School of Computer Science and Engineering
Dept. of Computer Science and Engineering
COURSE PLAN
Academic Year 2025-26 EVEN SEMESTER

School/Department of Students	**PSCS**
Name of the Program(s) of Students	B.Tech. Computer Science and Engineering (CSE), B.Tech. in Information Science and technology – IST, B.Tech. in Computer Science and Engineering (Networks) – CSN, B.Tech. in Computer Science and Information Technology – CSI, B.Tech. in Computer Engineering– COM
PRC Approval Ref. No.	**PU/AC-24.05/SOCSE04/CSE/2024-2028**
Semester/Year	**IV/II**
Course Code & Name	**CSE2503 & Scalable Application Development using Java**
Credit Structure (L-T-P-C)	**3-0-0-3**
Contact Hours	3 Sessions per week -45 Sessions
Course In-Charge (IC)	**Dr. Afroz Pasha, Ms. Impa B H, Dr. Joseph Michael Jerard**
Course Instructor(s)	**Ms. Chinmayi G V, Dr. Joseph Michael Jerard V, Ms. Uma Sankari, Mr. Prajeesh C B, Ms. Delsy Jyothi, Ms. Anu Joseph, Ms. Nayana R, Mr. Aadil Ferooz, Ms. Swetha K H, Dr. Aarif Ahamed, Mr. Selva Ganesh R, Mr. Sai Kumar,Ms. Sumana Datta, ,Mr. Libin Jacob,Mr. Sreehari T M,Dr. Raja Jitendra Nayak, Mr. Laxman, Mr. Sunil Kumar Sahoo, ,Dr. Ramesh Babu K,Ms. Sumita Guddin, Ms. Impa B H Dr. Afroz Pasha**
Course URL	**https://presidencyuniversity.linways.com**

1. COURSE PRE-REQUISITES:
Problem Solving Using Java (CSE1001)

2. COURSE DESCRIPTION:
The purpose of this course is to provide students with an in-depth understanding of advanced concepts and techniques in Java development. The course is both conceptual and analytical and is

understood with JDK 21 software & Eclipse IDE. This course involves essential core java concepts like multithreading, file handling, annotations, generics, lambda expressions etc. This course also develops critical thinking skills by augmenting the student's ability to develop web application for various modern management systems like banking management system, student information management system, , Library Management System etc. with the necessary API for communication with database.

3. COURSE OBJECTIVES:

The objective of the course is to familiarize the learners with the concepts of Scalable Application Development using Java and attain **Employability Skills** through **Problem Solving techniques.**

4. COURSE OUTCOMES:

TABLE 1: COURSE OUTCOMES

CO Number	Statement of CO *On successful completion of the course the students shall be able to*	Blooms Cognitive Level
CO1	Apply Concurrent Programming using Java Multi-Threading.	Apply
CO2	Practice the access mechanism to read/write file systems using Java I/O Operations.	Apply
CO3	Apply Java Collections Framework and JDBC techniques to design and develop data-driven applications.	Apply
CO4	Implement Generics, Annotations & Lambda expressions using Java Programs	Apply
CO5	Develop Web application using Servlet and JSP.	Apply

5. MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

5.1 *PROGRAM OUTCOMES*:

(A new set of POs, if any, should be used for the courses offered to the students admitted in the 2025 batch.)

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

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified

needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

TABLE 2a: CO-PO Mapping

CO. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	H	M	H	–	–	–	M	L	–	M
CO2	H	M	M	M	H	–	–	–	–	L	–	M
CO3	H	H	H	M	H	L	–	–	M	L	M	M
CO4	H	M	H	–	H	–	–	–	–	L	–	M
CO5	H	H	H	M	H	M	L	L	M	M	M	M

5.2 PROGRAM SPECIFIC OUTCOMES:

6. On successful completion of B.Tech. in Computer Science and Engineering - **CSE** Program the students will be able to:

PSO1	[Problem Analysis]: Identify, formulate, research literature, and analyze complex engineering problems related to Software Engineering principles and practices, Programming and Computing technologies reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PSO2	[Design/development of Solutions]: Design solutions for complex engineering problems related to Software Engineering principles and practices, Programming and Computing technologies and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PSO3	[Modern Tool usage]: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities related to Data Science principles and practices, Programming and Computing technologies with an understanding of the limitations.

