



**PG Diploma**

# Post Graduate Diploma in Data Science & Analytics

**2024-2025**

**1 year  
Offline mode**



# Background

Data Science and Analytics is an interdisciplinary field that leverages scientific methods, algorithms, and systems to extract insights and knowledge from data in various forms, including structured, unstructured, and semi-structured data. Data science integrates multiple domains such as mathematics, statistics, computer science and domain expertise to analyse vast amounts of data, make predictions, and solve complex problems. In this course, key stages in the data science workflow; such as data collection, cleaning, analysis, modeling, and interpretation, will be emphasized, with a focus on enabling data-driven decision-making and task automation.

Students will gain hands-on experience with widely-used programming languages like Python, R, and SQL, exploring their respective strengths and applications. Essential tools such as Jupyter Notebooks, RStudio, and Anaconda will be introduced, alongside key libraries like pandas, scikit-learn, TensorFlow, and PyTorch, which support data manipulation and machine learning. The curriculum also delves into the intersection of data science with Artificial Intelligence (AI) and big data technologies, examining how AI enhances the capabilities of data science. Additionally, specialized applications of data science in the agricultural sector will be covered, providing a practical perspective on its transformative potential in this domain.

## About ICAR

The Indian Council of Agricultural Research (ICAR) is an autonomous organisation under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July 1929 as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at New Delhi.

The Council is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With 113 ICAR institutes and 74 agricultural universities spread across the country this is one of the largest national agricultural systems in the world.

## About ICAR-IARI

ICAR - Indian Agricultural Research Institute (IARI) is India's largest and foremost Institute in the field of research, higher education and training in agricultural sciences. The main functions of the Institute cover the areas of basic and applied research in the major branches of agricultural sciences; under graduate programs viz. B.Sc. Community Science, B.Sc. Agriculture, B.Tech (Agri-Engineering) B.Sc. (Biotechnology); as well as post graduate education at the M.Sc., M. Tech. and Ph.D. levels for which the Institute has been accorded the status of a Deemed to be University under the University Grants Commission (UGC) Act of 1956; specialized post graduate training courses; and extension education and transfer of technology in selected areas. The Institute has inherited a great tradition of agricultural research. The Institute, which moved to New Delhi in 1936 with five Sections, now conducts its research and educational activities through a network of 26 disciplines, a Project Directorate, two Regional Centres, eight Units, one KVK, and eight Regional Stations. In the NIRF 2024 rankings, IARI not only retained its top rank in the "Agriculture and allied sector" category but also earned a coveted place in the top 50 rank-band in the "Research Institution" and "Innovation" categories. The Graduate School, IARI runs 56 degree programmes (04 in Undergraduate, 26 in Masters and 26 in Ph.D), in New Delhi Campus (including IARI, New Delhi and 03 sister institutes namely, IASRI, NIPB, NBPGR) and 16 regional hubs.

## About ICAR-IASRI

ICAR-Indian Agricultural Statistics Research Institute (IASRI) is a pioneer institute of ICAR undertaking research, teaching and training in Agricultural Statistics, Computer Application and Bioinformatics. Ever since its inception way back in 1930, as small Statistical Section of the then Imperial Council of Agricultural Research, the Institute has grown in stature and made its presence felt both nationally and internationally. ICAR-IASRI has been mainly responsible for conducting research in Agricultural Statistics and Informatics to bridge the gaps in the existing knowledge. It has also been providing education/ training in Agricultural Statistics and Informatics to develop trained human resources in the country. The research and education are used for improving the quality and meeting the challenges of agricultural research in newer emerging areas. The Institute conducts Ph.D. and M.Sc. degree courses in Agricultural Statistics, Bioinformatics and Computer Application in collaboration with the Graduate School of ICAR-IARI. The institute also conducts in-service courses in the aforementioned disciplines.

