

Program Project Report of BCA in Data Science

1	Degree Awarding body	Visvesvaraya Technological University
2	Name of the Program (specified by UGC / AICTE etc.)	BCA in Data Science
3	Program Format	UGC Compliant. Quadrant Model
4	Program Credit	120
5	Nature of Target Group of Learners	Students after class 12
6	Date of Commencement	2023-24

I. Programme's mission and objectives

The mission of a Bachelor of Computer Applications (BCA) program in Data Science is to provide students with a strong foundation in computer science, mathematics, and statistical analysis, as well as specialized knowledge and skills in data science. The program aims to prepare graduates to become competent professionals in the field of data science who can leverage their knowledge to extract meaningful insights from complex data sets and inform business decisions.

A BCA in Data Science curriculum can give students a solid background in Computer Applications and help them develop the practical skills and expertise needed to succeed not only in the IT industry but also in government and the nonprofit sectors.

Program Educational Objectives/Goals:

1. Equip students with a strong theoretical foundation in computer science, mathematics, and statistics to enable them to analyze complex data sets.
2. Develop students' technical skills in data science tools and techniques, such as programming languages (Python, R, etc.), machine learning, data visualization, and database management.
3. Provide students with practical experience through hands-on projects and internships in order to prepare them for real-world challenges in the field of data science.



4. Foster critical thinking and problem-solving skills to enable students to identify and solve data-related problems in various domains such as healthcare, finance, marketing, etc.
5. Instill ethical and social responsibility among students by educating them about the ethical issues related to data science and the potential impacts of their work on society.
6. Develop communication skills, allowing students to effectively communicate complex technical ideas to both technical and non-technical audiences.
7. Prepare students for a range of careers in the IT industry, including Data Analyst, Health Care Analyst, Data Scientist, Market Research Analyst and more.
8. Enable students to pursue further study at the master level, if desired.

Program Operational Objectives:

The outcomes of the BCA in Data Science program are to produce graduates who:

1. Possess a deep understanding of the fundamental concepts, theories, and techniques of data science.
2. Can apply their knowledge and skills to solve complex problems in a systematic and analytical manner.
3. Demonstrate proficiency in computer science, mathematics, and statistics to enable them to analyze complex data sets and other core areas of computer applications.
4. Have knowledge and skills in programming languages (Python, R, etc.), machine learning, data visualization, and database management and other cutting-edge technologies.
5. Can effectively communicate complex technical ideas to both technical and non-technical audiences.
6. Understand the importance of ethical and social responsibility in the use of computer application.
7. Are prepared for a range of careers in the IT industry, including Data Analyst, Health Care Analyst, Data Scientist, Market Research Analyst and more.

8. Can pursue further study at the master level, if desired.
9. Can work independently and collaboratively on digital marketing projects, demonstrating initiative, creativity, and adaptability.
10. Can continuously learn and adapt to new technologies and developments in the field of computer applications.

II. Relevance of the program with HEI's Mission and Goals

Institutional Goals & Mission:

To provide value-based education and mould the character of the younger generation through a system of wholesome learning, so that their earnest endeavor to achieve progress and prosperity in life is matched by an ardent desire to extend selfless service to society, one complementing the other. Our profound mission of providing education for life, and emphasis on compassion driven research, has shaped VTU-COE as a unique institution.

At VTU-COE, we stand united in our mission towards solving globally recognized scientific and societal challenges, including environment, development, and health. VTU-COE stands at the strategic juncture of two streams of cultures: East and West. It is our vision to bring the two together to bridge the divide through meaningful collaborations with world class universities and innovative approaches that will benefit the entire planet.

Institutional Goals:

- To enhance the teaching-learning process by adopting the best and innovative practices to produce competent professionals for careers in Research, Industry and Business with social and common concern.
- To provide the best infrastructure and learning resources to help achieve excellence in career and life.
- To contribute to their personal growth by helping them build marketable skills, enhance career prospects and create productive options for the future.
- Promoting collaborations with neighboring industry, reputed academic institutions

and other establishments for resource sharing and to promote creativity, innovation and entrepreneurship culture.

