PRESIDENCY UNIVERSITY

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi

PRESIDENCY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Program Regulations and Curriculum

2025-2026

POST GRADUATE DIPLOMA (PBD) in

Big Data

based on Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

(As amended up to the xx Meeting of the Academic Council held on xx June 2025. This document supersedes all previous guidelines)

Regulations No: PU/AC-xx.x/SOCSE06/PBD/2025-2026

Resolution No.xx of the xx Meeting of the Academic Council held on xx June 2025, and ratified by the Board of Management in its x Meeting held on xx June 2025.

JUNE-2025

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PART A – PROGRAM REGULATIONS

1. Vision & Mission of the University and the School / Department

1.1 Vision of the University

To be a Value-driven Global University, excelling beyond peers and creating professionals of integrity and character, having concern and care for society.

1.2 Mission of the University

- Commit to be an innovative and inclusive institution by seeking excellence in teaching, research and knowledge-transfer.
- Pursue Research and Development and its dissemination to the community, at large.
- Create, sustain and apply learning in an interdisciplinary environment with consideration for ethical, ecological and economic aspects of nation building.
- Provide knowledge-based technological support and services to the industry in its growth and development.
- To impart globally-applicable skill-sets to students through flexible course offerings and support industry's requirement and inculcate a spirit of new-venture creation.

1.3 Vision of Presidency School of Computer Science and Engineering

To be a value-based, practice-driven Presidency School of Computer Science and Engineering, committed to developing globally competent engineers, dedicated to developing cutting-edge technology to enhance the quality of life.

1.4 Mission of Presidency School of Computer Science and Engineering

- Cultivate a practice-driven environment with computing-based pedagogy, integrating theory and practice.
- Attract and nurture world-class faculty to excel in teaching and research in the realm of computing sciences.
- Establish state-of-the-art computing facilities for effective teaching and learning experiences.
- Promote interdisciplinary studies to nurture talent for global impact.
- Instill entrepreneurial and leadership skills to address social, environmental and community needs.

2. Preamble to the Program Regulations and Curriculum

This is the subset of Academic Regulations and it is to be followed as a requirement for the award of M.Tech degree.

The Curriculum is designed to take into the factors listed in the Choice Based Credit System (CBCS) with focus on Social Project Based Learning, Industrial Training, and Internship to enable the students to become eligible and fully equipped for employment in industries, choose higher studies or entrepreneurship.

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations of the University, the Academic Council hereby makes the following Regulations.

3. Short Title and Applicability

a. These Regulations shall be called the PG Diploma Degree Program Regulations and Curriculum 2025-2026.
b. These Regulations are subject to, and pursuant to the Academic Regulations.

c. These Regulations shall be applicable to the ongoing PG Diploma Degree Programs of the 2025-2026 batch, and to all other PG Diploma Degree Programs which may be introduced in future.
d. These Regulations shall supersede all the earlier PG Diploma Degree Program Regulations and Curriculum, along with all the amendments thereto.
e. These Regulations shall come into force from the Academic Year 2024-2025.

4. Definitions

In these Regulations, unless the context otherwise requires:

a. *"Academic Calendar" means the schedule of academic and miscellaneous events as approved by the Vice Chancellor;*
b. *"Academic Council" means the Academic Council of the University;*
c. *"Academic Regulations" means the Academic Regulations, of the University;*
d. *"Academic Term" means a Semester or Summer Term;*
e. *"Act" means the Presidency University Act, 2013;*
f. *"AICTE" means All India Council for Technical Education;*
g. *"Basket" means a group of courses bundled together based on the nature/type of the course;*
h. *"BOE" means the Board of Examinations of the University;*
i. *"BOG" means the Board of Governors of the University;*
j. *"BOM" means the Board of Management of the University;*
k. *"BOS" means the Board of Studies of a particular Department/Program of Study of the University;*
l. *"CGPA" means Cumulative Grade Point Average as defined in the Academic Regulations;*
m. *"Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;*
n. *"COE" means the Controller of Examinations of the University;*
o. *"Course In Charge" means the teacher/faculty member responsible for developing and organising the delivery of the Course;*
p. *"Course Instructor" means the teacher/faculty member responsible for teaching and evaluation of a Course;*
q. *"Course" means a specific subject usually identified by its Course-code and Course-title, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific Academic Term;*
r. *"Curriculum Structure" means the Curriculum governing a specific Degree Program offered by the University, and, includes the set of Baskets of Courses along with minimum credit requirements to be earned under each basket for a degree/degree with specialization/minor/honours in addition to the relevant details of the Courses and Course catalogues (which describes the Course content and other important information about the Course). Any specific requirements for a particular program may be brought into the Curriculum structure of the specific program and relevant approvals should be taken from the BOS and Academic Council at that time.*
s. *"DAC" means the Departmental Academic Committee of a concerned Department/Program of Study of the University;*
t. *"Dean" means the Dean / Director of the concerned School;*
u. *"Degree Program" includes all Degree Programs;*