## Educational Eligibility

Age	Educational Qualification	Number of intake of students	Tuition fee	Diploma awarding organisation	Collaboration Divisions/institutions/industry
Maximum age : No Age Limit	Minimum eligibility to apply: Employed professionals / Individuals holding B.Sc./B.E./B.Tech. in any branch with mathematics till 12th class /BCA/ BA(Mathematics/Statistics) or equivalent from any University or Institution recognized by ICAR/UGC.	Minimum:15 Maximum:20	Rs.120000/-	ICAR-IARI	ICAR-IASRI

## Selection Criteria

Minimum 60% marks or 6.0 out of 10.0 OGPA throughout the academic career (10th /12th and UG), with relaxation of 10% marks for candidates of ST/SC/PwBD category.

Weightage of Score: Academic (80%) and personal interview (20%).

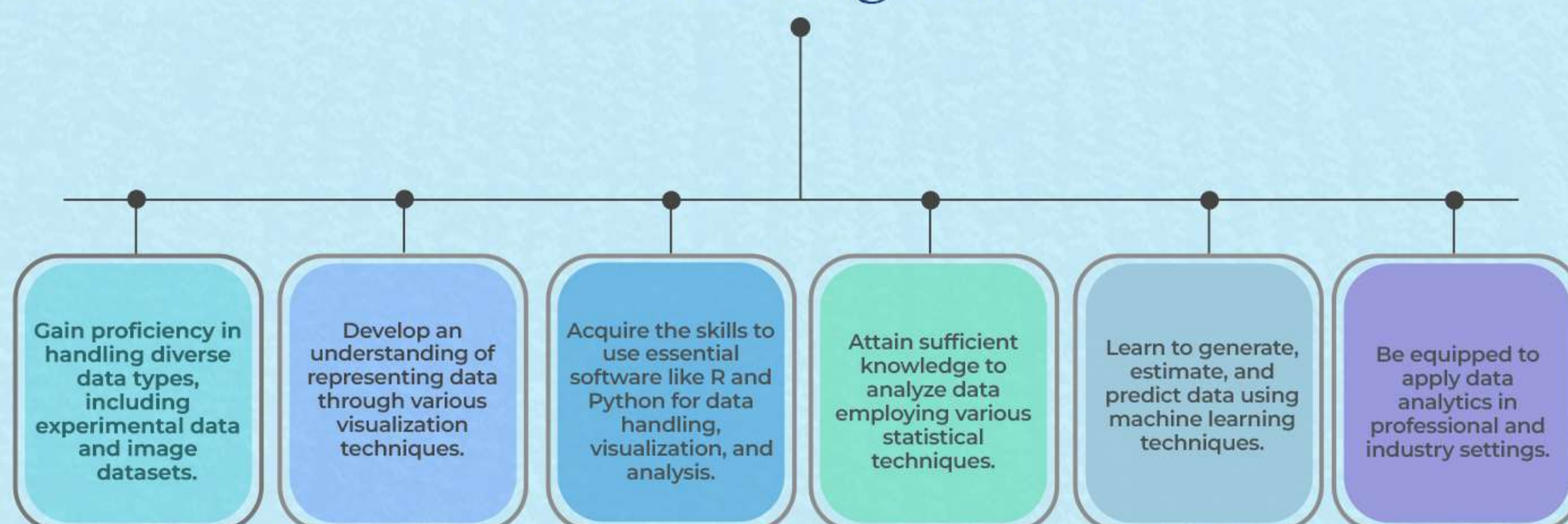
Reservation of seats for OBC-NCL, SC, ST and Persons with Benchmark Disability (PwBD) category as per Govt. of India rules.

\*No T.A/D.A will be provided for taking part in admission process

## How to Apply

For details refer : <https://iari.res.in/bms/latest-news/index.php>. The candidate need to fill the proforma and send the filled in proforma along with all degree documents(10/12/UG/ PG/any other diploma/certificate course) and SC/ST/OBC-NCL/EWS/PwBD certificate(if applicable) to [diplomacourses.iari@gmail.com](mailto:diplomacourses.iari@gmail.com). For further details contact: Dr. Rajender Parsad, Director, ICAR-IASRI, Library Avenue, Pusa, New Delhi-110012, E-mail: [director.iasri@icar.gov.in](mailto:director.iasri@icar.gov.in); Phone: +91-11-25841479

## Student Learning Outcomes



Gain proficiency in handling diverse data types, including experimental data and image datasets.

