M.Sc- Data Science

PROGRAM DETAILS

Faculty	Computing and IT (FCIT)
School	School of Computer Applications (SCA)
Program	MSc- Data Science
Dean of Faculty	Mrs. Shweta Marigoudar
Director of School	Ms. Shamina Attar

1	**Title of the Award**	MSc-Data Science
2	**Modes of Study**	Full Time
3	**Awarding Institution /Body**	GM University
4	**Joint Award**	Not Applicable
5	**Teaching Institution**	FCIT GM University
6	**Date of Program Specifications**	November -2023
7	**Date of Course Approval by the Academic Council of GMU**	---
8	**Next Review Date:**	---
9	**Program Approving Regulating Body and Date of Approval**	---
10	**Program Accredited Body and Date of Accreditation**	---
11	**Grade Awarded by the Accreditation Body**	---
12	**Program Accreditation Validity**	---
13	**Program Benchmark**	N/A
14	**Program Overview- M.Sc Data Science** The Master of Science program specializing in Data Science is designed to equip students with advanced knowledge and skills in extracting valuable insights from vast data sets. This comprehensive program integrates foundational concepts in statistics, computer science, and domain-specific expertise to address the evolving challenges of the data-driven era. Students will engage in a rigorous curriculum covering topics such as machine learning, data visualization, and big data technologies. The program emphasizes hands-on experience through practical projects, fostering a deep understanding of data manipulation, analysis, and interpretation. Advanced statistical techniques and	

	algorithms are explored to empower graduates to solve complex problems and make informed decisions in various industries. The curriculum is continually updated to reflect the latest trends and technologies in the rapidly evolving field of data science. Collaborative learning is encouraged through team projects, promoting effective communication and teamwork skills crucial for success in real-world data science projects. Faculty members, often industry experts, guide students in applying theoretical knowledge to practical scenarios. The program also integrates internship opportunities, enabling students to gain valuable industry experience and build professional networks. Throughout the program, students are exposed to real-world datasets, challenging them to develop creative solutions to authentic problems. Graduates emerge with a versatile skill set, ready to tackle diverse data challenges and contribute meaningfully to the growing demand for data-driven decision-making across industries. The Master of Science in Data Science program aims to produce professionals who are not only proficient in data analysis but also capable of driving innovation in the era of big data.
15	**Program Educational Objectives (PEOs) for MSc- Data Science:** **1. Advanced Analytical Proficiency:** Graduates of the Master of Science program specializing in Data Science will possess advanced analytical proficiency, demonstrated through the ability to apply sophisticated statistical and machine learning techniques to extract meaningful insights from complex datasets. This includes proficiency in data preprocessing, feature engineering, model selection,and evaluation, ensuring graduates are well-equipped to address diverse challenges in the field. **2. Effective Communication and Collaboration:** The program aims to cultivate effective communication and collaboration skills in graduates, enabling them to convey complex data-driven findings to both technical and non-technical stakeholders. Graduates will be adept at translating technical insights into actionable recommendations, fostering collaboration between data science teams and decision-makers across various domains. This skill set ensures that graduates can play a pivotal role in driving organizational change through data-driven decision-making. **3. Ethical Data Practices and Continuous Learning:** Graduates will be instilled with a commitment to ethical data practices, understanding the implications of their analyses on privacy, security, and societal well-being. The program emphasizes the importance of staying abreast of evolving technologies and methodologies in data science. Graduates will demonstrate a commitment to continuous learning, adapting to emerging trends and technologies, and exhibiting a proactive approach to professional development in the dynamic field of data science.