v. "Department" means the Department offering the degree Program(s) / Course(s) / School offering the concerned Degree Programs / other Administrative Offices;

w. "Discipline" means specialization or branch of M.Tech. Degree Program;

x. "HOD" means the Head of the concerned Department;

y. "L-T-P-C" means Lecture-Tutorial-Practical-Credit – refers to the teaching – learning periods and the credit associated;

z. "MOOC" means Massive Open Online Courses;

aa. "MOU" means the Memorandum of Understanding;

bb. "NPTEL" means National Program on Technology Enhanced Learning;

cc. "Parent Department" means the department that offers the Degree Program that a student undergoes;

dd. "Program Head" means the administrative head of a particular Degree Program/s;

ee. "Program Regulations" means the PG Diploma Degree Program Regulations and Curriculum, 2025-2026;

ff. "Program" means the Masterr of Technology (M.Tech.) Degree Program;

gg. "PSCS" means the Presidency School of of Computer Science and Engineering;

hh. "Registrar" means the Registrar of the University;

ii. "School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;

jj. "Section" means the duly numbered Section, with Clauses included in that Section, of these Regulations;

kk. "SGPA" means the Semester Grade Point Average as defined in the Academic Regulations;

ll. "Statutes" means the Statutes of Presidency University;

mm. "Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;

nn. "Summer Term" means an additional Academic Term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;

oo. "SWAYAM" means Study Webs of Active Learning for Young Aspiring Minds.

pp. "UGC" means University Grant Commission;

qq. "University" means Presidency University, Bengaluru; and

rr. "Vice Chancellor" means the Vice Chancellor of the University.

5. Program Description

The PG Diploma Degree Program Regulations and Curriculum 2025-2026 are subject to, and, pursuant to the Academic Regulations. These Program Regulations shall be applicable to the following ongoing PG Diploma (Big Data.) Degree Programs of 2025-2026 offered by the Presidency School of Engineering (PSOE):

1. PG Diploma in Drone Technology

5.1 These Program Regulations shall be applicable to other similar programs, which may be introduced in future.

5.2 These Regulations may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.

5.3 The effect of periodic amendments or changes in the Program Regulations, on the students admitted in earlier years, shall be dealt with appropriately and carefully, so as to ensure that those students are not subjected to any unfair situation whatsoever, although they are required to conform to these revised Program Regulations, without any undue favour or considerations

6. Minimum and Maximum Duration

6.1 PG Diploma Degree Program is a One-Year, Full-Time Semester based program. The minimum duration of the pG Diploma Program is One year and each year comprises of two academic Semesters (Odd and Even Semesters) and hence the duration of the PG Diploma Degree is Two (02) Semesters.

6.2 A student who for whatever reason is not able to complete the Program within the normal period or the minimum duration (number of years) prescribed for the Program, may be allowed a period of One year beyond the normal period to complete the mandatory minimum credits requirement as prescribed by the concerned Program Regulations and Curriculum. In general, the permissible maximum duration (number of years) for completion of Program is 'N' + 1 year, where 'N' stands for the normal or minimum duration (number of years) for completion of the concerned Program as prescribed by the concerned Program Regulations and Curriculum.

6.3 The time taken by the student to improve Grades/CGPA, and in case of temporary withdrawal/re-joining (Refer to Clause 16.1 of Academic Regulations), shall be counted in the permissible maximum duration for completion of a Program.

6.4 In exceptional circumstances, such as temporary withdrawal for medical exigencies where there is a prolonged hospitalization and/or treatment, as certified through hospital/medical records, women students requiring extended maternity break (certified by registered medical practitioner), and, outstanding sportspersons representing the University/State/India requiring extended time to participate in National/International sports events, a further extension of one (01) year may be granted on the approval of the Academic Council.

6.5 The enrolment of the student who fails to complete the mandatory requirements for the award of the concerned Degree (refer Section 19.0 of Academic Regulations) in the prescribed maximum duration (Sub-Clauses 18.1 and 18.2 of Academic Regulations), shall stand terminated and no Degree shall be awarded.

7 Programme Educational Objectives (PEO)

After successful completion of the PG Diploma in Big Data, the learners shall be:

PEO 01: Equipped with the knowledge and practical skills to work in data-driven industries as data engineers, analysts, or big data developers.
PEO 02: Able to demonstrate a strong understanding of big data tools, techniques, and platforms such as Hadoop, Spark, and NoSQL databases.
PEO 03: Capable of solving complex real-world problems through critical thinking, data modeling, and predictive analytics.
PEO 04: Prepared for continuous learning and professional development in emerging areas of data science and big data technologies.

