different setups of TCS across India.

Demand for people with big data skills is projected to grow rapidly in the coming years. They are likely to be increasingly sought after as the integration

of statistical and computational analytical tools becomes essential in all kinds of organisations and enterprises. India currently contributes to 12% of worldwide analytics and data science job openings, making it the largest analytics hub in the world, outside the US. Average salaries in the Big Data jobs in India are higher than the average salaries of the IT jobs and the skills shortage will make that gap bigger.

Admission Procedure

Admission to the MSc in Big Data Analytics programme is selective. We are looking for students with interest in data analytics. Applicants are expected to have good background in pass course level mathematics. The students will be selected based on a written test followed by a viva-voce examination.

The written test typically consists of multiple-choice test in Mathematics at pass course level and general aptitude. A sample question paper is provided online. Shortlisted candidates on the basis of the performance in the written test will be announced the next day of the written test. These shortlisted candidates must appear for a viva-voce test for final selection.

How to apply?

Application forms and Admit Card can either be downloaded online or collected from the University's central office at Belur (just outside the Belur Math main gate). Please read the instructions printed in the application form carefully.

All the relevant information of the application must be duly filled and submitted along with a fee of Rs.300/-. It can be either a demand draft for Rs 300/- made in favour of 'Ramakrishna Mission Vivekananda University' payable at Belur Math, Howrah, (preferably UBI or SBI) or by cash.

Completed application forms can be submitted in any of the following ways as given below.

1) Send the completed application form with the demand draft to the following address on/before the above-mentioned last date.

Registrar
Ramakrishna Mission Vivekananda Educational and Research Institute
PO Belur Math
Howrah, West Bengal 711202

2) Submit the completed form in person with the demand draft or cash to the University's central office at Belur on/before the above-mentioned last date.
3) Send the completed application preferably in pdf format by email to: *datasc@rkmvu.ac.in*

Bring a printout of the completed application form and printout of the email sent to us along with the demand draft or cash to the University's central office at Belur on the day of the entrance test **at least half hour** before the commencement of the admission test.

Applicants have to duly fill the admit card details and bring it on the day of admission test. Please do not submit the admit card along with your application

Fee Structure

Admission process shall begin immediately after the interview. Those candidates permitted and willing to take admission may get admitted immediately by paying a total amount of Rs 17,050/ having the following breakup.

Tuition fee for the first semester:	Rs 6000 /-
Admission cum registration fee (one time):	Rs 5000/-
Lab fee:	Rs 3000/-
Examination fee:	Rs 1000/-
Id Card:	Rs 50/-
Caution Deposit (one time, refundable):	Rs 2000/-

Selected candidates have to take admission by paying the requisite fees . **Those who fail to take admission before the stipulated date without explicit permission from the authority will run the risk of forfeiting their admission.**

Student Life

Limited number of seats for male candidates are available in the hostel attached to the Institution campus. Students requiring admission to hostels have to apply separately. The fee structure is as given below:

Hostel admission fees (one time):	Rs 500/-
Per month Hostel accommodation fee:	Rs 500/-
Hostel Deposit (one time, refundable) :	Rs 5000/-
Meal charges (variable as per mess system), approx.:	Rs 2500/-

Those selected for the hostel will be informed separately.

Important Dates (Tentative)

April 29, 2018, Friday: Last date for receiving applications

May 19, 2018, Saturday: Written admission test (2 hrs)

May 20, 2018, Sunday: Announcement of results of the admission test

June 01, 2018, Monday: Commencement of classes from 10:00 am

Quick Facts

Degree Name	MSc. in Big Data Analytics
Duration	2 years (4 semesters)
Start Date	June 01, 2018
Course Structure	4 semesters: 4-5 core courses and some optional courses per semester; Last semester optional internship project
Location	RKMVERI Campus, Belur, Howrah, West Bengal
Cost	Total consolidated course fee - Rs. 25,050/- in 1st year and Rs. 20,000/- in 2nd year.
Application Deadline	April 29, 2018
Entrance Examination	May 19, 2018
Eligibility	B.Sc.(Hons) /B.E. / B.Tech. / AMIE in relevant subjects