CHANDIGARH UNIVERSITY

Discover. Learn. Empower.

INSTITUTE : UIE

DEPARTMENT : CSE

Bachelor of Engineering (Computer Science & Engineering)

PROJECT BASED LEARNING IN JAVA

(20CST-319/20ITT-319)

Topic: PBL in JAVA Introduction

Lecture: Zero(1st Day)

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DISCOVER . LEARN . EMPOWER

Vision Of University

- “To be globally recognized as a Centre of Excellence for Research, Innovation, Entrepreneurship and disseminating knowledge by providing inspirational learning to produce professional leaders for serving the society”.

Mission Of University

- Providing world class infrastructure, renowned academicians and ideal environment for Research, Innovation, Consultancy and Entrepreneurship relevant to the society.
- Offering programs & courses in consonance with National policies for nation building and meeting global challenges.
- Designing Curriculum to match International standards, needs of Industry, civil society and for inculcation of traits of Creative Thinking and Critical Analysis as well as Human and Ethical values.
- Ensuring students delight by meeting their aspirations through blended learning, corporate mentoring, professional grooming, flexible curriculum and healthy atmosphere based on co-curricular and extra-curricular activities.
- Creating a scientific, transparent and objective examination/evaluation system to ensure an ideal certification.
- Establishing strategic relationships with leading National and International corporate and universities for academic as well as research collaborations.
- Contributing for creation of healthy, vibrant and sustainable society by involving in Institutional Social Responsibility (ISR) activities like rural development, welfare of senior citizens, women empowerment, community service, health and hygiene awareness and environmental protection

Vision Of Department

- To be recognized as a leading Computer Science and Engineering department through effective teaching practices and excellence in research and innovation for creating competent professionals with ethics, values and entrepreneurial attitude to deliver service to society and to meet the current industry standards at the global level.

Mission Of Department

- M1: To provide practical knowledge using state-of-the-art technological support for the experiential learning of our students.
- M2: To provide industry recommended curriculum and transparent assessment for quality learning experiences.
- M3: To create global linkages for interdisciplinary collaborative learning and research.
- M4: To nurture advanced learning platform for research and innovation for students' profound future growth.
- M5: To inculcate leadership qualities and strong ethical values through value based education.

PEO's(Program Educational Objectives)

The statements of PEOs (revised from 2022) are given below:

- **PEO 1.** Graduates of the Computer Science and Engineering can contribute to the Nation's growth through their ability to solve diverse and complex computer science & engineering problems across a broad range of application areas.
- **PEO 2.** Graduates of the Computer Science and Engineering can be successful professionals, designing and implementing Products & Services of global standards in the field of Computer Science & Engineering, becoming entrepreneurs, pursuing higher studies & research.
- **PEO 3.** Graduates of the Computer Science and Engineering Program can be able to adapt to changing scenario of dynamic technology with an ability to solve larger societal problems using logical and flexible approach in decision making.

Program Outcomes (POs)

- PO1: Engineering knowledge: Apply the knowledge of Mathematics, Science, Engineering fundamentals and computer science fundamental and strategies which have the solution of complex computer science engineering problems.
- PO2: Problem analysis: Identify, formulate, research literature, and analyze complex computer science engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex database and software engineering problems and design system components or processes that meet the specified needs with appropriate considerations for the public health and safety, and the cultural, societal, and environmental considerations.

Program Outcomes (POs)

- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of software engineering & networking based 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 Computer science engineering and IT tools including prediction and modeling to complex database or software engineering activities with an understanding of the limitations.
- PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess social, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Professional Computer Science & Engineering practice.

Program Outcomes (POs)

- PO7: Environment and sustainability: Understand the impact of the professional computer science and engineering solutions in social and environmental contexts, and demonstrate the knowledge of, and need for sustainable development goals.
- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of computer science 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.

