

# BCA - Data Science

## PROGRAM DETAILS

<b>Faculty</b>	Computing and IT (FCIT)
<b>School</b>	School of Computer Application (SCA)
<b>Program</b>	BCA-Data Science
<b>Dean of Faculty</b>	Dr. Shweta Marigoudar
<b>Director of School</b>	Ms. Shamina M. Attar

1	<b>Title of the Award</b>	BCA-Data Science
2	<b>Modes of Study</b>	Full Time
3	<b>Awarding Institution /Body</b>	GM University
4	<b>Joint Award</b>	Not Applicable
5	<b>Teaching Institution</b>	Faculty of Computing and IT (FCIT)
6	<b>Date of Program Specifications</b>	November -2023
7	<b>Date of Course Approval by the Academic Council of GMU</b>	---
8	<b>Next Review Date:</b>	---
9	<b>Program Approving Regulating Body and Date of Approval</b>	---
10	<b>Program Accredited Body and Date of Accreditation</b>	---
11	<b>Grade Awarded by the Accreditation Body</b>	---
12	<b>Program Accreditation Validity</b>	---
13	<b>Program Benchmark</b>	N/A
14	<b>Program Overview: Bachelors in Data Science</b>	<p>The Bachelor's in Data Science is a dynamic and interdisciplinary program designed to equip students with the skills and knowledge necessary for navigating the evolving landscape of data-driven decision-making. Spanning three to four years, this program integrates principles from computer science, statistics, and domain-specific applications.</p> <p>Students engage in core areas such as data analysis, machine learning, programming, and the ethical considerations of data practices. Emphasis is placed on hands-on experience, with students participating in real-world projects and internships that allow them to apply theoretical knowledge to practical scenarios.</p> <p>The curriculum covers a broad range of subjects, including advanced statistical techniques, machine learning algorithms, big data technologies, and data visualization. Students will develop programming proficiency in languages like Python and R, ensuring they can implement and optimize data science solutions effectively. The program also includes a focus on database management, enabling students to efficiently store and retrieve</p>

	<p>data.</p> <p>A strong ethical foundation is embedded within the program, emphasizing responsible data practices and compliance with privacy regulations.</p> <p>Upon completion, graduates will be well-prepared to pursue careers as data scientists, analysts, or machine learning engineers, contributing meaningfully to industries where data-driven insights are vital. The program aims to produce professionals who excel not only in technical skills but also in understanding the ethical implications and real-world applications of data science.</p>
15	<p><b>Program Educational Objectives (PEOs) for BCA-Data Science Program:</b></p> <ol style="list-style-type: none"> <li><b>1. Advanced Data Analysis Proficiency:</b> Graduates of the program will demonstrate advanced proficiency in data analysis, showcasing the ability to employ sophisticated statistical and computational methods to extract meaningful insights from diverse and complex datasets.</li> <li><b>2. Effective Communication of Technical Insights and Collaborative Teamwork:</b> Graduates will possess effective communication skills to convey complex technical insights clearly to diverse audiences and excel in collaborative team environments.</li> <li><b>3. Effective Communication of Technical Insights and Collaborative Teamwork:</b> Graduates will possess effective communication skills to convey complex technical insights clearly to diverse audiences and excel in collaborative team environments.</li> </ol>
16	<p><b>Program Outcomes for Bachelor's Program in Data Science:</b></p> <ol style="list-style-type: none"> <li><b>1. Proficient Data Analysis:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will demonstrate proficiency in collecting, cleaning, and analyzing diverse datasets, applying statistical and computational methods to extract meaningful insights.</li> </ul> </li> <li><b>2. Advanced Machine Learning Applications:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will apply machine learning algorithms for predictive modelling, showcasing competence in supervised and unsupervised learning techniques.</li> </ul> </li> <li><b>3. Effective Data Visualization:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will communicate complex technical findings through clear data visualizations, reports, and presentations, ensuring effective dissemination of insights.</li> </ul> </li> <li><b>4. Programming and Algorithmic Skills:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will exhibit advanced programming skills and algorithmic competence, optimizing data science solutions using contemporary languages and methodologies.</li> </ul> </li> <li><b>5. Database Management Proficiency:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will possess specialized skills in designing, implementing, and optimizing databases, ensuring efficient data storage and retrieval.</li> </ul> </li> <li><b>6. Big Data Handling and Technologies:</b> <ul style="list-style-type: none"> <li>• Outcome: Graduates will apply principles of distributed computing and utilize big data technologies, demonstrating proficiency in handling large-scale datasets.</li> </ul> </li> </ol>