Develop an understanding of representing data through various visualization techniques.

Acquire the skills to use essential software like R and Python for data handling, visualization, and analysis.

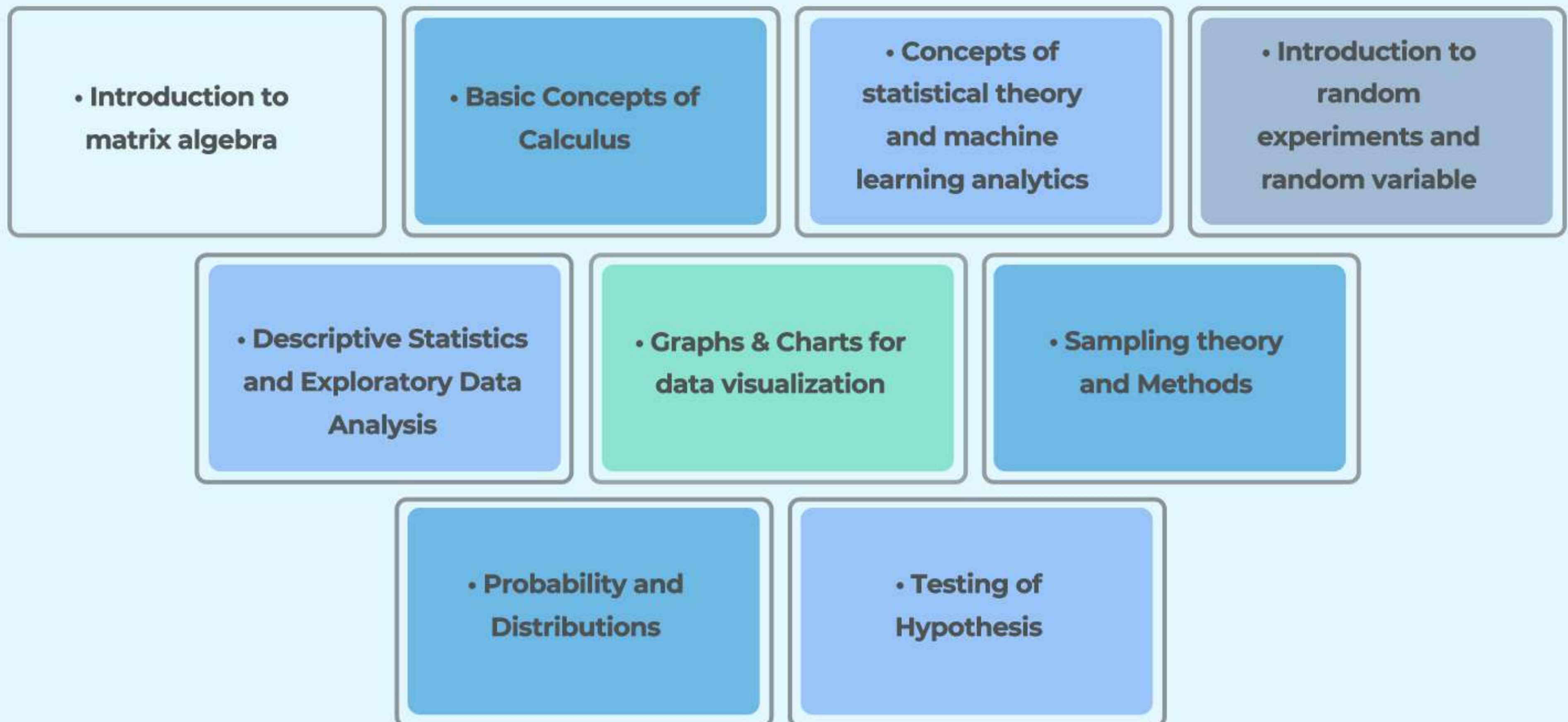
Attain sufficient knowledge to analyze data employing various statistical techniques.

Learn to generate, estimate, and predict data using machine learning techniques.

