

Rayat Shikshan Sanstha's
KARMAVEER BHURAO PATIL COLLEGE, VASHI.
NAVI MUMBAI
(Autonomous)
Department of Data Science
M. Sc. Data Science

Program Outcomes (POs)

Learners are able to–

PO-1	Disciplinary Knowledge	Acquire the comprehensive and in-depth knowledge of various subjects in sciences such as Physics, Chemistry, Mathematics, Microbiology, Bio-analytical Science, Computer Science, Data Science, Information Technology and disciplinary skills and ability to apply these skills in the field of science, technology and its allied branches
PO-2	Communication and Presentation Skills	Develop various communication skills including presentation to express ideas evidently to achieve common goals of the organization.
PO-3	Creativity and Critical Judgment	Facilitate solutions to current issues based on investigations, evaluation and justification using evidence based approach.
PO-4	Analytical Reasoning and Problem Solving	Build critical and analytical attitude in handling the problems and situations.
PO-5	Sense of Inquiry	Curiously raise relevant questions based on highly developed ideas, scientific theories and its applications including research.
PO-6	Use of Digital Technologies	Use various digital technologies to explore information/data for business, scientific research and related purposes.
PO-7	Research Skills	Construct, collect, investigate, evaluate and interpret information/data relevant to science and technology to adapt, evolve and shape the future.
PO-8	Application of Knowledge	Develop a scientific outlook to create consciousness against the social myths and blind faith.
PO-9	Moral and Ethical Reasoning	Imbibe ethical, moral and social values to develop virtues such as justice, generosity and charity as beneficial to individuals and society at large.
PO-10	Leadership and Teamwork	Work cooperatively and lead proactively to achieve the goals of the organization by implementing the plans and projects in various field-based situations related to science, technology and society at large.
PO-11	Environment and Sustainability	Create social awareness about the environment and develop sustainability for betterment of the future.

PO-12	Lifelong Learning	Realize that pursuit of knowledge is a lifelong activity and in combination with determined efforts, positive attitude and other qualities to lead successful life.
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**Department of Data Science
Program Specific
Outcomes(PSO)**

PSO-1	Understand the various processes involved in application development in the context of Data science.
PSO-2	Develop realistic solutions to meet the requirements of the society and the industry using the acquired data analytics skills

PGDS101 Advanced Database Technologies

Course Outcomes: After successful completion of this course, students will be able to:

CO-1: Recall the concept of Database Systems, Relational Databases ,Structure of Relational Databases & Relational Algebra.

CO-2: Describe the Object Databases Systems ,Design the E-R model ,Normalization process.

CO-3: Illustrate the NOSQL concept with the NOSQL database.

CO-4: Explain Data Modeling With Graph (NEeo4j), Key-Value Databases (Riak), Column-Family stores (Cassandra).

ICT Tools Used: Videos, PPT, IRIS, MongoDB

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://nptel.ac.in/courses/106/106/106106093/>

2) https://onlinecourses.swayam2.ac.in/cec19_cs05/preview

The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	1	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-
CO3	2	1	2	1	-	-	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-

PGDS102 Descriptive Statistics and Probability

CO4	2	-	-	2	-	-	-	-	-	-	-	-
CO5	1	-	-	1	-	3	-	-	-	-	-	-

PGDS104 Data Visualization using R

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain basic programming language concepts using R

CO2: Differentiate between different R data structures such as: string, number, vector, matrix, data frame, factor, date and time object

CO3: Collect detailed information raw data using R profiler

CO4: Visualize your data using base R graphics

ICT Tools Used: Videos, PPT, R studio, CSV

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

- 1) <https://www.coursera.org/learn/r-programming>
- 2) <https://www.udemy.com/course/data-visualization-in-r-base-lattice-ggplot/>

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CO1	1	-	-	1	-	-	-	-	-	-	-	-
CO2	3	-	-	1	-	1	-	-	-	-	-	-
CO3	1	-	-	1	-	-	-	-	-	-	-	-
CO4	2	-	-	2	-	-	-	-	-	-	-	-

PGDS105 Data Warehousing & Mining

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain the operational and decision support system.

CO2: Evaluate the impact of use and information using knowledge discovery in databases and KDD process models.

CO3: Summarize the data mining concepts with the help of Apriori algorithm, lift conviction and trees.

CO4: Construct data models and prototypes needed to gain stakeholder support to achieve business objectives.

ICT Tools Used: Videos, PPT, Chalk Board, Iris, Weka

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

- 1) <https://www.coursera.org/specializations/data-warehousing>
- 2) <https://www.udemy.com/course/data-warehouse-fundamentals-for-beginners/>

PGDS201 Research in Computing

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Develop analytical skills by applying scientific methods.

CO2: Review the existing research article on Machine learning & Business analytics

CO3: Survey the specific research areas in field of Computer Science

CO4: Test & validate the proposed methodology on research problems.