8 Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

8.1 Programme Outcomes (PO)

On successful completion of the Program, the students shall be able to:

After completing the PG Diploma in Big Data, learners will be able to:

PO1: Apply big data analytics concepts, tools, and techniques to solve real-world data challenges.
PO2: Demonstrate practical proficiency in using distributed computing frameworks and data platforms such as Hadoop and Spark.
PO3: Develop and deploy predictive models and machine learning pipelines using structured and unstructured datasets.
PO4: Analyze large-scale datasets to extract actionable insights and support data-driven decision-making.
PO5: Exhibit professional ethics, effective communication, and collaboration skills in multi-disciplinary data science projects.

8.2 Program Specific Outcomes (PSOs):

On successful completion of the Program, the students shall be able to:
PSO1: Apply domain-specific knowledge of big data analytics to design and implement end-to-end solutions using scalable data architectures.
PSO2: Demonstrate the ability to integrate advanced analytical techniques with real-time data processing tools for decision support and automation.
PSO3: Develop data-centric applications that adhere to industry standards in security, scalability, and performance for solving business problems.

9 Admission Criteria (as per the concerned Statutory Body)

The University admissions shall be open to all persons irrespective of caste, class, creed, gender or nation. All admissions shall be made on the basis of merit in the qualifying examinations; provided that forty percent of the admissions in all Programs of the University shall be reserved for the students of Karnataka State and admissions shall be made through a Common Entrance Examination conducted by the State Government or its agency and seats shall be allotted as per the merit and reservation policy of the State Government from time to time**.** The admission criteria to the M.Tech. Program is listed in the following Sub-Clauses:

- Have a Bachelor's degree in engineering (B.E./B.Tech/BSC) from a recognized university.
- Have a minimum aggregate of 50% in your Bachelor's degree.
- Have a minimum aggregate of 45% in your Bachelor's degree if you belong to a reserved category.
- Have to submit score card from any state or central entrance exam or the Presidency University admission qualifying exam

10. Specific Regulations regarding Assessment and Evaluation (including the Assessment Details of NTCC Courses, Weightages of Continuous Assessment and End Term Examination for various Course Categories)

10.1 The academic performance evaluation of a student in a Course shall be according to the University Letter Grading System based on the class performance distribution in the Course.

10.2 Academic performance evaluation of every registered student in every Course registered by the student is carried out through various components of Assessments spread across the Semester. The nature of components of Continuous Assessments and the weightage given to each component of Continuous Assessments (refer Clause 8.8 of academic regulations) shall be clearly defined in the Course Plan for every Course, and approved by the DAC.

10.3 Format of the End-Term examination shall be specified in the Course Plan.

10.4 Grading is the process of rewarding the students for their overall performance in each Course. The University follows the system of Relative Grading with statistical approach to classify the students based on the relative performance of the students registered in the concerned Course except in the following cases:

- Non-Teaching Credit Courses (NTCC)

Absolute grading method may be adopted, where necessary with prior approval of concerned DAC.

Grading shall be done at the end of the Academic Term by considering the aggregate performance of the student in all components of Assessments prescribed for the Course. Letter Grades shall be awarded to a student based on her/his overall performance relative to the class performance distribution in the concerned Course. These Letter Grades not only indicate a qualitative assessment of the student's performance but also carry a quantitative (numeric) equivalent called the Grade Point.

10.5 Assessment Components and Weightage

Table 1: Assessment Components and Weightage for different category of Courses

Nature of Course and Structure	Evaluation Component	Weightage
Lecture-based Course L component in the L-T-P Structure is predominant (more than 1) (Examples: 3-0-0; 3-0-2; 2-1-0; 2-0-2, 2-0-4 etc.)	Continuous Assessments	50%
	End Term Examination	50%
Lab/Practice-based Course P component in the L-T-P Structure is predominant (Examples: 0-0-4; 1-0-4; 1-0-2; etc.)	Continuous Assessments	50%
	End Term Examination	50%

Skill based Courses like Industry Internship, Capstone project, Research Dissertation, Integrative Studio, Interdisciplinary Project, Summer / Short Internship, Social Engagement / Field Projects, Portfolio, and such similar Non-Teaching Credit Courses, where the pedagogy does not lend itself to a typical L-T-P structure	Guidelines for the assessment components for the various types of Courses, with recommended weightages, shall be specified in the concerned Program Regulations and Curriculum / Course Plans, as applicable.

The exact weightages of Evaluation Components shall be clearly specified in the concerned PRC and respective Course Plan.

Normally, for Practice/Skill based Courses, without a defined credit structure (L–P–C) [NTCC], but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations), the method of evaluation shall be based only on Continuous Assessments. The various components of Continuous Assessments, the distribution of weightage among such components, and the method of evaluation/assessment, shall be as decided and indicated in the Course Plan/PRC. The same shall be approved by the respective DAC.