CO Number	PSO1	PSO2	PSO3
CO1	H	M	M
CO2	H	M	M
CO3	H	H	M
CO4	H	M	M
CO5	M	H	M

On successful completion of B.Tech. in Information Science and technology - **IST** Program the students will be able to:

PSO1	Exhibit a solid grasp of information science fundamentals to explain core concepts, analyze computational challenges using theoretical knowledge, and design and develop reliable, efficient systems and applications
PSO2	Combine software development practices, programming skills and information science domain knowledge to create practical, real-world applications, preparing them for a range of career opportunities in software development, advanced studies, research, or entrepreneurial ventures
PSO3	Create, deploy, and supervise robust data systems that maintain consistency, integrity, and availability, while performing analysis as well as audits to ensure compliance, detect anomalies, uphold accountability through sound data management, administration, and risk assessment practices

CO Number	PSO1	PSO2	PSO3
CO1	H	M	M
CO2	H	M	M
CO3	H	H	M
CO4	H	M	M

CO5	H	H	M

On successful completion of B.Tech. in Computer Science and Engineering (Networks) – **CSN** Program the students will be able to:

PSO1	Employ a solid understanding of computer science fundamentals to clarify key concepts, analyse computational problems based on theoretical knowledge, and build reliable and optimized computing systems
PSO2	Combine programming skills, software development tools, and knowledge of computer networks to create practical, real-world applications, preparing for diverse career opportunities in software development, higher education, research, or entrepreneurial ventures
PSO3	Use networking tools and technologies to solve real-world problems and demonstrate readiness for careers in network administration, cybersecurity, cloud computing, and telecommunications.

CO Number	PSO1	PSO2	PSO3
CO1	H	M	M
CO2	H	M	M
CO3	H	M	M
CO4	H	M	M
CO5	M	M	M

On successful completion of B.Tech. in Computer Science and Information Technology –**CSI** Program the students will be able to:

PSO1	Explain key concepts with a strong understanding of computer science fundamentals, analyse computational problems using theoretical knowledge, and develop reliable and optimized computing systems.
PSO2	Use programming skills, software development practices, and expertise in information technology to create practical, real-world applications that prepare students for diverse opportunities in software development, higher education, research, or entrepreneurial pursuits.
PSO3	Design, implement, and manage robust data systems that ensure data consistency, integrity, and availability through effective data management and data administration practices.

CO Number	PSO1	PSO2	PSO3
CO1	H	H	M
CO2	H	H	M
CO3	H	H	M
CO4	H	H	M
CO5	H	H	M

On successful completion of B.Tech. in Computer Engineering– **COM** Program the students will be able to:

PSO1	Explain key concepts with a strong understanding of computer science fundamentals, analyse computational problems using theoretical knowledge, and develop reliable and optimized computing systems.
PSO2	Use programming skills, software development practices, and expertise in information technology to create practical, real-world applications that prepare students for diverse opportunities in software development, higher education, research, or entrepreneurial pursuits.
PSO3	Design, implement, and manage robust data systems that ensure data consistency, integrity, and availability through effective data management and data administration practices.

CO Number	PSO1	PSO2	PSO3
CO1	H	H	M
CO2	H	H	M
CO3	H	H	M
CO4	H	H	M
CO5	H	H	M

7. COURSE CONTENT:

Module Number	Module Name	Number of Sessions
1	**Multi-Threading** **Multi-Threading in Java:** Understanding Threads , Needs of Multi-Threaded Programming , Creating a Thread ,Thread Life-Cycle, Thread Priorities , Synchronizing Threads, Inter Communication of Threads , Dead lock, Concurrency Framework .	8
2	**Input / Output & File Handling** **Java I/O Operations :** Input/ Output Operation in Java(java.io Package), Streams and the new I/O Capabilities ,Working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel, Serializing Objects, Observer and Observable Interfaces.	8
3	**Collection and Database programming using JDBC** **Collection** – Enum, Collection Framework: Collections of Objects, Collection Types, Sets, Sequence, Map, Understanding Hashing, Use of Array List & Vector, Comparable and Comparator Interfaces. **Database Programming using JDBC**- Introduction to JDBC, JDBC Drivers & Architecture, CRUD operation Using JDBC, Connecting to non-conventional Databases.	12

4	**Modern Java Features** **Annotation :** Basics, Type and Repeating Annotation - Generics : Generic Class, Bounded Types using wild card arguments, Generic Methods, Generic Interfaces- Lambda Expressions : Block Lambda, Generic functional Interfaces, Passing Lambda expressions as arguments, Lambda Expressions & Exceptions, Variable Capture, Method & constructor references, Reflection	8
5	**Distributed Programming with Servlet** Web Application Basics: Introduction to Servlet & JSP, Servlet life cycle, Developing and Deploying Servlets, create and compile servlet source code, Web Server, servlet API, Handling HTTP Requests and Responses: Handling HTTP GET requests and POST request, Using Cookies, Session Tracking, Simple Servlet Program to fetch database records.	9

REFERENCE MATERIALS:

Text Books:

T1.Herbert Schildt, *"Java : The Complete Reference"*, Tata McGraw-Hill Education, 12th Edition,2021.

