

# Program Project Report of MCA in Artificial Intelligence and Data Science

1	Degree Awarding body	Visvesvaraya Technological University
2	Name of the Program (specified by UGC / AICTE etc.)	MCA in Artificial Intelligence and Data Science
3	Program Format	UGC Compliant. Quadrant Model
4	Program Credit	80
5	Nature of Target Group of Learners	Graduate Adults/ Professional Learners/Experienced Professionals/Corporate Employees
6	Date of Commencement	2023-24

## I. Programme's mission and objectives

**Mission:** The mission of an MCA in Artificial Intelligence and Data Science is to provide students with a rigorous and comprehensive education in the fields of artificial intelligence and data science, with the aim of preparing them to become leaders in these rapidly evolving fields.

The program aims to train students in the latest tools, technologies, and methodologies used in artificial intelligence and data science, and to equip them with the critical thinking and problem-solving skills necessary to address real-world problems in these fields. The program seeks to provide a strong foundation in both theoretical and practical aspects of artificial intelligence and data science, and to foster creativity and innovation in the development of intelligent systems and applications.

An MCA in Artificial Intelligence & Data Science curriculum can give students a solid background in computer applications in the field of Artificial Intelligence & Data Science and help them to develop the practical skills and expertise needed to succeed not only in the business world but also in government and the nonprofit sectors.

### **Program Educational Objectives/Goals:**

1. To provide students with a comprehensive understanding of the fundamental concepts and principles of artificial intelligence and data science, including machine learning, data mining, natural language processing, and robotics.
2. To train students to apply advanced algorithms and techniques for data analysis, pattern recognition, and prediction using artificial intelligence and machine learning tools.
3. To teach students to design and implement software solutions for data management, storage and retrieval, and to develop intelligent systems and applications that can learn and adapt to changing environments.
4. To develop students' critical thinking and problem-solving skills through research projects and case studies that address real-world problems in Artificial Intelligence and Data Science.
5. To provide students with the communication skills necessary to present and discuss scientific findings with other scientists and the general public.
6. To foster students' ability to adapt to changing technologies, industry trends, and to pursue lifelong learning in the field of Artificial Intelligence & Data Science.
7. To instill in students a sense of ethical awareness , social responsibility and to emphasize the importance of integrity, diversity, and sustainability in their professional practices.
8. Prepare students for a range of careers in the AI & DS sector including Artificial Intelligence Engineer, Data Scientist, Data Analyst, Product Analyst, Machine Learning Engineer and more.
9. Enable students to pursue further study at the doctoral level, if desired.

### **Program Operational Objectives:**

The outcomes of the MCA in AI & DS program are to produce graduates who:

1. Possess a deep understanding of the fundamental concepts and principles of artificial intelligence and data science, including machine learning, data mining, natural language processing, and robotics.
2. Can apply their knowledge and skills to solve complex problems in a systematic and analytical manner.

3. Demonstrate proficiency in fundamental concepts and principles of artificial intelligence and data science, including machine learning, data mining, natural language processing, and robotics.
4. Have knowledge and skills in advanced algorithms and techniques for data analysis, pattern recognition, and prediction using artificial intelligence and machine learning tools 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 applications.
7. Are prepared for a range of careers in the computer application industry, including Artificial Intelligence Engineer, Data Scientist, Data Analyst, Product Analyst, Machine Learning Engineer and more.
8. Can pursue further study at the doctoral level, if desired.
9. Can work independently and collaboratively on AI & DS projects, demonstrating initiative, creativity, and adaptability.
10. Can continuously learn and adapt to new technologies and developments in the field of Artificial Intelligence & Data Science.

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

### **Institutional 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 PG 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 field of Artificial Intelligence & Data Science or in other fields of applied Artificial Intelligence & Data Science.
- Those who hope to become entrepreneurs in the field of Artificial Intelligence & 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 Distance Learning and/or Online mode**

The program is ideal to be conducted in Distance Learning and/or 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 enables them to study at their own pace

#### **Learning Outcomes**

At the end of the MCA in AI & DS program, students should be able to:

- Apply knowledge of analysis, design, implement, and maintain computer application systems to meet the needs of industry.
- 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 of computer application, tools and techniques necessary for administration and management 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 computer application professional and analyse the impact of administration and management 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.

**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.

**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.

**Quadrant-III** is the Discussion forum for raising of doubts and clarifying the same by the Course Coordinator

**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	Code	Course Name	Credit
1	OMCI101	Foundation Mathematics for Computer Applications	4
2	OMCI102	Data Structure	4
3	OMCI103	Relational Database Management System	4
4	OMCI104	Programming using JAVA	4
5	OMCI105	JAVA Lab	2
6	OMCI106	DBMS Practical's	2
TOTAL			20



### SEMESTER-II

Sl. No	Code	Course Name	Credit
1	OMCI201	Design & Analysis of Algorithms	4
2	OMCI202	Python programming for Data Structures	4
3	OMCI203	Data Warehousing & Data Mining	4
4	OMCI204	Introduction to Artificial Intelligence	4
5	OMCI205	Python Lab	2
6	OMCI206	ADA Lab	2
<b>TOTAL</b>			<b>20</b>

### SEMESTER-III

Sl. No	Code	Course Name	Credit
1	OMCI301	Probability & Statistics for AI & DS	4
2	OMCI302	Data Visualization	4
3	OMCI303	Machine Learning	4
4	OMCI304x	Elective - I	4
5	OMCI305	Machine Learning using Python Lab	2
6	OMCI306	Mini Project on Data Modeling	2
<b>TOTAL</b>			<b>20</b>

<b>Elective -I</b>		
Sl.No.	Course Code	Course Name
1	OMCI304A	Deep Learning
2	OMCI304B	Natural Language Processing
3	OMCI304C	Computer Vision
4	OMCI304D	Business Analytics



## SEMESTER-IV

Sl. No	Code	Course Name	Credit
1	OMCI401	Project Work	14
2	OMCI402	Predictive Analysis using Machine Learning	3
3	OMCI403x	Elective - II	3

Elective -II		
Sl.No.	Course Code	Course Name
1	OMCI403A	Applications of Machine Learning
2	OMCI403B	Internet of Things - IoT
3	OMCI403C	Data Engineering for AI
4	OMCI403D	Text Mining

**c) Duration of the programme : 2 Years**

**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 helps the student 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 Counselling/ 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 UG degree. Learners below 50% marks will be also considered for admissions following a short interview.

- Candidates must have passed 10 + 2
- Candidate must have completed any undergraduate degree
- Students in their final year can apply with the last completed semester results
- Candidates with work experience will have an added advantage for admissions.

**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 their

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 meeting 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 platforms. We are in the process of selecting a high-quality proctoring solutionthat 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 OL 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

## VII. Laboratory Support and Library Resources

Due to the nature of VTU-COE 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 e-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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