ENGINEERS WITH SOCIAL RESPONSIBILITY

(/)

M.Sc. (Data Science)

Program Overview

Courses

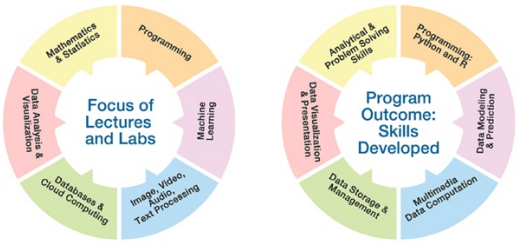
Data science is a “concept to unify statistics, data analysis, machine learning and their related methods” in order to “understand and analyze actual phenomena” with data. In other words, the detailed study of the flow of information from structured and unstructured data available with an organization is called data science. It primarily involves obtaining the meaningful insights from the data which is processed through analytical study. The current era is becoming a digital space where each organization deals with large amount of structured and unstructured data on a daily basis. Evolving technologies are leading to cost saving solutions for storage and analysis of such large data. In the current era, for the career progression, one needs to understand the language of data through analytical skill. Hence, it is absolutely necessary nowadays, to develop manpower with a skill to perform data analysis to get meaningful information from the data of different domains such as banking and finance, insurance, agriculture, healthcare, retail, education, social media, manufacturing, transportation, entertainment and so on. As reported recently, with nearly 100,000 vacancies, India is the second biggest data analytics jobs hub after the US and demand for data science skill sets is increasing at a very fast pace.

The field of data science has witnessed an immense growth in recent years particularly due to the rise of internet and social media. The exploration of data science by the business world initially started with analysis of business data and hence emphasis was given for financial data analytics. With the increase of multimedia data such as image, video, audio and text, each domain as mentioned above, many a times needs to perform analysis of such multimedia big data. Hence the study of data science includes analysis of multimedia data along with other types of data such as business data and unstructured social media data. In our daily life, now we are capturing data from sources such as i) sensors used in various places like agricultural fields, shopping malls, ii) posts on social media, iii) digital images and videos captured in cell phones and iv) purchase transactions made through e-commerce. Analysis of such big data which could be multimodal in nature is a huge challenge. Modern technologies in the areas of artificial intelligence (AI) and machine learning (ML) are now extensively used to get insights of such big data.

With the availability of modern technologies of data storage, cleaning and computing, the study of data science expanded beyond the boundaries of mathematics and statistics. In modern days the study of data science is constituted with the knowledge of mathematics, statistics and computer science. Data science brings together a lot of skills of these disciplines with adequate domain knowledge to help any organization find ways to i) take major business decisions, ii) reduce costs, iii) get in to new markets, iv) launch a new product or service, v) find the sentiment of the customers, vi) recruiting the best talent and so on.

With all these in mind, our new master's program in Data Science (launched in 2020), not only includes traditional data analysis skills but also incorporates other crucial skills to perform multimedia and big data analysis. The courses focus on acquiring fundamental knowledge of mathematics, statistics, computer science and machine learning. The curriculum also includes domain specific knowledge by incorporating courses in multimedia, business and finance. Techniques such as data processing, database management, deep learning, data visualization along with tools such as Python, R, and Tableau are also included to enhance the technical and analytical skills. Value Added Courses are offered during the program to make the students hands-on with the challenges of data

science and to enable students with industry ready skills. In essence, MSc. in Data Science program has been designed to provide students with a strong foundation in data management and analysis, and the necessary skills to succeed in data science and data-analytics related job.



Based on student requests, **optional** Value Added Courses such as comprehensive SAS training which has variety of tools and applications may be also offered during summer/winter breaks. The SAS based training will also enable the students to obtain SAS global certification in many fields and the skills can be ratified and showcased through SAS international certification badges.

Degree Name: M.Sc. in Data Science

Duration: 2 Years (Four Semesters)

Characterization of the Program: Intersection of Mathematics, Statistics, Programming, Big-Data and Machine Learning

Uniqueness of the Program: Hands on and Case Study based Program

The program primarily aims to cater to the following audience:

- Traditional Science/ Economics/ Engineering Graduates with good mathematical aptitude, basic programming skills and inclination towards data science.
- Professionals in the workplace who wish to improve their skills for the emerging jobs in data-science related fields.

Program Objective

The primary objective of the M.Sc. in Data Science program is to develop skilled professional workforce that is prepared to address the increasing needs in the rapidly expanding area of big data analytics. The program aims to provide skills in quantitative data analysis, data mining, data modeling and prediction, data storage and

management, machine learning, big data processing, data visualization, multimedia big data, programming and communication skills. Value Added Course/ training and a large number of practical case studies have been integrated in the program to boost the learner confidence and market acceptability.

Pedagogy

The program relies on a wide range of teaching methods including lectures, tutorials, case studies, lab exercises, and projects throughout the year. The program's emphasis is on learning by doing and this is imparted in the form of mini-projects and case-studies.

Participants

Science (Statistics, Mathematics, Physics)/ IT/ Computer Science/ Data Science/ Economics/ Engineering Graduates or its equivalent with good mathematical aptitude, basic programming skills and inclination to pursue a career in data science.
Professionals who are interested in upskilling in the field of data science.

Programme Outcomes (POs)

On completion of the program the participants would

PO No.	Program Outcomes
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with

	appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

PSO No.	Programme Specific Outcomes (PSOs)
PSO1	To model computational problems by applying mathematical concepts and solving real-world problems using algorithmic techniques.
PSO2	To apply the mathematical and statistical approaches for analyzing, designing and development of computing systems in interdisciplinary applications.
PSO3	To work as a socially responsible professional by drawing statistical inference using software tools in real-world problems.

Program Outcomes (POs) & Course Outcomes (COs) of The Program (https://www.daiict.ac.in/sites/default/files/other-files/POs-PSOs-COs_ver2.pdf)

Syllabus of The Program (https://www.daiict.ac.in/sites/default/files/other-files/Syllabus.pdf)

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NAAC

- SSR & Evaluative Reports Addendum 2017 (/sites/default/files/NAAC-Addendum-final.pdf)
- SSR 2015 (/sites/default/files/NAAC-Self-Study-Report.pdf)
- Evaluative Report 2015 (/sites/default/files/NAAC-Evaluative-Report.pdf)

CoE, Government of Gujarat

- Application submitted (/coe-government-gujarat)
- Audited Accounts (/coe-government-gujarat)
- Meeting of the Governing Bodies (/coe-government-gujarat)

NIRF

- INDIA Ranking 2023 DCS Submitted (/nirf-national-institutional-ranking-framework)

Other Links

- **Prof. S.C. Sahasrabudhe - A Memoir (https://www.daiict.ac.in/prof-sc-sahasrabudhe-memoir)**
- **Holidays 2023 (/sites/default/files/other-files/Holidays2023.pdf)**
- **Ecampus (https://ecampus.daiict.ac.in/webapp/intranet/index.jsp)**
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- **DCEI (http://ceid.daiict.ac.in/)**
- **Proforma for Inspection by UGC (/sites/default/files/UGCproforma_30Dec2015.pdf)**
- **Committees (https://www.daiict.ac.in/committees)**
- **Anti-Ragging Committee (/sites/default/files/other-files/Anti-Ragging_Vigilance-Committee_Faculty-and-Staff_2022-23.pdf)**
- **DA-IICT Lecture Series (/da-iict-lecture-series-dls)**
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