	<p><b>7. Ethical Data Practices and Privacy Compliance:</b></p> <ul style="list-style-type: none"> <li>• Outcome: Graduates will uphold ethical standards in data science practices, demonstrating awareness of legal and ethical implications related to data privacy.</li> </ul> <p><b>8. Real-world Application through Project-Based Learning:</b></p> <ul style="list-style-type: none"> <li>• Outcome: Graduates will apply theoretical knowledge to practical settings, successfully completing industry-relevant projects and collaborating with industry partners on data science challenges.</li> </ul>
17	<p><b>Program Specific Outcomes (PSOs) for Bachelor's Program in Data Science:</b></p> <ol style="list-style-type: none"> <li>1. Advanced Data Analysis Competence: <ul style="list-style-type: none"> <li>• <i>Outcome:</i> Graduates will demonstrate advanced proficiency in employing sophisticated statistical and computational methods to extract meaningful insights from diverse datasets, showcasing expertise in feature engineering and predictive modelling.</li> </ul> </li> <li>2. Programming and Algorithmic Excellence: <ul style="list-style-type: none"> <li>• <i>Outcome:</i> Graduates will exhibit advanced programming skills and algorithmic competence, enabling them to implement and optimize data science solutions using contemporary languages, design patterns, and debugging techniques.</li> </ul> </li> <li>3. Effective Communication through Data Visualization: <ul style="list-style-type: none"> <li>• <i>Outcome:</i> Graduates will possess strong communication skills, effectively conveying complex technical insights through clear data visualizations, reports, and presentations, catering to both technical and non-technical stakeholders.</li> </ul> </li> </ol>

### Programme Structure

#### A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
2 Hr. Tutorial (T) per week	1 Credit
2 Hr. Practical (P) per week	1 Credit

Sl. No.	Program -Category	Credits
1	Program-Core courses, elective Courses, open electives	100/130
2	Technical Skills	10 (SDTCD)
3	Life Skills	3(CASP)
4	Innovation and Entrepreneurial Skills	3(CIPI)
5	Environmental Awareness and Community Services	3(SA)
6	Athletics, Sports, Yoga, Gymnasium	3(SA)
7	Cultural & Literary Activities	3(SA)
8	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	2(SA&SP)
9	Placement Training	3(CASP)
	<b>Total</b>	<b>130+30=160</b>

**3-year degree program: 100 + 30= 130**

**4 Year Honors Program: 130+30= 160**

**18. Courses and Credits:**

<b>Semester-1</b>			
<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
1	UL25FHK11 UL25FHH13	Kannada Siri-1 Katha Saritha	<b>02</b>
2	UL25FHE12	Insight-1	<b>02</b>
3	UC25DS1104	C Programming	<b>03</b>
4	UC25DS1105	C Programming Lab	<b>02</b>
5	UC25DS1106	Computer Fundamental	<b>03</b>
6	UC25DS1107	Computer Fundamental Lab	<b>02</b>
7	UC25DS1108	Mathematical Foundation	<b>03</b>
8	UM25BC1142	OEC-1	<b>03</b>
9	U25TS01	Technical Skills	00
10	U25LS02	Life Skills	00
11	U25ES03	Innovation and Entrepreneurial Skills	00
12	U25VS04	Environmental Awareness and Community Services	00
13	U25AS05	Athletics, Sports, Yoga, Gymnasium	01
14	U25CL06	Cultural & Literary Activities	00
15	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
16	U25PT08	Placement Training	00
		<b>Total</b>	<b>21</b>

<b>Semester-2</b>			
<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
1	UL25FHK21 UL25FHH23	Kannada Siri-2 Katha Sourabha	<b>02</b>
2	UL25FHE22	Insight- 2	<b>02</b>
3	UC25DS1204	Programming Fundamental using C++	<b>03</b>
4	UC25DS1205	C++ Lab	<b>02</b>
5	UC25DS1206	Data Structures using C++	<b>03</b>
6	UC25DS1207	Data Structures Lab	<b>02</b>
7	UM25BC2341	OEC-2	<b>03</b>
8	U25TS01	Technical Skills	02
9	U25LS02	Life Skills	00
10	U25ES03	Innovation and Entrepreneurial Skills	00
11	U25VS04	Environmental Awareness and Community Services	01
12	U25AS05	Athletics, Sports, Yoga, Gymnasium	01
13	U25CL06	Cultural & Literary Activities	00
14	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
15	U25PT08	Placement Training	00
		<b>Total</b>	<b>21</b>