10.6 Minimum Performance Criteria:

10.6.1 Theory only Course and Lab/Practice Embedded Theory Course

A student shall satisfy the following minimum performance criteria to be eligible to earn the credits towards the concerned Course:

a. A student must obtain a minimum of 30% of the total marks/weightage assigned to the End Term Examinations in the concerned Course.

b. The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of the components of Continuous Assessments, Mid Term Examinations and End Term Examinations in the concerned Course.

10.6.2 Lab/Practice only Course and Project Based Courses

The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of all assessment components in the concerned Course.

10.6.3 A student who fails to meet the minimum performance criteria listed above in a Course shall be declared as "Fail" and given "F" Grade in the concerned Course. For theory Courses, the student shall have to re-appear in the "Make-Up Examinations" as scheduled by the University in any subsequent semester, or, re-appear in the End Term Examinations of the same Course when it is scheduled at the end of the following Semester or Summer Term, if offered. The marks obtained in the Continuous Assessments (other than the End Term Examination) shall be carried forward and be included in computing the final grade, if the student secures the minimum requirements (as per sub-clause 8.9.1 and

8.9.2 of academic regulations) in the "Make-Up Examinations" of the concerned Course. Further, the student has an option to re-register for the Course and clear the same in the summer term/ subsequent semester if he/she wishes to do so, provided the Course is offered.

11 Additional clarifications - Rules and Guidelines for Transfer of Credits from MOOC, etc. – Note: These are covered in Academic Regulations

The University allows students to acquire credits from other Indian or foreign institutions and/or Massive Open Online Course (MOOC) platforms, subject to prior approval. These credits may be transferred and counted toward fulfilling the minimum credit requirements for the award of a degree. The process of transfer of credits is governed by the following rules and guidelines:

11.1 The transfer of credits shall be examined and recommended by the Equivalence Committee (Refer ANNEXURE B of academic regulations) and approved by the Dean - Academics.

11.2 Students may earn credits from other Indian or foreign Universities/Institutions with which the University has an MOU, and that MOU shall have specific provisions, rules and guidelines for transfer of credits. These transferred credits shall be counted towards the minimum credit requirements for the award of the degree.

11.3 Students may earn credits by registering for Online Courses offered by *Study Web of Active Learning by Young and Aspiring Minds* (SWAYAM) and *National Program on Technology Enhanced Learning* (NPTEL), or other such recognized Bodies/ Universities/Institutions as approved by the concerned BOS and Academic Council from time to time. The concerned School/Parent Department shall publish/include the approved list of Courses and the rules and guidelines governing such transfer of credits of the concerned Program from time to time. The Rules and Guidelines for the transfer of credits specifically from the Online Courses conducted by SWAYAM/ NPTEL/ other approved MOOCs are as stated in the following Sub-Clauses:

11.3.1 A student may complete SWAYAM/NPTEL/other approved MOOCs as mentioned in Clause 11.3 (as per academic regulations) and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses as prescribed in the concerned Curriculum Structure. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses and the Open Elective Courses as prescribed by the Curriculum Structure of the concerned Program.

11.3.2 SWAYAM/NPTEL/ other approved MOOCs as mentioned in Clause 11.3 (as per academic regulations) shall be approved by the concerned Board of Studies and placed (as Annexures) in the concerned PRC.

11.3.3 Parent Departments may release a list of SWAYAM/NPTEL/other approved MOOCs for Pre-Registration as per schedule in the Academic Calendar or through University Notification to this effect.

11.3.4 Students may Pre-Register for the SWAYAM/NPTEL/other approved MOOCs in the respective Departments and register for the same Courses

as per the schedule announced by respective Online Course Offering body/institute/ university.

11.3.5 A student shall request for transfer of credits only from such approved Courses as mentioned in Sub-Clause 11.3.2 above.

11.3.6 SWAYAM/NPTEL/other approved MOOCs Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM/NPTEL/other approved MOOCs and obtained a certificate of successful/satisfactory completion.

11.3.7 A student who has successfully completed the approved SWAYAM/NPTEL/ other approved MOOCs and wants to avail the provision of transfer of equivalent credits, must submit the original Certificate of Completion, or such similar authorized documents to the HOD concerned, with a written request for the transfer of the equivalent credits. On verification of the Certificates/Documents and approval by the HOD concerned, the Course(s) and equivalent Credits shall forwarded to the COE for processing of results of the concerned Academic Term.

11.3.8 The credit equivalence of the SWAYAM/NPTEL/other approved MOOCs are based on Course durations and/or as recommended by the Course offering body/institute/university. The Credit Equivalence mapped to SWAYAM/ NPTEL approved Courses based on Course durations for transfer of credits is summarised in Table shown below. The Grade will be calculated from the marks received by the Absolute Grading Table 8.11 in the academic regulations.