- Enhancing the quality of education offered through active association with students, parents, faculty, industry, alumni, reputed academic institutions and research organizations.
- Practicing and promoting high standards of professional ethics, transparency, and accountability.
- To sensitize the students to the need to live their lives rooted in the eternal values in the current business scenario.

VTU-COE AHEAD's UG program is in complete congruence with the Institution's mission and educational goals. The program aims to provide a holistic education to the students that are at par with the industry standards. The program has been meticulously designed by VTU-COE highly qualified team of expert faculty members to prepare the graduates to pursue successful careers in diverse fields and to meet both domestic and global demands.

III. Nature of prospective target group of learners

- Those who aspire for career opportunities in the fields of Data Science or in other fields of applied Data Science.
- Those who hope to become entrepreneurs in the field of Data Science and its varied applications.
- Students who wish to pursue their studies for career growth.
- Students from remote areas who do not have access to a regular mode of education.
- Under-privileged students who could not continue their education due to financial difficulties and family obligations.

IV. Appropriateness of programme to be conducted in online mode

The program is ideal to be conducted in online mode because of

- VTU-COE curriculum design

- VTU-COE teaching expertise and evaluation experience in online mode of education
- Our meticulously designed LMS that caters to the needs of each student and enable them to study at their own pace

Learning Outcomes

At the end of the BCA program, students should be able to:

- Apply knowledge of mathematics, computing and management principles appropriately to design and develop software applications.
- Able to identify, formulate problem definition for real world problems, analyse the literature and develop solutions.
- Able to assimilate and use state of the art computing technologies, tools and techniques necessary for computing practices.
- Able to apply standards to manage projects and develop soft skills, and practice professional ethics in all environments.
- Able to communicate effectively in both verbal and written form.
- Able to function effectively as an individual, and as a member or leader in diverse teams, and in a multidisciplinary environment.
- Able to engage in self-learning for continual development as a computing professional and analyse the impact of computing on individuals, organizations, research community and the society at large.

V. Instructional Design

a) Program Format:

Each course will be in 4 quadrants, fully following the UGC guidelines.

1. Quadrant-I is e-Tutorial; which shall contain: Video and Audio Content in an organized form, Animation, Virtual Labs, etc., along with the transcription of the video.
2. Quadrant-II is e-Content; which shall contain; self-instructional material (digital Self Learning Material), e-Books, case studies, presentations etc., and also contain Web Resources such as further references, Related Links etc.
3. Quadrant-III is the Discussion forum for raising of doubts and clarifying the same by the Course Coordinator
4. Quadrant-IV is Assessment, which shall contain; Problems and Solutions, which could be in the form of Multiple-Choice Questions, Fill in the blanks, Matching Questions, Short Answer Questions, Long Answer Questions, Quizzes, Assignments and solutions.

b) Detailed Scheme

Semester - I			
Sl.No	Course Code	Course Name	Credits
1	OBCD101	Foundation Mathematics -I	4
2	OBCD102	Fundamentals of Computers	4
3	OBCD103	Programming in C	4
4	OBCD104	Principles of Management (Introduction)	4
5	OBCD105	Programming in C Lab	2
6	OBCD106	IT Lab	2
Total Credits			20

Semester - II			
Sl.No	Course Code	Course Name	Credits
1	OBCD201	Data Structures using C	4
2	OBCD202	Foundation Mathematics -II	4
3	OBCD203	Communication English	4
4	OBCD204	Data Base Management System	4
5	OBCD205	Data Base Management System Lab	2
6	OBCD206	Data Structure Lab	2
Total Credits			20

Semester - III			
Sl.No	Course Code	Course Name	Credits
1	OBCD301	Operating System with Unix	4
2	OBCD302	Object Oriented Programming Using Java	4
3	OBCD303	Analysis & Design of Algorithm	4
4	OBCD304	Computer Networks	4
5	OBCD305	Java Lab	2
6	OBCD306	ADA Lab	2
Total Credits			20