**Semester-3**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
1	UC25DS2301	Fundamentals of Data Science	<b>03</b>
2	UC25DS2302	Object Oriented Programming Using Java	<b>03</b>
3	UC25DS2303	Java Lab	<b>02</b>
4	UC25DS2304	Cloud Computing	<b>03</b>
5	UC25DS2305	Designing of Algorithm	<b>03</b>
6	UC25DS2306	Designing of Algorithm Lab	<b>02</b>
7	UC25DS2307	OEC-3	<b>03</b>
8	U25TS01	Technical Skills	02
9	U25LS02	Life Skills	00
10	U25ES03	Innovation and Entrepreneurial Skills	01
11	U25VS04	Environmental Awareness and Community Services	00
12	U25AS05	Athletics, Sports, Yoga, Gymnasium	00
13	U25CL06	Cultural & Literary Activities	00
14	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
15	U25PT08	Placement Training	00
		<b>Total</b>	<b>23</b>

**Semester-4**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>
1	UC25DS2401	Database Management System	<b>03</b>
2	UC25DS2402	Database Management System Lab	<b>02</b>
3	UC25DS2403	Python Programming	<b>03</b>
4	UC25DS2404	Python Programming Lab	<b>02</b>
5	UC25DS2405	Cyber Ethics	<b>03</b>
6	UC25DS2406	Internet of Things	<b>03</b>
7	U25TS01	Technical Skills	02
8	U25LS02	Life Skills	02
9	U25ES03	Innovation and Entrepreneurial Skills	00
10	U25VS04	Environmental Awareness and Community Services	01
11	U25AS05	Athletics, Sports, Yoga, Gymnasium	00
12	U25CL06	Cultural & Literary Activities	01
13	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14	U25PT08	Placement Training	01
		<b>Total</b>	<b>23</b>

### Semester-5

Sl. No.	Course Code	Course Title	Credits
1	UC25DS3501	R Programming and Statistical Skills	03
2	UC25DS3502	R Programming Lab	02
3	UC25DS3503	Data Visualization	03
4	UC25DS3504	Data Visualization Lab using Power Bi and Tableau	02
5	UC25DS3505	Data Mining	03
6	UC25DS3506	Software Engineering	03
7	U25TS01	Technical Skills	02
8	U25LS02	Life Skills	01
9	U25ES03	Innovation and Entrepreneurial Skills	01
10	U25VS04	Environmental Awareness and Community Services	00
11	U25AS05	Athletics, Sports, Yoga, Gymnasium	01
12	U25CL06	Cultural & Literary Activities	00
13	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
14	U25PT08	Placement Training	01
		<b>Total</b>	<b>23</b>

### Semester-6

Sl. No.	Course Code	Course Title	Credits
1	UC25DS3601	Big Data Analytics	03
2	UC25DS3602	Web Development using PHP-MySQL	03
3	UC25DS3603	Project Work	06
5	U25TS01	Technical Skills	02
4	U25LS02	Life Skills	01
6	U25ES03	Innovation and Entrepreneurial Skills	01
7	U25VS04	Environmental Awareness and Community Services	00
8	U25AS05	Athletics, Sports, Yoga, Gymnasium	01
9	U25CL06	Cultural & Literary Activities	00
10	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
11	U25PT08	Placement Training	01
		<b>Total</b>	<b>19</b>

**Semester-7**

Sl. No.	Course Code	Course Title	Credits
1	UC25DS4701	Research Methodology and IPR	03
2	UC25DS4702	Research Paper - 1	03
3	UC25DS4703	Internship	08
4	U25TS01	Technical Skills	00
5	U25LS02	Life Skills	00
6	U25ES03	Innovation and Entrepreneurial Skills	00
7	U25VS04	Environmental Awareness and Community Services	00
8	U25AS05	Athletics, Sports, Yoga, Gymnasium	00
9	U25CL06	Cultural & Literary Activities	00
10	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
11	U25PT08	Placement Training	00
		<b>Total</b>	<b>14</b>

