DEPARTMENT OF MATHEMATICS
Gargi College, University of Delhi
(NAAC Accredited A+)

Under the aegis of RDC and IQAC

announces

Certificate Course

on

MATHEMATICAL DATA SCIENCE

For Students and Faculty familiar with Calculus, Probability and Linear Algebra

PATRON	CONVENERS	CO-ORDINATORS
Prof. (Dr.) Sangeeta Bhatia	Ms. Sapna Malhotra	Dr. Deepika Dhall
Principal (Off.)	Ms. Pooja Gupta	Ms. Manpreet Kaur
		Ms. Anshika Agrawal

ARE YOU READY TO UNLOCK THE POWER OF DATA AND HARNESS ITS POTENTIAL TO ANSWER REAL-WORLD QUESTIONS?

The course is very reasonably priced for the value it provides

Join our Certificate Course in Mathematical Data Science for a hands-on journey through the world of data analysis, visualization, statistics, and machine learning.

Main objective is to encourage women in STEM education

ABOUT THE COURSE

Most of the Data Science courses focus majorly on Python. However, this course lay emphasis on Mathematics behind Data Science. The objective of the course is to provide cutting edge curriculum emphasizing the tools and techniques for handling, managing, analyzing and interpreting data. This program will help the learner to implement data science methodologies and build analytical capabilities to drive data science projects. Participants will gain in depth understanding of Machine Learning concepts and techniques to present and visualize data. This comprehensive program will equip you with the skills and knowledge necessary to thrive in the data-driven landscape of modern day industry.

COURSE DETAILS

DURATION:
12 weeks (Classes will be held on weekend)

LAST DATE FOR REGISTRATION:
21st Feb 2024

COMMENCEMENT:
First week of March 2024 (Tentative)

MODE: Hybrid

COURSE PEDAGOGY

Data Exploration and Understanding

Formulating Questions

Mathematical Foundations

Implementation with Python

EXPECTED LEARNING OUTCOMES

Module 1: Python programming
- Pandas, NumPy, Matplotlib, and Seaborn packages
- SciPy, Scikit-learn, Statsmodels, Tensorflow, and Keras packages
- Arrays, Lists, Data frames
- Handling categorical data
- Handling missing values
- Row and column manipulation
- Scatter plots, line plots, histograms, bar charts, box plots

Module 2: Statistics
- Discrete and continuous probability distributions
- Hypothesis testing
- Likelihood function
- Maximum Likelihood estimation
- Confidence intervals
- Conditional distribution and Conditional mean

Module 3: Mathematics
- Matrices and Vectors
- Inner products and norms
- Eigenvalues and eigenvectors
- Orthonormal basis
- Maxima and minima of functions
- Convergence of sequences
- Properties of integrals

Module 4: Machine Learning Models
- Linear regression
- Polynomial regression
- Logistic regression
- Discriminant analysis
- Naïve Bayes classifier
- Random Forest classifier
- Support Vector Machines (SVM)
- Kernel SVM
- Artificial Neural Networks for Regression and Classification

Module 5: Clustering Techniques
- K-means
- Principal Component Analysis (PCA)
- Kernel PCA

Module 6: Mathematical Framework of Machine Learning
- Out-of-sample error
- Bias-Variance trade-off
- VC dimension
- Overfitting and regularization
- Cross-validation
- Training, Testing, and Validation sets

WHERE DOES THIS COURSE FIT?

- Makes the student industry ready. India will have more than 11 Million job openings in Data Science by 2026 (India Today,2022).
- With the mathematical and computational training imparted this course, students will be well prepared to enroll into higher degree programs in Data Science globally.
- Faculty looking to explore Mathematical Data Science as a research area can jump start their ambition through this quick and rigorous introduction to the subject.
- Data Science educators will have plenty of inspiring takeaways out of this course.

Evaluation Scheme:
- Regular Assignments after each topic
- Mini Project on a real-world industry relevant scenario

Certificate will be provided only after successful completion of the course

COURSE INSTRUCTORS

Dr. Niteesh Sahni, (PhD, University of Delhi)
Associate Professor, Mathematics, Shiv Nadar University

Dr. Utsav Pandey, (PhD, IIM, Calcutta)
Assistant Professor, Decision Sciences, IIM, Lucknow

ADVISORY BOARD MEMBERS

Prof. Sarabjot Anand, (PhD, University of Ulster)
Professor of Computer Science at IISER, Mohali
Founder, TATRAS Data Ltd.

Prof. Giulia Rotundo, (PhD, University of Rome)
Professor of Statistics, University of Rome

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Professor (Retd.) Mathematics, Delhi University
NCERT

Dr. Debasis Mohanty, (Ph. D., Indian Institute of Science, Bangalore)
Director, National Institute of Immunology

Register Here

REGISTRATION LINK: https://forms.gle/Hv8JQGevDTfVVEcw9
(Screenshot of the completed payment needs to be uploaded)

Fee Details

Gargi Students/ Faculty: INR 10000
Non Gargi participants: INR 15000

Pay your Fees here

Bank Name: State Bank of India
Account Name- GARGI COLLEGE ADD ON COURSES
Account Number- 10617208676
IFSC- SBIN0001188

For any queries, mail us at maths.data.science@gargi.du.ac.in
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