DR. P. A. Inamdar University, Pune

FACULTY OF COMPUTER APPLICATIONS & INFORMATION TECHNOLOGY

Bachelor of Computer Applications (BCA) Data Science

SYLLABUS

**Four years, Eight Semesters, Full time Program
Under Choice Based Credit System (CBCS)
&
Outcome Based Education (OBE) Pattern as
per UGC and NEP-2020 Guidelines
Syllabus Effective from 2023-24 academic year**

1. **BCA Four Years Program:**

Preamble
The degree shall be titled as Bachelor of Computer Application Program under Faculty of Computer Application and IT. It follows a choice based credit system and NEP2020 policy   and is a full time four year program consisting of 8 semesters offered by Dr. P. A. Inamdar University (DRPAIU), Pune.

Colleges under DRPAIU have excellent faculty members, computer laboratories, Libraries, and other facilities to provide a proper learning environment to the students.

The expectations and requirements of the Software Industry, immediately and soon, are considered while designing the BCA program. While designing the BCA Program, the above facts are considered and the requirements for higher studies and immediate employment are visualized. This Program consists of different core computer, Open elective subjects, Interdisciplinarity subject and a wide range of value added courses helps the students to build an all-round personality to successfully face the challenges of an IT professional career and good communication skills.

2.   **Program Objectives:**

- An ability to learn design and control strategy; techniques to secure information and adapt to the fast-changing world of information technology needs.

- Apply Principal of Data Science and knowledge of statistical data analysis techniques utilized to support decision making in business.

- Demonstrate use of teamwork, leadership skills, decision making, and organization theory using data analytical tools

- Apply the knowledge of mathematics and computing fundamentals to various real-life applications for any given requirement.

- Analytical and computational approaches on and face the challenges boldly.

- To further creativity and pursuit of excellence in computer applications

3.   **Program Structure:**
The Program is a Four Year (eight semesters) Full Time Degree Program based on a credit system comprising 192 credits and as National Education Policy (NEP) 2020.

4.   **Duration:**
The duration of the BCA degree program shall be of four years divided into eight Semesters. i.e. BCA Part – I (Sem-I & II), BCA Part – II (Sem-III & IV), BCA Part – III (Sem V & VI) and BCA Part – IV (Sem VII & VIII).

5.   **Medium of Instruction**: English

6.   **Eligibility Criteria for admission:**

- A candidate is eligible for admission to the Degree in Bachelor of Computer Application after passing 12th Std. examination (H.S.C. 10+2) from any stream with English as passing subject and has secured 40% marks at 12th std.

- Three Years Diploma after S.S.C. i.e. 10th Standard of Board of Technical Education conducted by Government of Maharashtra or its equivalent.

- Two Years Diploma in Pharmacy after H.S.C., of the Board of Technical Education conducted by the Government of Maharashtra or its equivalent.

- MCVC

7.   **SYLLABUS of BCA (Data Science)**

BACHELOR OF COMPUTER APPLICATION (Data Science)
BCA (Data Science)

7.0 PROPOSED SYLLABUS STRUCTURE

BCA (Data Science) I YEAR (Sem -I)

Semester I					
Sr. No	Subject Name	Course Code	Credit	IA	EA
1	Computer Fundamentals & Organization	C101	4	30	70
2	Basic Mathematics (Linear Algebra, Calculus and Trigonometry)	C102	4	30	70
3	Programing Concepts using C	C103	4	30	70
4	Open Elective 1	ID1	2	25	25
5	Value Added Course 1	MD1	2	25	25
6	Practical / Lab - C Language	P103	4	30	70
7	Practical / Lab- CO	P101	4	30	70
TOTAL			24	600	

BCA I YEAR (Sem -II)

Semester II					
Sr. No	Subject Name	Course Code	Credit	IA	EA
1	Discrete Mathematics	C201	4	30	70
2	Data Structures using C	C202	4	30	70
3	Object Oriented Software Engineering	C203	4	30	70
4	Open Elective 2	ID2	2	25	25
5	Value Added Course 2	MD2	2	25	25
6	Practical / Lab - Data Structure	P202	4	30	70
7	Practical / Lab - Using UML tool	P203	4	30	70
TOTAL			24	600	

BACHELOR OF COMPUTER APPLICATION (Data Science)
BCA (Data Science)