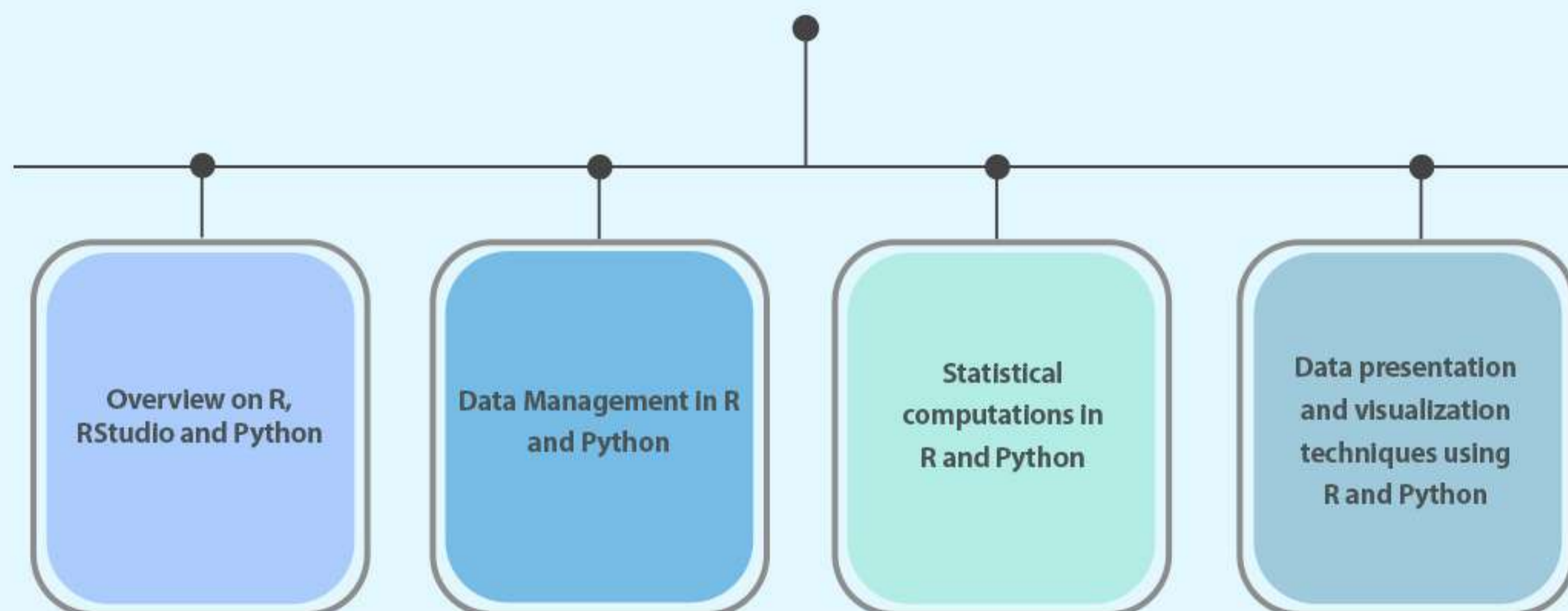
Be equipped to apply data analytics in professional and industry settings.