Table 2: Durations and Credit Equivalence for Transfer of Credits from SWAYAM-NPTEL/ other approved MOOC Courses

Sl. No.	Course Duration	Credit Equivalence
1	4 Weeks	1 Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

11.3.9 The maximum permissible number of credits that a student may request for credit transfer from MOOCs shall not exceed 20% of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree.

11.3.10 The University shall not reimburse any fees/expense; a student may incur for the SWAYAM/NPTEL/other approved MOOCs.

11.4 The maximum number of credits that can be transferred by a student shall be limited to forty percent (40%) of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. However, the grades obtained in the Courses transferred from

other Institutions/MOOCs, as mentioned in this Section (11.0), shall not be included in the calculation of the CGPA.

PART B: PROGRAM STRUCTURE

12.0 Structure / Component with Credit Requirements Course Baskets & Minimum Basket wise Credit Requirements

The PG.Dip. Big Data Program Structure (2025-2026) totalling 50 credits. Table 3 summarizes the type of baskets, number of courses under each basket and the associated credits that are mandatorily required for the completion of the Degree.

Table 3: Summary of mandatory courses and minimum credit contribution from various baskets

S.No	Baskets	Credit Contribution
1	SCHOOL CORE	15
2	PROGRAM CORE	35
	TOTAL CREDITS	**Min. 50**

In the entire Program, the practical and skill based course component contribute to an extent of approximately 61% out of the total credits of 50 for PG. Dip. In Big Data program of One year duration.

13. Minimum Total Credit Requirements of Award of Degree

As per the AICTE guidelines, a minimum of 50 credits is required for the award of a PG Diploma degree.

14. Other Specific Requirements for Award of Degree, if any, as prescribed by the Statutory Bodies,

14.1 The award of the Degree shall be recommended by the Board of Examinations and approved by the Academic Council and Board of Management of the University**.**

14.2 A student shall be declared to be eligible for the award of the concerned Degree if she/he:

a. Fulfilled the Minimum Credit Requirements and the Minimum Credits requirements under various baskets;

b. Secure a minimum CGPA of 5.0 in the concerned Program at the end of the Semester/Academic Term in which she/he completes all the requirements for the award of the Degree as specified in Sub-clause 19.2.1 a of Academic Regulations**;**

c. No dues to the University, Departments, Hostels, Library, and any other such Centers/ Departments of the University; and

d. No disciplinary action is pending against her/him.

PART C: CURRICULUM STRUCTURE

15.Curriculum Structure – Basket Wise Course List (not Semester Wise)
List of Courses Tabled – aligned to the Program Structure
(Course Code, Course Name, Credit Structure (LTPC), Contact Hours, Course Basket, Type of Skills etc., as applicable).

Type of Skill
F - Foundation
S - Skill Development
EM – Employability
EN – Entrepreneurship

Course Caters to
GS - Gender Sensitization
ES - Environment and sustainability
HP - Human values and Professional Ethics

Table 3.1 : List of School Core Courses (SC)

S. No	Course Code	Course Name	L	T	P	C	Contact Hours	Type of Skills	Pre requisite
1	PBD7000	Mini Project/Internship (Industry-Oriented)	0	0	0	5		S	-
2	PBD7001	University Project/ Internship (Industry-Oriented)	0	0	0	10		S	-
		Total No. of Credits				**15**			

Table 3.2 : List of Programme Core Courses (PC)

S.No	Course Code	Course Name	L	T	P	C	Contact Hours	Type of Skills	Pre requisite
1	PBD4000	Big Data and Data Warehousing	3	0	2	4	5	S	-
2	PBD4001	Data Structures and Algorithms for Big Data	2	0	4	4	6	S	-
3	PBD4002	Programming for Big Data	1	0	4	3	5	S	-
4	PBD4003	Big Data Frameworks and Technologies	2	0	2	3	4	S	-
5	PBD4004	Fundamentals of Cloud Computing	3	0	0	3	3	S	-
6	PBD4005	Big Data Visualization and Reporting	2	0	2	3	4	S	-
7	PBD4006	NoSQL for Big Data Analytics	2	0	2	3	4	S	-
8	PBD4007	Machine Learning for Big Data	2	0	2	3	4	S	-
9	PBD4008	Big Data Security and Privacy	2	0	2	3	4	S	-
10	PBD4009	IoT Data Analytics	2	0	2	3	4	S	-
11	PBD4010	Data Mining and Predictive Analytics	2	0	2	3	4	S	-

	Total No. of Credits	**35**			

16. Practical / Skill based Courses – Internships / Thesis / Dissertation / Capstone Project Work / Portfolio / Mini project

Practical / Skill based Courses like internship, project work, capstone project, research project / dissertation, and such similar courses, where the pedagogy does not lend itself to a typical L-T-P-C Structure as defined in Clause 5.1 of the Academic Regulations are simply assigned the number of Credits based on the quantum of work / effort required to fulfill the learning objectives and outcomes prescribed for the concerned Courses. Such courses are referred to as Non-Teaching Credit Courses (NTCC). These Courses are designed to provide students with hands-on experience and skills essential for their professional development. These courses aim to equip students with abilities in problem identification, root cause analysis, problem-solving, innovation, and design thinking through industry exposure and project-based learning. The expected outcomes are first level proficiency in problem solving and design thinking skills to better equip M.Tech. graduates for their professional careers. The method of evaluation and grading for the Practical / Skill based Courses shall be prescribed and approved by the concerned Departmental Academic Committee (refer Annexure A of the Academic Regulations). The same shall be prescribed in the Course Handout.