Semester - IV			
Sl.No	Course Code	Course Name	Credits
1	OBCD401	Web Programming	4
2	OBCD402	Data Analytics using python	4
3	OBCD403	Software Engineering	4
4	OBCD404	Introduction to Artificial Intelligence	4
5	OBCD405	Web Lab	2
6	OBCD406	Data Analytics using Python Lab	2
Total Credits			20

Semester - VI			
Sl.No.	Course Code	Course Name	Credits
1	OBCD601	Project work	12
2	OBCD602	Big Data	4
3	OBCD603	Cloud computing	4
Total			20

Semester - V			
Sl. No	Course Code	Course Name	Credits
1	OBCD501	Computer System & Network Security	4
2	OBCD502	.Net Programming Using C#	4
3	OBCD503	Introduction to Machine Learning	4
4	OBCD504	Data Mining	4
5	OBCD505	.Net Lab	2
6	OBCD506	Mini Project	2
Total Credits			20

c) Duration of the programme

Duration	3 Years
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d) Faculty and support staff requirement

VTU-COE abides by the UGC requirements to have one Programme Coordinator per one Programme, one Course Coordinator per one Course, one Course Mentor per batch of 250 learners and additional Examiners to support and monitor the students.

e) Credit hours for each course or module of the programme

The curriculum of the program will have credits, apportioned as below in the following knowledge segments:

- Core courses in the primary area of the program, including project in the end semester

- Soft core electives in various emerging technology streams
- Industry certification courses as electives
- Soft skills & personality development courses
- Laboratory courses

This program aligns to the credit-based system as per UGC regulations which help the student to understand the exact learning hours required to complete a course

Sl. No.	Credit value of the course	No. of Weeks	No. of Interactive Sessions		Hours of Study Material		Self-Study hours including Assessment etc.	Total Hours of Study (based on 30 hours per credit)
			Synchronous Online Counseling/ Webinars/ Interactive Live Lectures (1 hour per week)	Discussion Forum/ asynchronous Mentoring (2 hours per week)	e-Tutorial in hours	e-Content hours		
1	2 Credits	6 Weeks	6 Hours	12	10	10	22	60
2	4 Credits	12 Weeks	12 Hours	20	20	20	44	120
3	6 Credits	14 Weeks	28 Hours	30	30	30	66	180
4	8 Credits	16 Weeks	32 Hours	40	40	40	88	240

VI. Admission Procedure

Students are admitted to the program only after carefully considering their specific eligibility. The documents are carefully scrutinized before admissions are provided.

a) Minimum Eligibility

Indian Education Students: Direct admissions for learners with a minimum of 50% marks in 10 + 2 level. Learners below 50% marks will be also considered for admissions following a short interview.

b) Procedure for Admissions:

The online procedure for admission is simple and easy to access. Interested candidates can apply online application form provided in VTU official website.

c) Policy of Programme Delivery Method

The course will be delivered completely through online materials prepared as per the applicable norms laid down by competent authority of UGC.

- These e-learning Materials (PPT, Video, Video Script, reading materials, Quiz, assignments & Discussion Forums) as per Four-Quadrant approach are delivered through VTU Learning Management System (LMS) and these e-contents will be made available to all the registered applicants in a formalized way with proper accesses credentials.
- The unit wise continuous assessment (designed using blooms taxonomy) is conducted online in the LMS on adaptive basis as per the requirement of the course.
- There will be Live Sessions - 1 hour per week per course.
- Reading materials & video lectures are uploaded every week prior to the live session
- There will be discussion forums active for 2 hours on weekly basis for every course
- There will be Quizzes & Assignments once a week, every week for each course.
- Every week, for every course, there will be a live doubt clearing session with the faculty, typically for about an hour. These sessions will also be recorded and available for watching later. In order to accommodate working professionals, these sessions will be held on weekends or after working hours.

d) Web-based Tool

Our instructional delivery system is the same for all programs. The content for Quadrant-1 (E-Tutorial) is created by the expert faculty. Each faculty uses a standardized PowerPoint template (same fonts / layout for all courses). Each course is broken up into short 6-10-minute videos with PowerPoint slides as research has proven this is the ideal content length. All material created is from the expert faculties knowledge and using appropriate copyright provisions.