Program Outcomes (POs)

- PO10: Communication: Communicate effectively on complex computer science engineering activities with the engineering community like CSI 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 computer science 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 computer science engineering changes

Program Specific Outcomes (PSOs)

A Graduate of Computer Science and Engineering Program will be able:

- PSO1. To acquire proficiency in developing and implementing efficient solutions using emerging technologies, platforms and Free and Open-Source Software (FOSS).
- PSO2. To gain critical understanding of hardware and software tools catering to the contemporary needs of IT industry.

Course Objectives

1.To understand the use of Java in a variety of technologies and on different platforms.

2. Understand the server side programming

3.To understand the basic concepts and fundamentals of platform independent object oriented language.

4. To demonstrate skills in writing programs using exception handling techniques and multithreading.

5. To understand streams and efficient user interface design techniques.

Course Outcomes

1. To gain knowledge of the structure and use the Java programming language for various technologies
2. Use the syntax and semantics of java programming language and basic concepts of OOP.
3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
4 . Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
5. Design event driven GUI and web related applications which mimic the real word scenarios.

Syllabus(Theory)

Unit-I

- Java Fundamentals: Introduction to Java. Difference between C++ and Java. Keywords, Tokens, Data types. Use of public, private and protected.
- OOPS using Java: Use of class and method in Java. Inheritance, Abstraction, Polymorphism, Encapsulation and data privacy. Difference between method overloading and method overriding.
- Exception Handing: Introduction to Exceptions. Difference between error and exception. Use of try, catch and throw. Difference between throw and throws. Types of Exceptions, Exception handling in Java.

Unit-II

- Collection Framework: Use of Collections in Java. ArrayList, LinkedList, HashMap, TreeMap, HashSet in Java.. Multithreading in Java. Thread Synchronization. Thread Priority, Thread LifeCycle.
- Wrapper Classes, I/O Streams and Annotations: Use of wrapper classes in Java- Integer, Character, Long, Boolean. Autoboxing and Unboxing. Byte stream, Character stream, Object serialization, cloning. System defined annotations, Custom annotations, application of annotations, Testing using JUnit.
- JDBC: Database connectivity, Types of Drivers for connection, Connection Example. CRUD operations using Database, Configuring various types of drivers for Java Database Connectivity, MVC Model for project development, Sequence, Dual table , Date type management in Java.

Unit-III

- Servlets and JSP: Servlet Lifecycle, Generic Servlet, Http Servlet, Linking Servlet to HTML, HttpServlet Request and Response, Servlet with JDBC, Configuring project using servlet, Servlet Config and Servlet Mapping JSP declaration, JSP directives, JSP Scriptlets, JSP include tag, JSP page tag, JSTL.
- XML and Web Services: Structure of XML, Elements of XML 1.0, 2.0, DTDs, XML parser, DOM parser, Web services using REST and HTTP, Creating web services for database access via remote servers

Text books:

Herbert Schildt, Java : The Complete Reference, 9th Edition, Oracle Press.
Gary Cornell, Core Java Volume II Advanced Features, 8th Edition, Pearson Education.
Jim Keogh, J2ee : Complete Reference, 1st Edition, Tata McGraw Hill.

Reference books:

James Gosling, Ken Arnold and David Holmes, Java Programming Language, 5th Edition, Pearson Education.
Gary Cornell, Core Java Volume I, 3rd Edition, Pearson Education.

CO_PO_SO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2	3	–	–	–	–	–	–	–	–	–	–	–	–	–
CO3	3	–	–	–	–	–	–	–	–	–	–	–	–	–
CO4	3	2	3	–	–	–	–	–	–	–	–	–	–	2
CO5	3	3	3	2	–	–	–	–	–	–	–	–	–	2
CO6	3	3	3	3	–	–	–	–	–	–	–	–	–	2

Assessment Model Theory

Sr. No.	Type of Assessment Task	Weightage of actual conduct	Frequency of Task	Final Weightage in Internal Assessment (Prorated Marks)	Remarks
1.	Assignment*	10 marks of each assignment	One Per Unit	10 marks	As applicable to course types depicted above.
2.	Time Bound Surprise Test	12 marks for each test	One per semester	4 marks	As applicable to course types depicted above.
3.	Quiz	4 marks of each quiz	One per semester	4 marks	As applicable to course types depicted above.
4.	Mid-Semester Test**	20 marks for one MST.	2 per semester	20 marks	As applicable to course types depicted above.
5.	Attendance Score	NA	NA	2 marks	

Syllabus Practical(List Of Experiments)

UNIT-I

1. Create a application to save the employee information usingarrays.
2. Design and implement a simple inventory control system for a small video rentalstore.
3. Create a application to calculate interest for FDs, RDs based on certain conditions using inheritance.