# Syllabus

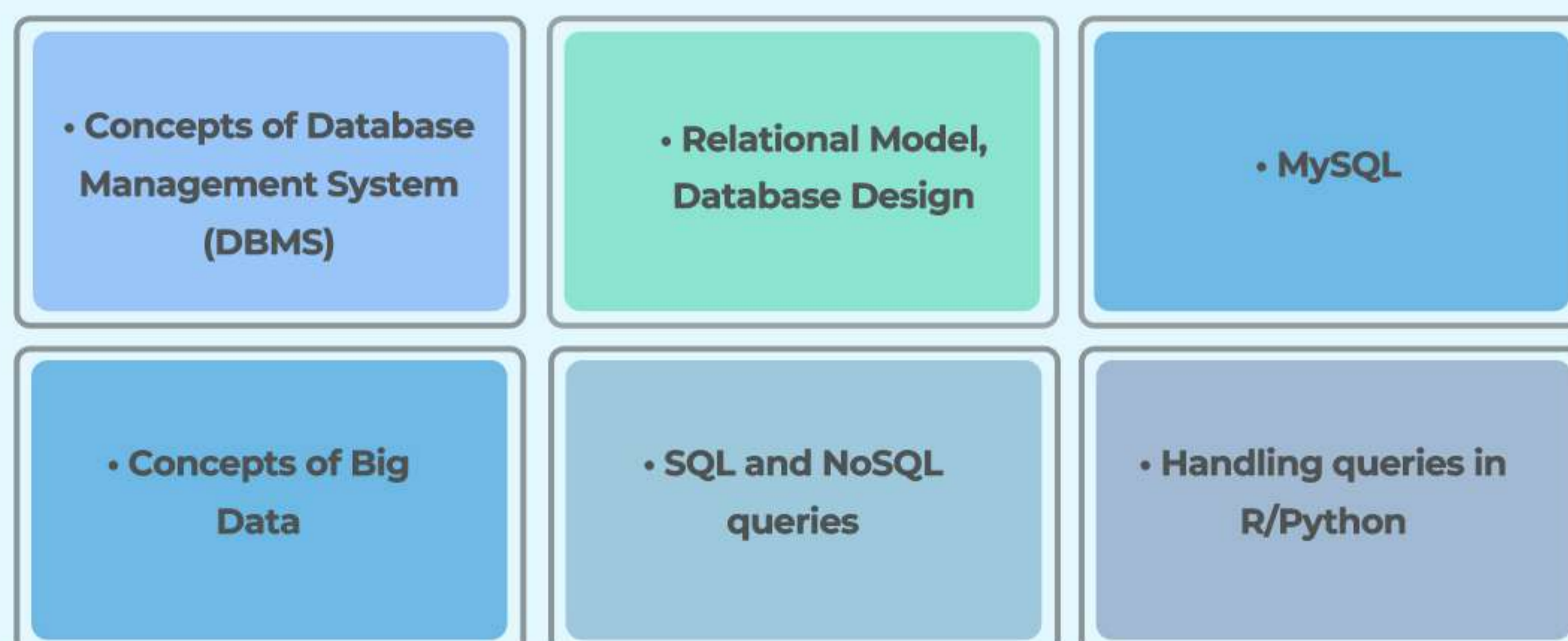
## PGDSA 1: Basic Concepts and Exploratory Data Analysis



## PGDSA 2: Software/Tools for Data Science-I



## PGDSA 3: Database Handling and Management



## PGDSA 4: Machine Learning Techniques

Basics of machine learning, Types of machine learning: supervised learning, unsupervised learning, semi-supervised learning, reinforcement learning

Models of regression; Linear regression - least squares; Polynomial regression - learning curves; Regularized linear models - Ridge, LASSO

Problems - regression, classification, clustering

### Machine learning Algorithms

KNN - K-Nearest Neighbors

SVM - Support Vector Machines

FNN - Feedforward Neural Networks

AdaBoost - Adaptive Boosting

XGBoost - eXtreme Gradient Boosting

CatBoost - Categorical Boosting

LGBM - Light Gradient Boosting Machine

RF - Random Forest

Clustering

Association Rule Mining

### Model Evaluation and Validation

Cross-validation, train-test splits.