16	**Program Outcomes for M.Sc-Data Science:** **1. Data Acquisition and Cleaning:** Graduates will demonstrate the ability to collect, preprocess, and clean diverse datasets from various sources, ensuring the reliability and integrity of data for analysis. **2. Statistical and Machine Learning Expertise:** Graduates will showcase proficiency in applying advanced statistical methods and machine learning algorithms to extract meaningful patterns, trends, and predictions from large and complex datasets. **3. Data Visualization and Interpretation:** Graduates will be capable of creating effective data visualizations and communicating insights clearly to both technical and non-technical stakeholders, facilitating informed decision-making. **4. Big Data Technologies:** Graduates will have a solid understanding of big data technologies and tools, demonstrating the ability to work with large-scale datasets and leverage distributed computing frameworks for efficient data processing. **5. Real-world Problem Solving:** Graduates will apply data science methodologies to real-world problems, demonstrating critical thinking and creativity in designing solutions that address practical challenges in diverse domains. **6. Team Collaboration and Project Management:** Graduates will exhibit effective collaboration and project management skills by working in multidisciplinary teams on data science projects, showcasing the ability to meet deadlines and deliver high-quality results. **7. Ethical and Responsible Data Practices:** Graduates will adhere to ethical standards in data collection, analysis, and interpretation considering the societal implications of their work and promoting responsible data practices within organizations. **8. Continuous Learning and Professional Development:** Graduates will engage in lifelong learning, keeping pace with advancements in data science and related technologies. They will actively seek professional development opportunities and contribute to the advancement of the field through continuous self-improvement.
17	**Program Specific Outcomes (PSOs) for MSc-Data Science:** **1. Algorithmic Innovation:** Students in the Master of Science program specializing in Data Science will engage in specific objectives related to algorithmic innovation. This includes the development of novel

	algorithms for data analysis, exploration of cutting-edge machine learning techniques, andthe ability to adapt existing algorithms to address emerging challenges in the field. **2. Domain-Specific Application:** The program aims to equip students with the capability to apply data science methodologies to specific domains. This involves tailoring data analysis techniques to industry-specific problems, understanding the unique challenges within various sectors, and demonstrating expertise in utilizing data science for informed decision-making within those contexts. **3. Implementation of Scalable Solutions:** Students will be tasked with specific objectives related to implementing scalable data solutions. This includes leveraging big data technologies, distributed computing frameworks, and cloud platforms to design and deploy data science solutions capable of handling large volumes of data efficiently and effectively. Students will gain hands-on experience in optimizing algorithms and workflows for scalability.

18. Credit Requirements

- To complete a postgraduate program- M. Sc., a student is required to earn 80 credits
- Those students who successfully complete only course work (40 Credits) Postgraduate Diploma is awarded
- The credit distribution for M.Sc. Program:

Course Work – 14 X 3 Credits =	42 Credits
Course Work Lab – 5 X 2 Credits =	10 Credits
Research Work – 2 X 6 Credits =	12 Credits
Project Work =	08 Credits
Internship =	08 Credits
Total	**80 Credits**

19. Programme Structure

S. No.	Semester	Course Code	Course Title	Credits
1	**1**	PC24DS5101	Fundamental of Data Science	03
2		PC24DS5102	Mathematical Foundation for Computer Science	03
3		PC24DS5103	Machine Learning	03
4		PC24DS5104	Database Management System	03
5		PC24DS5105	Database Management System Lab	02
6		PC24DS5106	Machine Learning with Python Programming	03
7		PC24DS5107	Machine Learning with Python Programming Lab	02
Total				**19**
Break				
S. No.	**Semester**	**Course Code**	**Course Title**	**Credits**
1	**2**	PC24DS5201	Research Methodology and IPR	03
2		PC24DS5202	Advanced Algorithm and Analysis	03
3		PC24DS5203/ PC24DS5204/ PC24DS5205	**Elective - I**	03
4		PC24DS5206	Advanced Bigdata Analysis	03
5		PC24DS5207	Advanced Bigdata Analysis Lab	02
6		PC24DS5208	Data Science in Image Processing	03
7		PC24DS5209	Data Science in Image Processing Lab	02
Total				**19**
Break				
S. No.	**Semester**	**Course Code**	**Course Title**	**Credits**
1	**3**	PC24DS6301	Data Mining and Warehouse	03
2		PC24DS6302	Deep Learning	03
3		PC24DS6303/ PC24DS6304/ PC24DS6305	**Elective – II**	03
4		PC24DS6306	R Programming with Statical Foundation	03
5		PC24DS6307	R Programming with Statical Foundation Lab	02

6		PC24DS6308	Internship	08
Total				**22**
S. No.	**Semester**	**Course Code**	**Course Title**	**Credits**
1	**4**	PC24DS6401	Research Paper Review	6
2		PC24DS6402	Dissertation	8
3		PC24DS6403	Research Paper Publication	6
Total				**20**

List of **Elective – I** Offered:

1. Introduction to Geospatial Technology
2. Natural Language Processing
3. Cyber Security

List of **Elective – II** Offered:

1. Data Visualization
2. Hadoop Programming
3. Cloud Computing

Suggested Courses

1. **Foundations of Data Science:** Covering fundamental concepts in statistics, programming, and data manipulation, this course provides a solid base for understanding the core principles of data science.