**Semester-8**

Sl. No.	Course Code	Course Title	Credits
1	UC25DS4801	Industrial Excursion	03
2	UC25DS4802	Research Paper - 2	03
3	UC25DS4803	Dissertation	10
4	U25TS01	Technical Skills	00
5	U25LS02	Life Skills	00
6	U25ES03	Innovation and Entrepreneurial Skills	00
7	U25VS04	Environmental Awareness and Community Services	00
8	U25AS05	Athletics, Sports, Yoga, Gymnasium	00
9	U25CL06	Cultural & Literary Activities	00
10	U25CC07	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
11	U25PT08	Placement Training	00
		<b>Total</b>	<b>16</b>

List of **Open Elective Courses** Offered:

1. **Semester – 1:** Fundamentals of Computers
2. **Semester – 2:** Digital Fluency
3. **Semester – 3:** Internet Security

19	<p><b>Program Delivery and Program Attainment</b></p> <p>The program comprises several courses, each delivered according to the specifications outlined in the course documents. At the conclusion of each course, both course attainments and program attainments are computed. These attainments undergo analysis during Course Assessment Board and Program Assessment Board meetings, leading to recommendations for enhancements in subsequent offerings.</p>
20	<p><b>Teaching and Learning Methods</b></p> <ol style="list-style-type: none"> <li>1. Face to Face Lectures using Audio-Visuals</li> <li>2. Laboratory work/Fieldwork/Workshop</li> <li>3. Project Based Learning</li> <li>4. Problem Based Learning</li> <li>5. Group Exercises/Assignments</li> <li>6. Demonstrations</li> <li>7. Guest Lectures</li> <li>8. Industry Visit</li> <li>9. Workshops, Group Discussions, Debates, Presentations</li> <li>10. Project Work</li> <li>11. Project Exhibitions</li> <li>12. Technical Competitions</li> </ol>
21	<p><b>Attendance</b></p> <p>A minimum of 85% attendance is essential to appear for semester end examinations. Condoning of attendance shortage is as per the Academic Regulations of BCA Programme.</p>
22	<p><b>Assessment and Grading</b></p> <ol style="list-style-type: none"> <li>1. Every course will be assessed for a weight of 100</li> <li>2. There are 4 components: <ol style="list-style-type: none"> <li>a. Quiz -15%</li> <li>b. Class Tests: 25%</li> <li>c. Application Based open assignments/ Activity/project-based learning/problem-based learning and any such assessment: 20%</li> <li>d. Semester End Examination: 40%</li> </ol> </li> <li>3. Based on total marks scored grade is Awarded.</li> </ol> <p>If marks scored is:</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• If one scores D grade, the candidate is required to re-register for the course (for core courses only, students can exercises their choice in case of electives or open electives means they can re-register or register for a different elective course) and earn the required credits</li> <li>• <b>A minimum of overall 40% is required for completion of course by acquiring minimum grade (pass) with a minimum of 40% in each component.</b></li> </ul> <ol style="list-style-type: none"> <li>4. End of each semester grade card will be issued with SGPA displayed</li> </ol>
23	<p><b>Award of Degree</b></p>

	<p>Every student registering for the program need to complete a <b>minimum of 120 credits for the award of Bachelor’s degree and 160 credits for the award of honors degree.</b></p> <p><b>Award of Degree Certificate:</b></p> <p>Students will be issued consolidated grade card with CGPA displayed and GM University Degree Certificate.</p> <p><b>Award of Gold Medal:</b></p> <p>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 6/8 semester and completing the program within the specified period of 3/4 years (6/8 semesters) will be awarded Gold Medal.</p>
24	<p><b>Student Support for Learning</b></p> <ol style="list-style-type: none"> <li>1. Course Notes</li> <li>2. Reference Books in the Library</li> <li>3. Magazines and Journals</li> <li>4. Internet Facility</li> <li>5. Computing Facility</li> <li>6. Laboratory Facility</li> <li>7. Workshop Facility</li> <li>8. Staff Support</li> <li>9. Lounges for Discussions</li> <li>10. Any other support that enhances their learning</li> </ol>
25	<p><b>Quality Control Measures</b></p> <ol style="list-style-type: none"> <li>1. Review of Course Notes</li> <li>2. Review of Question Papers and Assignment Questions</li> <li>3. Student Feedback</li> <li>4. Moderation of Assessed Work</li> <li>5. Opportunities for students to see their assessed work</li> <li>6. Review by external examiners and external examiners reports</li> <li>7. Staff Student Consultative Committee meetings</li> <li>8. Student exit feedback</li> <li>9. Course Assessment Board (CAB)</li> <li>10. Programme Assessment Board (PAB)</li> </ol>