After creating the E-Tutorial videos, the faculty sends them to our in-house audio-video editing team that checks each video for any errors and performs post-processing. Upon approval the videos will be uploaded into the LMS.

We are using VTU-LMS an open source LMS. VTU-LMS provides modules and functionality for all of the 4 quadrants. Each faculty is assigned a course in VTU-LMS along with their respective team. The Faculties are able to create individual pages for each video. Each Q1- E-Tutorial video is show with its respective Q-2 (E-content), which is placed below the video. Students are also assigned quizzes, assignments and exams satisfying quadrant 4.

Every week students must complete 1 module of the course which includes all four quadrants, E- tutorial (videos created by faculty) E-content (supporting material from books and web), Discussion forums and meetings for doubt clearing. Also, there is a weekly quiz to motivate the students to stay on track. Quizzes are given using the VTU LMS which as a built-in functionality for this purpose.

Following the UGC guidelines we weight the internal marks at 30% and External (final-exam) as 70%. The final exam will be conducted by VTU using online proctored platform. We are in the process of selecting a high-quality proctoring solution that uses bio-metrics, safe browsing, and automated proctoring.

Overall, the VTU-LMS is used for delivering on all aspects needed to create a high-quality online educational experience. Students have a single central website to view the videos, take quizzes, submit assignments, view their grades, and discuss questions.

e) Academic Activities

VTU-COE is fully compliant for the quadrant model of instruction. Supplementary activities include webinars with industry experts, networking opportunities with other students for academic understanding. Other programs could have contests, blog inputs, and various other curriculum enrichments.

f) Evaluation Policy

All the courses will be offered in semester pattern. For every course a student attending during a semester, there is an online Continuous Internal Assessment (CIA) component that will contribute 30% (Quizzes, Case Studies, and Assignments). There will be one proctored online examination of 3 hours duration at the end of the semester for each

credited course which will contribute 70% total assessment. We advise Students to have at least 75% attendance in all the activities as per ODL regulations. The evaluation components include submissions, attendance in live sessions & LMS activities.

Grading: Relative grading system is adopted to award the letter grade. The letter grades, the corresponding grade points and the ratings are as follows:

Letter Grade	Grade Points	Rating
O	10.00	Outstanding
A+	9.50	Excellent
A	9.00	Very Good
B+	8.00	Good
B	7.00	Above Average
C	6.00	Average
P	5.00	Pass
F	0.00	Fail
FA	0.00	Failed due to insufficient attendance
I	0.00	Incomplete (awarded by lab courses/ projects/seminars)
W		Withheld

After finalization of the grades by the class committee and subsequent approval of the Head of the School, the result will be announced by the Controller of Examinations

VII. Laboratory support and Library Resources

- Due to the nature of VTU-COE Ahead being an online degree, all courses that require labs use virtual labs in the areas of computing.
- Students are provided with login credentials to access VTU-COE consortium for course related study materials and references.

VIII. Cost estimate of the programme and the provisions

In general, the costs vary based upon number of students. VTU strive to be fully compliant to all UGC regulations. Also, VTU is known for having admissions for a significant percentage of economically deprived portions of the society. VTU Online

Programmes related costs are 40% to 60% of fee revenue, and balance of semi variable/fixed expenses are 30% to 50%. In summary, VTU strives for 10% operating margins. If student quantities are less, VTU will not increase student fees.

IX. Quality assurance mechanism

VTU-COE has a very active audit committee that regularly and also spontaneously inspects current processes. If any process requires improvement, faculty and staff consider it to be the highest priority.


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