Hyperparameter tuning

Bias-variance tradeoff

## PGDSA 5: Case studies & Project Work Level 1

Case study in Market Intelligence using machine learning

Case study in weather data using machine learning

Case study in Biological Data using machine learning

## PGDSA 6: Optimization Techniques

Gradient and search-based optimization

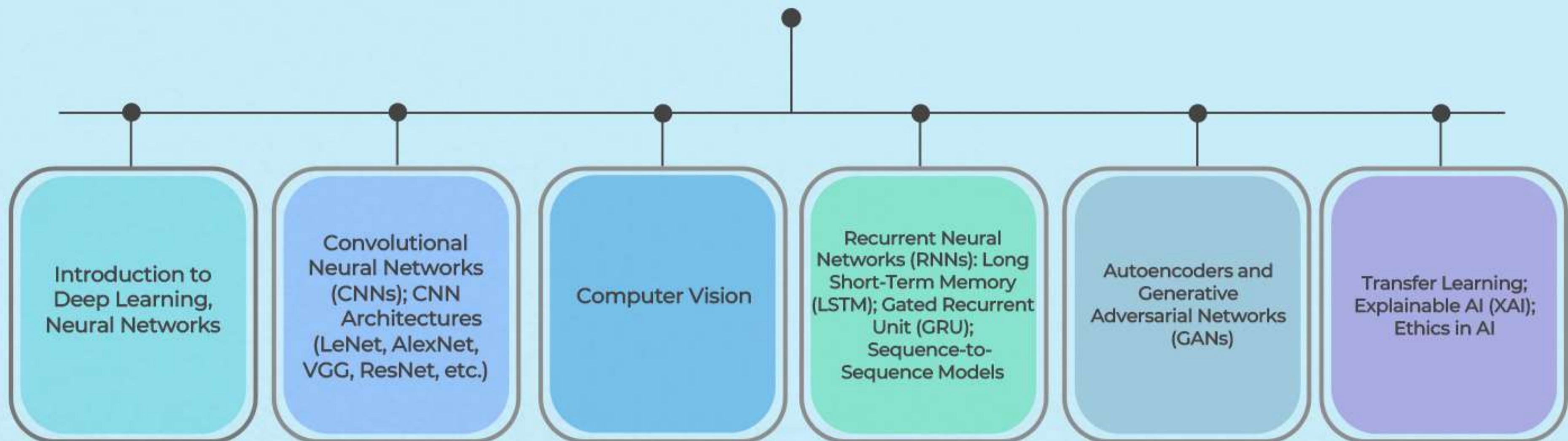
Linear, quadratic, nonlinear, and mixed integer programming Multi-objective and multi-criteria decision-making

## — PGDSA 7: Software/Tools for Data Science-II —

Python libraries for deep learning implementations : TensorFlow, Keras, PyTorch, MXNet, Caffe: Theano, CNTK and OpenCV etc

Java Script , Xjango frame work etc.