T2. Jim Keogh, "J2EE: The Complete Reference". Tata McGraw-Hill Education, 2018.

Reference Books:

R1: Y.Daniel Liang, "Introduction to Java programming Comprehensive Version", Pearson Education, 10th Edition, 2018.

R2: Cay S Horstmann and Gary Cornell, "CORE JAVA volume II-Advanced Features, 9th Edition,2016.

R3: Core and Advanced Java Black Book, Dream Tech Press.

Online Resources

1. https://docs.spring.io/spring-framework/reference/core.html
2. https://docs.oracle.com/javaee/7/api/javax/servlet/Servlet.html
3. https://docs.oracle.com/javaee/5/tutorial/doc/bnajo.html
4. https://docs.oracle.com/javase/tutorial/jdbc/basics/index.html

8. TEACHING AND LEARNING SCHEME:

Course Code	Course Title	Teaching and Learning Scheme					
		Class Room Instruction (CI) (in hour per semester)		Lab Instruction (LI) (in hour per semester)	Term work (TW) and Self Learning (SL) (TW+SL) (in hour per semester)	Total Number of hours per semester	Total Credits (C) = (Total hours/30)
		L	T	P	(TW=, SL=)		
CSE2503	Scalable Application	45	0	0	45	90	=90/30=3

	Development using Java						

9. DETAILED SCHEDULE OF INSTRUCTION

TABLE 3: LESSON PLAN				
Session Number	**Topic**	**Sub-Topic**	**CO Number**	**Reference**
1	Program Integration & Course Integration	Overview of the Course, Scope and Opportunities		
Module 1				
2	Understanding Threads , Needs of Multi-Threaded Programming	Understanding Threads , Needs of Multi-Threaded Programming, The Java Thread Model,Thread Priorities, Synchronization, Messaging	CO1	T1 (Ch11, Pg: 273 -276)
3	Creating a Thread and Thread Life Cycle	The Thread Life Cycle,The Main Thread,Creating a Thread,Implementing Runnable, Extending Thread	CO1	T1 (Ch11, Pg: 277 -284)
4	Creating Multiple Threads	Creating Multiple Threads, using IsAlive and Join methods	CO1	T1 (Ch11, Pg: 284 -289)
5	Thread Priorities	Thread Priorities	CO1	T1 (Ch11, Pg: 289 -292)
6	Synchronizing Threads	Synchronizing Threads	CO1	T1 (Ch11, Pg: 292 -297)
7	Inter Communication of Threads	Inter Communication of Threads	CO1	T1 (Ch11, Pg:297-302)
8	Inter Communication of Threads ,	Producer Consumer Problem	CO1	T1 (Ch11, Pg:297-302)
9	Dead lock, Concurrency Framework .	Deadlock, Suspending ,Resuming and Stopping the threads	CO1	T1 (Ch11, Pg:302-310)
Module 2				
10	**Java I/O Operations :** , , ,	Input/ Output Operation in Java(java.io Package), File, Directories	CO2	T1 (Ch17, Pg:538-543)
11	Streams and the new I/O Capabilities	Streams Classes and the new I/O Capabilities	CO2	T1 (Ch17, Pg:545-562)
12	Working with File Object, File I/O Basics	Working with File Object, File I/O Basics	CO2	T1 (Ch17, Pg:545-562