UNIT-II

4. Create a program to set view of Keys from Java Hashtable.
5. Create a program to show the usage of Sets of Collection interface.
6. Write a Program to perform the basic operations like insert, delete, display and search in list. List contains String object items where these operations are to be performed.
7. Create a menu based Java application with the following options.1.Add an Employee2.Display All3.Exit If option 1 is selected, the application should gather details of the employee like employee name, employee id, designation and salary and store it in a file. If option 2 is selected, the application should display all the employee details. If option 3 is selected the application should exit.

UNIT-III

8. Create a palindrome creator application for making a longest possible palindrome out of given input string.
9. Create a Servlet/ application with a facility to print any message on web browser.
10. Create JSP application for addition, multiplication and division.

CO_PO_SO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	–	–	–	2	–	–	–	–	–	–	–	–	–
CO2	3	–	–	–	2	–	–	–	–	–	–	–	–	–
CO3	3	–	–	–	2	–	–	–	–	–	–	–	–	–
CO4	3	2	2	–	2	–	–	–	–	–	–	–	2	2
CO5	3	2	–	–	2	–	–	–	–	–	–	–	–	–
CO6	3	–	–	–	2	–	–	–	–	–	–	–	–	–

Method of Teaching Practical

Method of Teaching :(Group Size: 30-40)

***Applicable for Physical Mode Only**

The teacher will deliver the session in normal class-room. The teacher is expected to discuss the brief theory and manual of the experiment before the actual simulating/performing the experiment.

The complete teaching and demonstration in practical class has been divided into the following segments: **(100 minutes total : 2 slots of 50 minutes each)**

Sr. No.	Name of Activity by Teacher	Time Spent approximately *	Student Activity
1.	Introduction of experiment, teaching the background theory of the experiment and information about the reading material available/Video.	20-25 minutes	Learning
2.	Discussion about the Worksheet record to be submitted.	5 minutes	Learning
3.	Demonstrating Actual Simulator/Design/ Live demonstration of the experiment.	20-25 minutes	Learning
4.	Giving some random values of the variables to students in individually or in groups (Student Performance).	45 minutes**	Performance by thestudents and calculations
5.	Submission of Work Sheets by students and evaluation with Rubrics.	----	---
6.	Viva Voce (based on the experiment covered)	45 minutes**	Evaluation

***The segments mentioned above needs to be covered in each practical lab but the time allocated to each segment can be changed as per the requirement of the practical delivery and orientation.**

**** Can be carried out simultaneously.**

Assessment Model for Lab

Assessment Model for Practical Courses (*Physical MODE)

Applicable to: Engineering and Technology, Basic & Applied Sciences and Health and Allied Sciences, Management, Commerce, Tourism, Hospitality and Legal Studies, Education, Liberal Arts Architecture and Design Cluster Programs (Except UIN, UIPS ,UID & UIA) (For UG & PG Programs)

Assessment Pattern: (For continuous lab work)

Sr.No.	Assessment Criterion	Weightage
1.	Student Performance (Conduct of experiment)	12 marks
2.	Viva Voce	10 marks
3.	Submission of Work Sheet (Record)	8 marks
	Total	**30 marks**

Assessment Pattern for Complete Practical Course: (60: Internal and 40: External)

Sr. No.	Type of Assessment Task	Weightage of actual conduct	Frequency of task	Final Weightage in Internal Assessment (Prorated Marks)	Remarks
1.	Practical Worksheet and Class-room Learning	30 marks for each experiment	8-12 experiments	45 marks	Depending upon no. of experiments
2.	Mid-Term Test	15 marks	1 per semester	15 marks	At-least after the completion of 5 experiments.