2. **Machine Learning and Predictive Analytics:** Focused on various machine learning algorithms, this course explores supervised and unsupervised learning techniques for predictive modelling and pattern recognition.

3. **Big Data Technologies:** Providing an in-depth understanding of big data technologies such as Hadoop and Spark, this course prepares students to handle and analyze massive datasets efficiently.

4. **Data Visualization and Communication:** This course emphasizes the principles of effective data visualization and communication, teaching students how to convey insights to diverse audiences using visualizations and storytelling techniques.

5. **Statistical Methods for Data Science:** A comprehensive course covering advanced statistical methods essential for making robust inferences and decisions based on data analysis.

6. **Natural Language Processing (NLP):** Focusing on techniques for understanding and processing human language, this course is crucial for students interested in applications like text mining, sentiment analysis, and language generation.

7. **Deep Learning and Neural Networks:** Exploring advanced neural network architectures and deep learning techniques, this course delves into applications such as image recognition, natural language processing, and speech recognition.

8. **Data Ethics and Privacy:** Addressing the ethical considerations surrounding data collection, analysis, and storage, this course emphasizes responsible data practices and the legal aspects of data

privacy.

9. **Applied Data Science in Industry:** Providing hands-on experience, this course involves real-world projects in collaboration with industry partners, allowing students to apply their skills to solve practical data science problems.

10. **Capstone Project in Data Science:** The capstone project is a culminating experience wherestudents independently apply their knowledge and skills to address a significant data science challenge, demonstrating their proficiency and readiness for the field.)

20	**Teaching and Learning Methods** 1. Face to Face Lectures using Audio-Visuals 2. Laboratory work/Fieldwork/Workshop 3. Project Based Learning 4. Problem Based Learning 5. Group Exercises/Assignments 6. Demonstrations 7. Guest Lectures 8. Industry Visit 9. Workshops, Group Discussions, Debates, Presentations 10. Project Work 11. Project Exhibitions 12. Technical Competitions
21	**Attendance** A minimum of 85% attendance is essential for each module.
22	**Assessment and Grading** 1. Every course will be assessed for a weight of 100 2. Assignments- 50% weight 3. End of Module Examination-50% weight 4. End of each module –grade card will be issued 2. If marks scored is: • 91 and above O (outstanding); 81-90 : A+ (Excellent); 71-80: A (Very Good); 61-70: B+ (Good); 51-60 : B (Above Average); 40 -50: C (Average); below 40: D (Not satisfactory) • If one scores D grade, the candidate is required to re-register for the module and earn the required credits • **A minimum of overall 40% is required for completion of a Module by acquiring minimum grade (pass) with a minimum of 40% in each component.**

23	**Award of Degree** Every student registering for the program need to complete a **minimum of 80 credits, for the award of M.Sc., Degree** **Award of Degree Certificate:** Students will be issued consolidated grade card with CGPA displayed and GM University Degree Certificate. **Award of Gold Medal:** A student with highest CGPA (Not less than 9.0 on a scale of 10) in the class without getting a D grade in any course over 8 semester and completing the program within the specified period of 2 years (4 semesters) will be awarded Gold Medal.
24	**Student Support for Learning** 1. Course Notes 2. Reference Books in the Library 3. Magazines and Journals 4. Internet Facility 5. Computing Facility 6. Laboratory Facility 7. Workshop Facility 8. Staff Support 9. Lounges for Discussions 10. Any other support that enhances their learning
25	**Quality Control Measures** 1. Review of Course Notes 2. Review of Question Papers and Assignment Questions 3. Student Feedback 4. Moderation of Assessed Work 5. Opportunities for students to see their assessed work 6. Review by external examiners and external examiners reports 7. Staff Student Consultative Committee meetings 8. Student exit feedback 9. Course Assessment Board (CAB) 10. Programme Assessment Board (PAB)