16.1 Mini Project Work

A student may opt to do a Project Work for a period of 12-15 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Internship during the II Semester as applicable, subject to the following conditions:

16.1.1 The Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

16.1.2 The student may do the project work in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 16.2.1). Provided further, that the Industry / Company or academic / research institution offering such project work confirms to the University that the project work will be conducted in accordance with the Program Regulations and requirements of the University.

16.2 Research Project / Dissertation

A student may opt to do a Research Project / Dissertation for a period of 12-14 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Capstone Project, subject to the following conditions:

16.2.1 The Research Project / Dissertation shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

The student may do the Research Project / Dissertation in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned

condition (Sub-Clause 18.4.1). Provided further, that the Industry / Company or academic / research institution offering such Research Project / Dissertation confirms to the University that the Research Project / Dissertation work will be conducted in accordance with the Program Regulations and requirements of the University.

Recommended Semester Wise Course Structure / Flow including the Programme / Discipline Elective Paths / Options

Semester wise Course Grid for PG Diploma Big Data							
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Basket**
Semester 1 - Foundations of Big Data & Analytics						25	
1	PBD4000	Big Data and Data Warehousing	3	0	2	4	Program core
2	PBD4001	Data Structures and Algorithms for Big Data	2	0	4	4	Program core
3	PBD4002	Programming for Big Data	1	0	4	3	Program core
4	PBD4003	Big Data Frameworks and Technologies	2	0	2	3	Program core
5	PBD4004	Fundamentals of Cloud Computing	3	0	0	3	Program core
6	PBD4005	Big Data Visualization and Reporting	2	0	2	3	Program core
7	PBD7000	Mini Project/Internship (Industry-Oriented)	0	0	0	5	School Core
Semester 2 - Advanced Big Data Technologies						25	
1	PBD4006	NoSQL for Big Data Analytics	2	0	2	3	Program core
2	PBD4007	Machine Learning for Big Data	2	0	2	3	Program core
3	PBD4008	Big Data Security and Privacy	2	0	2	3	Program core
4	PBD4009	IoT Data Analytics	2	0	2	3	Program core
5	PBD4010	Data Mining and Predictive Analytics	2	0	2	3	Program core
6	PBD7001	University Project/ Internship (Industry-Oriented)	0	0	0	10	School Core
		Total Credits				**50**	

Course Description and Syllabus

Semester-I

Course Name	Big Data and Data Warehousing					
Course Code:	PBD4000	Credit Structure:	L	T	P	C
			3	0	2	4

Course Description:

This course provides an in-depth understanding of two major pillars of modern data management: Big Data technologies and Data Warehousing systems. It is designed to equip students with the knowledge and practical skills to manage, process, and analyze large volumes of structured, semi-structured, and unstructured data.

Students will learn the architecture, design, and implementation of data warehouses and how they support business intelligence and decision-making. Simultaneously, the course covers Big Data technologies such as Hadoop, MapReduce, Hive, Spark, and NoSQL databases, which are essential for handling the scale and complexity of modern data environments.

Laboratory sessions will involve hands-on practice in building data warehouses and working with big data platforms and tools to process and analyze data at scale.

Textbooks:

1. Nathan Marz and James Warren, "Big Data: Principles and Best Practices of Scalable Real-Time Data Systems", Manning Publications, 2020
2. Rajendra Akerkar, “Big Data: Principles and Paradigms”, CRC Press, 2023

2

Course Name	Data Structures & Algorithms for Big Data					
Course Code:	PBD4001	Credit Structure:	L	T	P	C
			2	0	4	4

Course Description:

This course focuses on adapting core data structures and algorithmic techniques to the context of Big Data. It explores the design and analysis of scalable, distributed, and approximate algorithms that are essential for processing massive datasets efficiently.

Students will learn how traditional data structures are re-imagined in distributed environments and how algorithmic thinking evolves under constraints such as memory limits, data streaming, and parallel computation. Emphasis is placed on practical implementations using tools like Apache Spark and Hadoop, as well as emerging approaches like sketching, Bloom filters, and graph algorithms on distributed frameworks.

The lab component enables students to apply these concepts in real-world data scenarios using Big Data platforms and libraries.