## — PGDSA 8: Deep Learning Techniques —



## — PGDSA 9: Big Data Analytics —



## — PGDSA 10: Case studies & Project Work Level 2 —

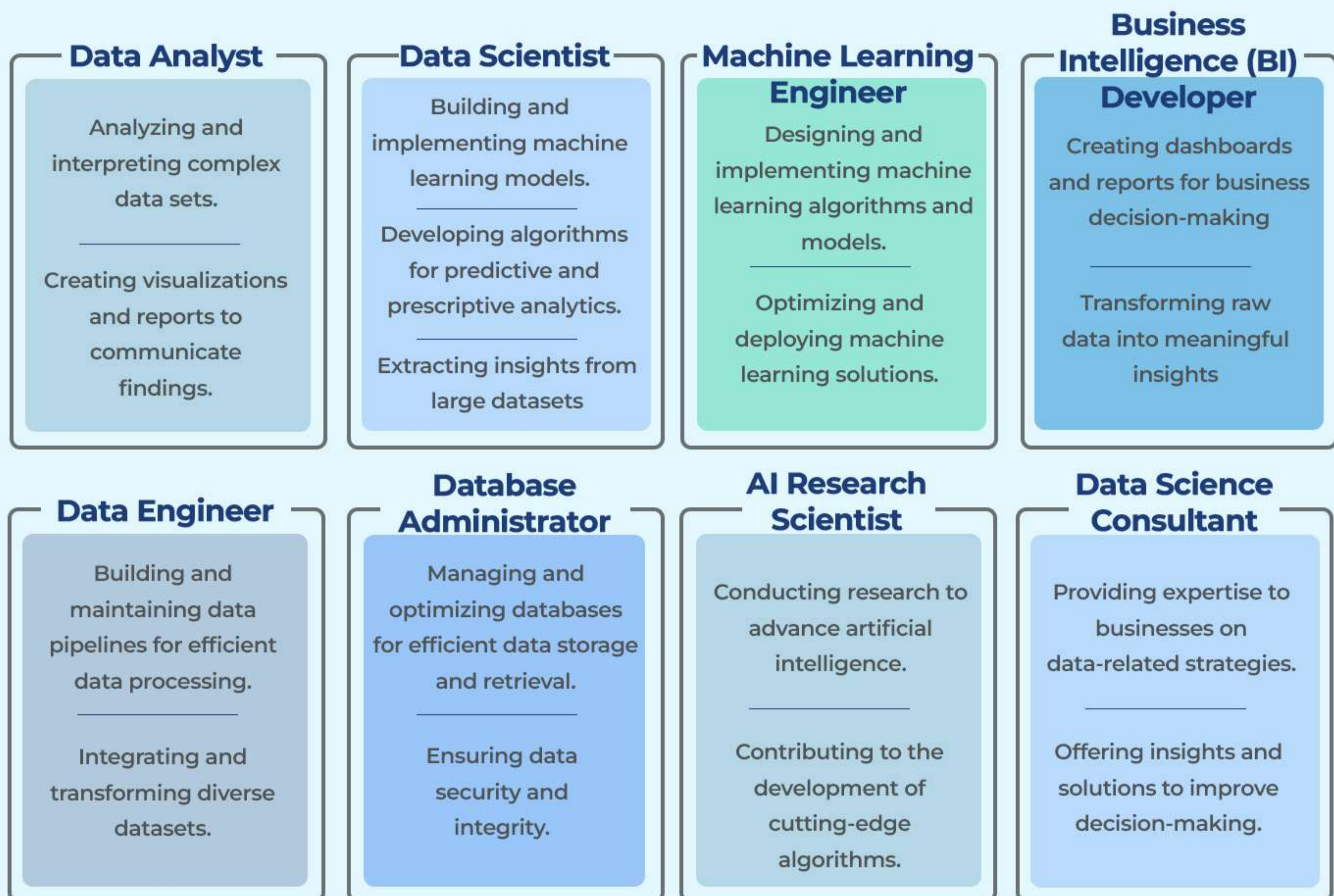


## — Evaluation pattern —

S.NO.	Type of exam	Marks
01	Mid-Term	20
02	Final Theory	30
03	Practical	25
04	Assignment	15
05	Quiz	10

# Employment Opportunity

Data science offers a wide range of career opportunities due to its increasing importance in various industries. Here are some key career paths and opportunities in data science:



To pursue a career in data science, it's essential to develop a strong foundation in mathematics, statistics, programming (Python, R, etc.), and data manipulation tools. Continuous learning and staying updated on industry trends are crucial in this rapidly evolving field. Additionally, gaining practical experience through internships, projects, and certifications can enhance your marketability in the job market.

**Proforma From**

**The Graduate School  
Indian Agricultural Research Institute  
New Delhi-110012**

**APPLICATION FOR ADMISSION TO  
ONE YEAR POST GRADUATE  
DIPLOMA COURSE**

Affix your passport  
size photo here

1. Name of the Diploma course applying for \_\_\_\_\_  
\_\_\_\_\_

2. Full Name (in Block Letter) \_\_\_\_\_

3. Name of father / Guardian / Husband \_\_\_\_\_

4. (a) Address for correspondence (in Block Letters) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ Pin Code \_\_\_\_\_

Phone No: \_\_\_\_\_ Email I.D: \_\_\_\_\_

(b) Permanent Address (in Block Letter) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. (a) Date of Birth \_\_\_\_\_

(b) Age \_\_\_\_\_

(c) Nationality \_\_\_\_\_

(d) Sex \_\_\_\_\_

6. Category \_\_\_\_\_



**7. Academic Qualifications:**

Qualification	Discipline	Passing Year	Name of School/College	University	Percentage/CGPA
10					
10+2/ Diploma					
Degree					
Others					

**8. I declare that the particulars given above are correct and that I will, if admitted, abide by the rules & regulations of IARI.**

Place: \_\_\_\_\_

Date: \_\_\_\_\_

**Signature of the Applicant**