ICT Tools Used: Videos, PPT, Open Source Databases (Scopus/ Google Scholar)

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://www.udemy.com/topic/research-paper-writing/>

2) <https://www.coursera.org/learn/academic-writing-capstone>

3) <https://masterclasses.nature.com/online-course-in-scientific-writing-and-publishing/16507840>

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CO1	1	-	-	2	-	-	-	-	-	-	-	-
CO2	-	-	1	-	2	-	-	-	-	-	-	-
CO3	-	-	1	-	-	2	2	-	-	-	-	-
CO4	-	-	-	-	-	-	1	-	-	2	-	-

PGDS202 Optimization Techniques

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain the theory of optimization methods and algorithms.

CO2: Apply the mathematical results and numerical techniques of optimization theory to concrete data science problems.

CO3: Apply basic concepts of mathematics to formulate an optimization problem.

CO4: Analyze and appreciate a variety of performance measures for various optimization problems.

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://www.coursera.org/learn/operations-research-modeling>

2) <https://nptel.ac.in/courses/111/105/111105039/>

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CO2	-	2	-	1	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	1	-	-	-	-

CO4	-	-	2	-	-	-	-	-	-	-	-	-
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PGDS203 Statistical Inference

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Recognize several basic types of statistical problems corresponding to various sampling designs.

CO2: Define null hypothesis, alternative hypothesis, level of significance, test statistic, p value, and statistical significance.

CO3: Describe the statistical decision-making theory and interpretation.

CO4: Demonstrate knowledge of the main properties of AR(1),AR(2), ARIMA models

CO5: Demonstrate computational skills to implement various statistical inferential approaches.

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://nptel.ac.in/courses/111/104/111104146/>

2) <https://nptel.ac.in/courses/111/102/111102112/>

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CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	1	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	1	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-

PGDS204 Advanced Python Programming

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain fundamental understanding of the Python programming language.

CO2: Describe common Python functionality and features used for data science

CO3: Illustrate the Object-oriented Programming concepts in Python.

CO4: Visualize and describe DataFrame structures for cleaning and processing data

ICT Tools Used: Videos, PPT, Pen-Tablet, CSV, Python

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://www.udemy.com/course/python-programming-basics-multithreading-oop/>

2) <https://www.coursera.org/learn/python-data-analysis#about>

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CO2	2	2	-	2	-	-	-	-	-	-	-	-
CO3	2	1	2	1	-	-	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-

PGDS205 Big Data Analytics

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Describe the fundamentals of various big data analytics techniques.

CO2: Design efficient algorithms for mining the data from large volumes.

CO3: Analyze the HADOOP and Map Reduce technologies associated with big data analytics.

CO4: Prepare a complete business data analytics solution

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://www.greatlearning.in/academy/learn-for-free/courses/mastering-big-data-analytics>

2) <https://www.coursera.org/learn/getting-started-with-data-warehousing-and-bi-analytics>

3) <https://www.coursera.org/learn/introduction-to-big-data-with-spark-hadoop>

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CO2	2	-	-	1	-	-	-	-	-	-	-	-
CO3	-	-	-	-	2	1	2	1	-	-	-	-
CO4	-	-	2	-	-	-	-	2	-	2	-	-

PGDS206 Analysis of Algorithm

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain the concepts of algorithms for designing good program

CO2: Implement algorithms using Python

CO3: Determine how to transform new problems into algorithmic problems with efficient solutions

CO4: Illustrate algorithm design techniques for solving different problems

ICT Tools Used: Videos, PPT, Chalk Board

CO2	-	-	-	-	-	-	2	2	-	-	-	-
CO3	3	-	1	1	-	-	2	2	-	-	-	-
CO4	-	-	-	2	-	-	-	2	-	-	-	-

PGDS304 Data Handling and Visualization

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain the concepts of algorithms for designing good program

CO2: Implement algorithms using Python

CO3: Determine how to transform new problems into algorithmic problems with efficient solutions

CO4: Illustrate algorithm design techniques for solving different problems

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://alison.com/course/introduction-to-data-visualization>

2) <https://alison.com/course/python-and-matplotlib-data-visualization>

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CO2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-

PGDS304 Case Studies in Data Science

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Explain the concepts of algorithms for designing good program

CO2: Implement algorithms using Python

CO3: Determine how to transform new problems into algorithmic problems with efficient solutions

CO4: Illustrate algorithm design techniques for solving different problems

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative
(Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://alison.com/courses/advanced-excel-2021/content#event=login>

2) <https://www.coursera.org/specializations/excel-data-analytics-visualization?action=enroll>

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CO2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-

PGDS401 Deep Learning

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Design simple Neural Networks using Linear Perceptron.

CO2: Implement Convolutional Neural Networks using TensorFlow.

CO3: Develop an application based on Recurrent Neural Network.

CO4:

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

Links: SWAYAM / MOOCS:

1) <https://www.coursera.org/specializations/deep-learning>

2) <https://www.coursera.org/learn/introduction-to-deep-learning-boulder>

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CO2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-

PGDS404 Data Visualization in Tableau

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Understand types of data and data visualization methods

CO2: Understand the need of data visualization.

CO3: Create and design visualizations and dashboards

CO4: Evaluate the performance of visualization technique

ICT Tools Used: Videos, PPT, Chalk Board

Students Centric Methods: Problem Solving and Participative (Experimental, Participative, Problem Solving)