PROPOSED SYLLABUS STRUCTURE
BCA (Data Science) II YEAR (Sem-III)

Semester III					
Sr. No	**Subject Name**	**Course Code**	**Credit**	**IA**	**EA**
1	Database Management System	C301	4	30	70
2	Computer Networks	C302	4	30	70
3	Statistical Techniques	C303	4	30	70
4	Open Elective 3	ID3	2	25	25
5	Value Added Course 3	MD3	2	25	25
6	Practical / Lab - R tool	P303	4	30	70
7	Practical / Lab - SQL, PLSQL	P301	4	30	70
TOTAL			**24**	**600**	

BCA (Data Science) II YEAR (Sem-IV)

Semester IV					
Sr. No	**Subject Name**	**Course Code**	**Credit**	**IA**	**EA**
1	Probability and Combinatorics	C401	4	30	70
2	Cloud Computing	C402	4	30	70
3	Big Data Analytics	C403	4	30	70
4	Open Elective 4	ID4	2	25	25
5	Value Added Course 4	MD4	2	25	25
6	Practical / Lab - Cloud Computing	P402	4	30	70

7	Big Data Analytics Lab	P403	4	30	70
TOTAL			**24**		00

BCA (Data Science) III YEAR (Sem-V)

Semester V					
Sr. No	**Subject Name**	**Course Code**	**Credit**	**IA**	**EA**
1	Times Series Analysis	C501	4	30	70
2	Data Analytics using MS Excel and SQL	C502	4	30	70
3	Data preprocessing & Data warehousing	C503	4	30	70
4	Open Elective 4	ID5	2	25	25
5	Mini project	ITP1	2	25	25
6	Practical / Lab - Times Series Analysis Lab	P501	4	30	70
7	Practical / Lab - Hands on Preprocessing Techniques & DW tools	P503	4	30	70
TOTAL			**24**	**600**	

BCA (Data Science) III YEAR (Sem-VI)

Semester VI					
Sr. No	**Subject Name**	**Course Code**	**Credit**	**IA**	**EA**
1	Data Science using Python	C601	4	30	70
2	Software Project Management	C602	4	30	70
3	Major Project I	ITP2	8	100	100
4	Practical / Lab - Python Programming	P601	4	30	70
5	Practical / Lab - SPM Tool MS Project / JIRA /	P602	4	30	70
TOTAL			**24**	500	

BCA (Data Science) IV YEAR (Sem-VII)

Semester VII					
Sr. No	Subject Name	Course Code	Credit	IA	EA
1	Data visualization Concepts & Techniques	C701	4	30	70
2	Data Mining - Machine Learning algorithms	C702	4	30	70
3	Major Project II	ITP3	8	100	100
4	Practical / Lab - Data Mining Tool	P702	4	30	70
5	Practical/Lab Data visualization tool Power BI/ Tableau	P701	4	30	70
TOTAL			24	600	

BCA (Data Science) IV YEAR (Sem-VIII)

Semester VIII					
Sr. No	Subject Name	Course Code	Credit	IA	EA
1	Predictive Modeling and Analytics	C801	4	30	70
2	Artificial Intelligence - Deep Learning	C802	4	30	70
3	Practical / Lab - AIDL	P802	4	30	70
4	IT Industry Project	ITP4	8	100	100
5	Research Project	ITP5	4	30	70
TOTAL			24	6 0	

7.1 List of Open Electives

Open Elective 1	Open Elective 2	Open Elective 3	Open Elective 4
Internet of Things	Linux Administration	Agile Methodology	DevOps
Research Methodology	Deployment Environment (Azure, AWS, Google Cloud)	Data Science Project Management	Visualization Tool (ClickView, ClickScense)
Advance Statistics	Data Visualization	MongoDB	NLP - Text mining
Deployment Environment (Flask, Heroku, Django)	RPA and Websraping	ETL Tool - ELK (Elastic, Logstack & Kibina)	ERL Tool- Talend
Web Scraping Tool (Beautiful Soup, Scrapy)			

7.2 List of Value added Electives

Value Added Elective 1	Value Added Elective 2	Value Added Elective 3	Value Added Elective 4
Soft Skill - English Vocabulary & written abilities	Soft Skill - Spoken English & Verbal Communication	Presentations Skills	PI & Group Discussions Skills
Time Management Skills	Cupping Therapy	Catering & Hotel Management	Basic Oral Hygiene

8. **Grading System for Program under Management Studies:**

    8.1. **Grade Points:** The Faculty of Computer Application and IT, Dr. P.A. Inamdar University has suggested a 10-point grading system for all programs designed by its various Board of Studies. A grading system is a 10-point system if the maximum grade point is 10. The system is given in Table I below.