13	Reading and Writing to Files,	Reading and Writing to Files	CO2	T1 (Ch17, Pg:562-566)
14	Buffer and Buffer Management,	Buffer and Buffer Management	CO2	T1 (Ch17, Pg:569-572)
15	Read/Write Operations with File Channel	Read/Write Operations with File Channel	CO2	T1 (Ch24, Pg:851-857)
16	Serializing Objects	Serializing Objects	CO2	T1 (Ch17, Pg:577-585)
17	Observer and Observable Interfaces	, Observer and Observable Interfaces	CO2	T1 (Ch16, Pg:527-531)
Module 3				
18	Collection Framework:,	Collection Overview, Collection Interfaces	CO3	T1 (Ch15, Pg:439-442)
19	Collections of Objects, Collection Types	Collection Methods	CO3	T1 (Ch15, Pg:444-445)
20	List Interface, Set Interface	Array List and Linked List	CO3	T1 (Ch15, Pg:445-454)
21	Set, HashSet, LinkedHashSet, TreeSet	Set, HashSet, LinkedHashSet, Tree Set	CO3	T1 (Ch15, Pg:454-456)
22	Accessing the Collection and Map Interface	Iterator, Map Interface and its types	CO3	T1 (Ch15, Pg:457-471)
23	Comparator Interface	Comparator Interface	CO3	T1 (Ch15, Pg:471-475)
24	Legacy Classes	Enum, Vector, Stack, Queue	CO3	T1 (Ch15, Pg:484-492)
25	Database Programming using JDBC- Introduction to JDBC, ,	Concept of JDBC and JDBC process	CO3	T2 (Ch6, Pg:124-133)
26	JDBC Drivers & Architecture	JDBC Drivers & Architecture	CO3	T2 (Ch6, Pg:125-126)
27	CRUD operation Using JDBC,	CRUD operation Using JDBC,	CO3 **Flipped Class Learning**	T2 (Ch6, Pg:133-141)
28	CRUD operation Using JDBC,	Statement Objects, PreparedStatement and Callable Statement	CO3	T2 (Ch6, Pg:133-141)
29	Connecting to non-conventional Databases.	Connecting to non-conventional Databases.	CO3	Online Resources
Module 4				

30	**Annotation :** Basics, Types	**Annotation :** Basics, Types	CO4	T1 (Ch12, Pg:279-290)
31	Repeating Annotation	Repeating Annotation, Example Programs	CO4	T1 (Ch12, Pg:292-299)
32	Generics : Generic Class, Bounded Types using wild card arguments,	Generics : Generic Class, Bounded Types using wild card arguments	CO4	T1 (Ch14, Pg:337-349)
33	Generic Methods, Generic Interfaces	Generic Methods, Generic Interfaces	CO4	T1 (Ch14, Pg:-352-362)
34	Lambda Expressions : Block Lambda, Generic functional Interfaces, Passing Lambda expressions as arguments,	Lambda Expressions : Block Lambda, Generic functional Interfaces, Passing Lambda expressions as arguments,	CO4	T1 (Ch15, Pg:381-391)
35	Lambda Expressions & Exceptions, Variable Capture, Method & constructor references,	Lambda Expressions & Exceptions, Variable Capture, Method & constructor references	CO4	T1 (Ch15, Pg:394-404)
36	Reflection	Reflection	CO4	T1 (Ch15, Pg:394-404)
Module 5				
37	Web Application Basics: Introduction to Servlet & JSP, Servlet life cycle,	Web Application Basics: Introduction to Servlet & JSP, Servlet life cycle,	CO5	T1 (Ch38, Pg:1211-1212)
38	Developing and Deploying Servlets, create and compile servlet source code, Web Server,	Developing and Deploying Servlets, create and compile servlet source code, Web Server,	CO5	T1 (Ch38, Pg:1213-1216)
39	Servlet API,	Servlet API with examples	CO5	T1 (Ch38, Pg:1216-1225)
40	Handling HTTP Requests and Responses	Handling HTTP Requests and Responses	CO5	T1 (Ch38, Pg:1227-1229)
41	HTTP GET requests and POST request,	HTTP GET requests and POST request an example program	CO5	T1 (Ch38, Pg:1227-1229)
42	Using Cookies,	Cookies demonstration	CO5	T1 (Ch38, Pg:1229-1229)
43	Session Tracking,	Session Tracking using	CO5	T1

		HttpSession		(Ch38, Pg:1230-1230)
44	Handling Simple Servlet Program to fetch database records.	Handling Simple Servlet Program to fetch database records.	CO5: **Experiential Learning**	Online Resources
45	Handling Simple Servlet Program to fetch database records.	Handling Simple Servlet Program to fetch database records.	CO5 **Experiential Learning**	Online Resources

The main pedagogical methods in the course are as follows:

- Lecture mode.
- Power Point Presentation.
- Video based learning.
- Problem based learning method.
- Simulation Practical system case study/Model Design.

TABLE 4: SPECIAL DELIVERY METHOD

S. No	Session Number	Subtopic (as per lesson plan)	Pedagogical Method
1.	**16**	Serializing Objects	Collaborative Learning
2.	**27**	CRUD operation Using JDBC	Flipped Class Learning
3.	**44 and 45**	Handling Simple Servlet Program to fetch database records.	Experiential Learning

10.ASSESSMENT SCHEDULE

TABLE 5: ASSESSMENT SCHEDULE

Sl. No	Assessment Type	Coverage	CO Number(s)	Duration in Minutes	Marks	Weightage
1	Continuous Assessment 1	Module 1, Module2 half	CO1,CO2	-	20	10%
2	Mid-Term (CAT)	Module 1, Module2 , Module 3 half	CO1, CO2, CO3	1 hour 30 Mins	50	25%
3	Continuous Assessment 2	Module 3 half, Module 4	CO3, CO4	-	20	10%
4	Assignment	Module 5	CO5	-	10	5%
5	End Term (FAT)	All Modules	CO1, CO2, CO3, CO4	3 hours	100	50%

11.COURSE CLEARANCE CRITERIA:

This is in accordance with the Academic Regulations of the University and the Program Regulations and Curriculum of the respective program.