Student Attendance/Leave Policy

- https://drive.google.com/file/d/1CHp7Sn0zaw-5TRydAj6Dz5uoh5EOejsY/view?usp=sharing
- https://docs.google.com/document/d/1NOZMDxXfjYGDetoVvO_cQlc9vlQkgb2pWFrfbSd1_0Q/edit?usp=sharing

Java Career Opportunities

Junior Developer

Senior Developer

Architect

Java Web Developer

Java Android Developer

Java EE developer

More details can be fetched from

https://www.upgrad.com/blog/career-in-java/

Target Companies

WIPRO (Talentnext and FutureSkill Program)	Claritrics India Private Limited (Buddi Health)
Crowe Horwath IT Services LLP (CHITSLLP)	Internshala
Hexagon Capability Center India Pvt. Ltd	CommVault Systems (India) Pvt Ltd
KPMG Global Services Private Limited	Ameyo Pvt Ltd
Birla Soft India Ltd	WorkIndia (Eloquent Info Solutions Pvt. Ltd.)
Think Future Technologies Pvt. Ltd. (TFTPL)	Target Integration Consultancy Private Limited
APPWRK IT Solutions Pvt. Ltd	Jungleworks (Click Labs Software Pvt Ltd.)
Ajira Tech (Ajira Software)	Cogno Ai (AllinCall Research and Solutions Pvt. Ltd.)
Accolite Software India Pvt. Ltd.	Survey2Connect Pvt Ltd
Codehall Technology Pvt. Ltd	Cognizant Technology Solutions India Private Limited
Virtuous Transactional Analytics Pvt. Ltd. (Vitrana)	ADP India Pvt Ltd
HashedIn Technologies Pvt. Ltd	Pitney Bowes India Private Limited
Cradlepoint India Private Limited	Kantar Analytics Practice (KAP)

Target Companies

Sarvaha Systems Pvt. Ltd	CIS IT Solutions (P) LTD
NovoInvent Software Pvt. Ltd	Saviynt India Private Limited
BrowserStack Software Pvt. Ltd	Accrete Globus Technology Pvt. Ltd
Interra Information Technologies	LAVA International Ltd
Taboola India	BT India Pvt. Ltd
Kaleyra India	Bebo Technologies Pvt. Ltd
McAfee India	Lumen (Previously known as century link)
Sophos Technology Solutions India Private Limited	SoftProdigy System Solutions (P) Ltd
AM Tech Networks (Sister concern CardInsider.com)	F5 Networks Innovation Private Limited
Zversal Pvt. Ltd	Thoughtspot India Private Limited
Navikenz Inc	Cloudwiry Inc
Caelius Consulting IT Services Pvt. Ltd	Centilytics
Bank Buddy.ai (Affinsys AI Pvt Ltd.)	AntWorks Solutions India Pvt. Ltd.
Infinite Computer Solutions	Auxiliobits Technologies Pvt. Ltd

WIPRO

PROGRAMS IN COLLABORATION WITH WIPRO

- Wipro TalentNext
  - PBL in JAVA
  - Embedded as a part of the Curriculum
  - Assessment-based Learning
  - Placement Oriented Program

- Wipro Future Skills
  - Self Learning Module
  - Focused on Emerging Technologies: AI, Big Data, RPA, IOT, Cloud Computing and Cyber Security
  - Certificate from Wipro-NASSCOM.

Programs Highlights

Wipro TalentNext

- Wipro TalentNext is training program completely based on Project Based Learning in Java.
- Started in Chandigarh University in June 2016.
- CU have started one dedicated course "**Project based learning in Java**" from 2016 onwards approved by Wipro and BoS.

Project Based Learning (PBL)
I do, I Understand

- Project Based Learning
- Collaborative Learning
- Discussion Forum
- Self-Directed Learning
- Logic Building Module
- Milestone Assessments
- Automated Evaluation
- 24*7 access

About TalentNext PBL

The **PJP Foundation** is an **optional** learning path that will take you through few videos on Foundation, Motivation and IT Trends.