Table I: The 10-point Grading System Adapted for Program

Range of Percent Marks	[80,100] [00,39]	[70,79]	[60,69]	[55,59]	[50,54]	[40,49]	[00,39]
Grade Point	10.0	9.0	8.0	7.0	6.0	5.0	0.0
Grade	**O**	**A+**	**A**	**B+**	**B**	**C**	**D**

Formula to calculate GP is as under:

Set x = Max/10 where Max is the maximum marks assigned for the examination (i.e. 100)

Formula to calculate the individual evaluation

Range of Marks	Formula for the Grade Point
8x ≤ Marks≤10x	10
5.5x ≤ Marks≤8x	Truncate (M/x) +2
4x ≤ Marks≤5.5x	Truncate (M/x) +1

8.2. Scheme of Examination

Courses having Internal Assessment (IA) and University Examinations (UE)shall be evaluated by the respective constituent units and the University at the term end for 40 and 60 Marks respectively. The total marks of IA and UE shall be 100 Marks and it will be converted into grade points and grades.

For Comprehensive Continuous Assessment (CCA) The subject teacher may use the following assessment tools: a) Class Tests
b) Presentations
c) Class Assignments
d) Case studies
e) Practical Assignments
f) Mini Projects
g) Oral

9. Award of Credits:

● Each semester consists of 3 Generic Core Subjects, one interdisciplinary Subject and one multidisciplinary Subject followed by Practical / Mini Project / Major Project.

● Each Generic core subject is of 4 credits shall be evaluated out of100 marks (30 Internal Assessment and 70 Term End Assessment) and students should secure at least 40 marks to earn full credits of that course.

● Each interdisciplinary and multidisciplinary subject is of 2 credits shall be evaluated out of 50 marks (25 Internal Assessment and 25 Term End Assessment) and students should secure at least 28 marks to earn full credits of that course.

10. Evaluation Pattern:

● Each course carrying 100 marks shall be evaluated with Internal Assessment (IA) and University Evaluation (UE) mechanism. Continuous assessment shall be of 30 marks while University Evaluation shall be of 70 marks. To pass the course, a student must secure a minimum of 40 marks provided that he should secure a minimum 28 marks in University Evaluation (UE). ● IA shall be based on internal tests (minimum 2 for 20 marks). In addition, for the remaining 10 marks a teacher may assign various activities such as home assignments, 3 tutorials, seminars, presentations, group discussion etc, to the students and evaluate them accordingly.

11. Method of Evaluation and Evaluation Criteria: -

1. **Internal Assessment** 30 marks for all theory related subjects 2. Practical and Project will be evaluated separately University examination will be 50 marks.

Instructions for teachers for internal evaluation for 30 Marks - The purpose of internal evaluation is to assess the depth of knowledge, understanding and awareness. For this purpose, a teacher is expected to use different evaluation methods to have rational and objective assessment of the learners and available resources.

The class work will carry 30 marks in each course. Internal Evaluation includes continuous evaluation of a student by adopting a variety of techniques such as Assignments, Presentation, Internal examination, Group Discussions, Projects etc.

There shall be two minor projects and one major project for internal and university evaluation as compulsory part of assessment (Semester V, VI, VI & VII).

2. **Internship and Project Examination**

   For the course on Practical and Project work as per the regular practice there will be a Written Report and a viva presentation of 100 marks at DRPAIU level.

3. **External Examination:** - There will be a written Examination of 70 marks and 3 hrs duration for every course at the end of each Semester. Setting of Question Papers (Applicable to theory subjects)

   a. A candidate shall have to answer the questions in all the subjects in English only.
   b. Question papers shall be framed to ensure that no part of the syllabus is left out of study by a candidate.
   c. Question papers shall be balanced in respect of various topics outlined in the syllabus.
   d. The question papers shall have a combination of long, short answer and MCQ type questions.

12. **Completion of Degree Program:** A student who earns 192 credits, shall be considered to have completed the requirements of the B.C.A. degree program and CGPA will be calculated for such students.

Students must complete the BCA program within six years from the date of admission.