12. SAMPLE QUESTIONS:

TABLE 6: SAMPLE QUESTIONS				
Sl. No	**Question**	**Marks**	**CO Number**	**Blooms Cognitive Level**
1	Develop a program to create two threads "Multiply3" and "Mutiply5" by extending the thread class (Hint: Multithreading). A Multply3 thread has to display the multiplication table of 3. Multiply5 thread has to display multiplication table of 5. Check the existence of threads using isAlive method. Make "Multiply3" thread to wait for some time till other thread completes its task.	10	CO1	Apply
2	Apply Java.io.* to perform serialization and deserialization operations with an Account object The attributes of Account object are (acct_no, acct_name, branch).	10	CO2	Apply
3	Create a Java program that manages a set of employees joined in an organization. Implement the following functionalities using the **Set** collection: 1. Add an Employee 2. Remove an Employee 3. Display All Employees 4. Check Employee Enrollment Prevent duplicate entries using the properties of a **Set** collection.	10	CO3	Apply
4	Demonstrate a Java program by creating a generic class Pair in Java, that holds two values of any type and provides methods to retrieve them.	10	CO4	Apply
5	Develop a Java Servlet program to implement Session tracking.	10	CO5	Apply

13. MAPPING WITH SUSTAINABLE DEVELOPMENT GOALS (SDGs):

TABLE 7: SDG MAPPING			
S. No	**Topic**	**SDG Number**	**Justification**
1	CRUD operation Using JDBC	**SDG 9** Industry, Innovation, and Infrastructure	JDBC skills are fundamental for building robust, scalable database-driven applications, which form the backbone of modern digital infrastructure and innovation across industries.
2	Handling Simple Servlet Program to fetch database records.	**SDG 12** Responsible Consumption and Production	Optimized servlet code reduces CPU cycles and memory usage, directly lowering the energy consumption of data centers and promoting more responsible use of digital resources.

14. CRITERIA FOR COURSE OUTCOME ATTAINMENT CALCULATION:

TABLE 8: Threshold and Target Set for Course Outcomes

Sl. No	C.O. No.	Course Outcomes	Threshold in %	Target in %
1.	CO1	Apply Concurrent Programming using Java Multi-Threading.	60	65
2.	CO2	Practice the access mechanism to read/write file systems using Java I/O Operations.	60	65
3.	CO3	Apply Java Collections Framework and JDBC techniques to design and develop data-driven applications.	55	60
4.	CO4	Implement Generics, Annotations & Lambda expressions using Java Programs	60	65
5.	CO5	Develop Web application using Servlet & JSP.	60	65

15. SUMMARY:

TABLE 9: SUMMARY OF COURSE SCHEDULE				
Sl. No.	**Activity**	**Start date**	**End date**	**Total number of Sessions**
1	Overview of the course	07.01.2026	07.01.2026	**1**
2	Module: 01	08.01.2026	27.01.2026	**8**
3	Continuous Assessment 1	09.02.2026	14.02.2026	
4	Module: 02	28.1.2026	20.02.2026	**8**
5	Module:03	23.02.2026	27.03.2026	**12**
6	Midterm	10.03.2026	14.03.2026	**-**
7	Module:04	30.03.2026	13.04.2026	**8**
8	Continuous Assessment 2	24.03.2026		**-**
9	Module:05	15.04.2026	5.04.2026	**9**
10	Continuous Assessment 3	20.04.2026	25.04.2026	-
11	End Term	07.05.2026	30.05.2026	**-**

CONTACT TIMINGS IN THE CHAMBER FOR DISCUSSION

Students can meet the respective course instructor during the Chamber Consultation Hour to clarify doubts related to the course.

SPECIFIC GUIDELINES TO STUDENTS, IF ANY:

- Attend all classes regularly.
- Bring a scientific calculator to every class.

- Refer to online study materials and watch the suggested videos available on the NPTEL website.

Dr. Afroz Pasha, Ms. Impa B H, Dr. Joesph Michael Jerard

Name and Signature of the course In-Charge

APPROVAL:

This course has been duly verified and approved by the Departmental Academic Committee (DAC).

Name and Signature of the Chairperson - DAC