Textbooks:

1. Meeta Gupta, S. K. Gupta, “Data Structures & Algorithms for Big Data”, Wiley Publications, 2019
2. Andrii Gakhov, “Probabilistic Data Structures and Algorithms for Big Data Applications”, Springer, 2019

3

Course Name	Programming for Big Data					
Course Code:	PBD4002	Credit Structure:	L	T	P	C
			1	0	4	3

Course Description:

This hands-on course introduces students to the core programming skills and frameworks required for Big Data processing. With an emphasis on practical implementation, students will learn how to write scalable code for managing, transforming, and analyzing massive datasets using distributed computing frameworks.

The course covers the use of programming tools and platforms such as Hadoop, Spark, Hive, and Kafka. Students will gain experience working with data in various formats and applying programming paradigms like MapReduce and functional programming for data-intensive tasks. Real-world datasets will be used throughout the course to reinforce concepts and develop industry-relevant skills.

Textbooks:

1. Jason Bell, “Programming for Big Data”, Wiley, 2018
2. S. S. Iyengar, S. S. Yadav, Data Science for Big Data Analytics, Wiley, 2017

4

Course Name	Big Data Frameworks and Technologies					
Course Code:	PBD4003	Credit Structure:	L	T	P	C
			2	0	2	3

Course Description:

This course explores the ecosystem of Big Data frameworks and technologies that power large-scale data processing in modern data-intensive applications. Students will learn the architecture, core components, and usage patterns of popular Big Data tools such as Hadoop, Spark, Kafka, Hive, HBase, Flink, and others.

The course emphasizes hands-on experience and practical exposure to setting up, configuring, and using these tools for batch, real-time, and streaming data analytics. Through case studies and labs, students will build scalable data pipelines and understand how to choose and integrate suitable frameworks based on application requirements.

Textbooks:

1. Tom White – *Hadoop: The Definitive Guide*, O'Reilly Media, 4th Edition, 2015.
2. Bill Chambers, Matei Zaharia – *Spark: The Definitive Guide: Big Data Processing Made Simple*, O'Reilly Media, 2018.

5.

Course Name	**Fundamentals of Cloud Computing**					
Course Code:	**PBD4004**	**Credit Structure:**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Description:

This course provides a foundational understanding of Cloud Computing, covering its essential concepts, service models, deployment strategies, and underlying technologies. Students will explore how cloud platforms enable scalable, elastic, and on-demand computing services over the internet. The course introduces major cloud providers, virtualization, containerization, and key aspects such as storage, networking, and security in cloud environments.

Textbooks:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing: Principles and Paradigms, 2011, Wiley.
2. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, Cloud Computing: Concepts, Technology & Architecture, 2013, Prentice Hall.
3. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, 2010, McGraw-Hill.

6

Course Name	**Big Data Visualization and Reporting**					
Course Code:	**PBD4005**	**Credit Structure:**	**L**	**T**	**P**	**C**
			2	**0**	**2**	**3**

Course Description:

This course focuses on the principles, tools, and techniques for effective visualization and reporting of Big Data. Students will learn how to transform complex and large-scale data into clear, interactive, and actionable insights. The course covers modern visualization libraries, dashboard creation, and reporting frameworks used in data-driven industries.

Students will work with real-world datasets and visualization tools such as Tableau, Power BI, Apache Superset, and libraries in Python (Matplotlib, Seaborn, Plotly) and JavaScript (D3.js). The course also emphasizes storytelling with data and the design of intuitive dashboards for business intelligence and data science applications.

Textbooks:

1. Andy Kirk – *Data Visualisation: A Handbook for Data Driven Design*, SAGE Publications, 2019.
2. Cole Nussbaumer Knaflic – *Storytelling with Data: A Data Visualization Guide for Business Professionals*, John Wiley & Sons, 2015.

Course Name	Mini Project/ Internship (Industry-Oriented)					
Course Code:	PBD7000	Credit Structure:	L	T	P	C
			0	0	0	5

Course Description:

The Mini Project/Internship (Industry-Oriented) aims to immerse students in a real-world, professional setting, allowing them to apply theoretical knowledge and technical skills to solve industry-relevant problems. This course is designed to foster industry-academia collaboration and provide practical exposure in the domains of Big Data, Data Analytics, Machine Learning, IoT, Blockchain, Cloud Computing, or related areas.

Students may engage in a short-term internship in an industry or work on a mini project in collaboration with an external organization, research lab, or in-house R&D cell under faculty supervision.

Semester-II

1.

Course Name	**NoSQL for Big Data Analytics**					
Course Code:	**PBD4006**	**Credit Structure:**	**L**	**T**	**P**	**C**
			2	**0**	**2**	**3**

Course Description:

This course introduces the concepts, design, and application of NoSQL (Not Only SQL) databases in the context of Big Data Analytics. It focuses on the differences between traditional RDBMS and modern NoSQL systems, and explores how NoSQL databases are optimized for handling large volumes of unstructured, semi-structured, and high-velocity data. Students will gain hands-on experience with key NoSQL databases such as MongoDB, Cassandra, HBase, and Redis. The course will also cover data modeling, querying, indexing, and performance tuning in NoSQL systems, along with integration strategies for Big Data pipelines and analytics workflows.