The main components of the **Pre-Joining Program Core** course are –

- ✓ **Tech Modules / Capsules**
- ✓ **Code Completion Tracker**
- ✓ **Discussion Forum**

About TalentNext PBL

Tech Modules / Capsules:

Each Tech Module contains a Mini-Project and related Learning material.

Students are expected to read the learning material and complete the hands-on assignments.

Code Completion Tracker:

Students are expected to do all the hands-on assignments and the mini-projects locally on local machine.

After completing the hands-on tasks, students are expected to upload the code using the “Code Completion Tracker” link.

About TalentNext PBL

Discussion Forum:

"Discussion Forum" should be used to post the technical queries OR for responding to queries posted by other co-learners.

The queries will also be responded by remote mentors who will keep monitoring the discussion forum.

Outcomes

- Gain knowledge of the structure and use the Java programming language for various technologies
- Annotations and Databases usage in project development
- Web Based Java Application Development

ASSESSMENT MODEL FOLLOWED IN PBL AT WIPRO TALENTNEXT

Sr. No.	Assessment Type	Question Type	Mode of implementation at CU
1	Hand on Assignments	Program based provided after each main topic.	Shared with students for the Practice Purpose. (Non-Evaluated)
2	Mini Project (pdf file)	Project based provided for each topic in tech module.	Included as Worksheets in Practical Sessions. (Evaluated)
3	Code Proficiency Check (CPC)	Project based problem that covers different topics and check for different test cases (Automated tool).	NA
4	Logic Building Plan	Problems based on mettl based problems.	Included in Assignment. (Evaluated)
5	Quiz	MCQ based.	Included in Quiz (in Theory/Practical). (Evaluated)
6	Assessment Milestone	After each module problem (tool such as mettl, MCQ based.	NA
7	Discussion Forum	Questionnaire Based (Automated tool).	Discussion Forum included per Unit. (Evaluated)

Implementation Model

- **Mini Project,** evaluated for the different test cases
- Topics to learn (Sub Topics (PDF**,** WEB, You Tube))
- MCQ Exercises
- **Hand on Assignments**
- **Logic Building** exercises based on platforms like **mettl,** Hackerrank etc.

Link: https://youtu.be/e9NVfe5Fjp0

Enrollment of Students in WTN

Sr. No.	Year	No. of Students Enrolled
1	2018-2019	555
2	2019-2020	995
3	2020-2021	805
4	2022 Batch	1282

STATS OF 2023 BATCH:

Wipro TalentNext Program

610 Students Enrolled

Wipro Future Skills Program

995 Students (Batch 1)

Batch 2 (under process)

Wipro - TalentNext - HireMee

96 Students are involved

Programs Highlights

Wipro Future Skills

Company: Wipro Technologies (Wipro's TalentNext)

Emerging technologies: AI, Big Data, RPA, IOT, Cloud Computing and Cyber Security backed by Wipro-NASSCOM certificate.

Nomination and Selections Process

- Nominated students will go through preliminary programming test in any one of these languages: JAVA / Python /C# / C++/ C
- Students securing cut-off mark of specific percentage will be considered.

Programs Highlights

Learning Process

- Student will have access to FutureSkills platform for max 1 year
- Student should enroll to recommended free courses before the enrolment expiry date
- License/Access will be revoked for candidates who are not active for 2 weeks from the date of registrations
- Students should plan to complete at least one emerging technologies course in 3 months from the date of availability to be eligible for Wipro-NASSCOM certificate
- Final assessment for Wipro and NASSCOM joint certificates will be conducted from 3rd Month
- Wipro and NASSCOM Joint certificate will be issued to students clearing the final assessment on the respective recommended free course

Programs Highlights

Value for Students

Wipro and NASSCOM Joint certificate will be issued to students clearing the final assessment on the respective recommended free course, this will add value to students profile.

Best Wishes
and
Happy Learning

THANK YOU