Textbooks:

1. Pramod J. Sadalage, Martin Fowler – *NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence*, Addison-Wesley, 2012.
2. Shannon Bradshaw, Kristina Chodorow – *MongoDB: The Definitive Guide*, O'Reilly Media, 2019.

2.

Course Name	**Machine Learning for Big Data**					
Course Code:	**PBD4007**	**Credit Structure:**	**L**	**T**	**P**	**C**
			2	**0**	**2**	**3**

Course Description:

This course explores the intersection of Machine Learning (ML) and Big Data technologies, focusing on the design, scaling, and deployment of machine learning algorithms on massive datasets. It covers distributed ML frameworks, scalable data processing, model training at scale, and real-time analytics.

Students will apply ML algorithms using platforms like Apache Spark MLlib, TensorFlow on distributed environments, and H2O.ai. Emphasis is given to practical implementation, evaluation, and optimization of models for structured, semi-structured, and unstructured Big Data.

Textbooks:

1. Aurélien Géron – *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly Media, 2019.
2. Charu C. Aggarwal – *Machine Learning for Big Data: With R and Python*, Springer, 2018.

3.

Course Name	Big Data Security and Privacy					
Course Code:	PBD4008	Credit Structure:	L	T	P	C
			2	0	2	3

Course Description:

This course focuses on the security and privacy challenges that arise in Big Data environments. It explores fundamental principles, technologies, and tools for protecting large-scale data systems against various threats and vulnerabilities. Topics include secure data storage, access control, privacy-preserving analytics, cryptographic techniques for Big Data, and regulatory compliance such as GDPR and HIPAA.

Students will gain hands-on experience with encryption tools, access control frameworks, and privacy-preserving algorithms implemented in Big Data frameworks like Hadoop and Spark.

Textbooks:

1. David M. Wheeler – *Big Data Security*, Springer, 2021.
2. Nataraj Dasgupta – *Practical Big Data Security: Building Secure Analytics Infrastructure in the Cloud*, Apress, 2018.

4.

Course Name	**IoT Data Analytics**					
Course Code:	**PBD4009**	**Credit Structure:**	**L**	**T**	**P**	**C**
			2	**0**	**2**	**3**

Course Description:

This course explores how data generated by Internet of Things (IoT) devices can be collected, processed, analyzed, and visualized to extract actionable insights. It focuses on real-time and batch analytics pipelines tailored for IoT use cases, including smart cities, healthcare, industrial automation, and environmental monitoring. Students will gain hands-on experience with IoT data platforms, time-series databases, edge analytics, and cloud-based analytics tools. Emphasis is placed on scalability, latency, and security in handling IoT-generated Big Data.

Textbooks:

1. Pethuru Raj, Anupama C. Raman – *The Internet of Things: Enabling Technologies, Platforms, and Use Cases*, CRC Press, 2017.
2. Andrew Minteer – *Analytics for the Internet of Things (IoT): Intelligent Analytics for Your Intelligent Devices*, Packt Publishing, 2017.

Course Name	Data Mining and Predictive Analytics					
Course Code:	PBD4010	Credit Structure:	L	T	P	C
			2	0	2	3

Course Description:

This course introduces the fundamental techniques of data mining and their application in predictive analytics. It covers essential concepts such as classification, clustering, association rule mining, regression, and anomaly detection. The course emphasizes practical skills in building predictive models, selecting appropriate algorithms, and evaluating model performance. Students will work with real-world datasets using industry-standard tools (like Python, R, Weka, or RapidMiner) and apply predictive techniques in domains such as marketing, healthcare, finance, and e-commerce.

Textbooks:

1. Ian H. Witten, Eibe Frank, Mark A. Hall Data Mining: Practical Machine Learning Tools and Techniques 2016, Morgan Kaufmann
2. Galit Shmueli, Peter C. Bruce, Nitin Patel Data Mining for Business Analytics: Concepts, Techniques, and Applications 2017, Wiley

Course Name	University Project / Internship (Industry-Oriented)					
Course Code:	PBD7001	Credit Structure:	L	T	P	C
			0	0	0	10

Course Description:

This course offers students the opportunity to engage in a long-term, full-time industry-oriented project or internship, either at a recognized organization or within an approved university research initiative. It is designed to facilitate deep experiential learning, bridging academic training with professional, real-world challenges in emerging domains such as Big Data, Artificial Intelligence, Blockchain, IoT, and Cloud Computing. Students will be mentored by both academic and industry supervisors and are expected to undertake a comprehensive, end-to-end project involving research, development, deployment, and evaluation of innovative solutions.