Comprehensive Summary of CSEN401 Course and Projects

The CSEN401 course focuses on **Object-Oriented Programming (OOP)** and Java, emphasizing teamwork, problem-solving, and real-world applications through projects and labs. Here's a comprehensive summary:

Course Highlights: Topics and Objectives

1. OOP Principles (A-PIE)

- **Abstraction**: Simplifies complexity by hiding details, implemented via abstract classes and interfaces.
- **Polymorphism**: Enables dynamic and static method behavior.
- **Inheritance**: Facilitates code reuse across related classes.
- **Encapsulation**: Protects data integrity using controlled access (getters/setters).

2. Advanced Java Features

- **Abstract Classes & Interfaces**: Differentiates behavior-sharing mechanisms.
- **Exception Handling**: Ensures program stability via `try-catch-finally`.

3. GUI Development

- **Swing Framework**: Lightweight, flexible interface design using `JFrame`, `JPanel`, and layout managers.
- **Event-Driven Programming**: Handles user actions with event listeners.

4. Labs and Projects

Structured assignments focus on mastering OOP concepts, from debugging to advanced inheritance and abstraction.

Lab Summaries

Lab Assignment 0: Introduction

- Tool configuration, Eclipse usage, and debugging basics.

Lab Assignment 1: Warmup

- Created `DairyProduct` and `Beverage` classes to implement basic attributes, methods, and package organization.

Lab Assignment 2: Inheritance and Encapsulation

- Refined OOP practices by introducing superclass `GroceryProduct` and testing encapsulation.

Lab Assignment 3: Polymorphism and Abstraction

- Enhanced project flexibility using abstract classes and polymorphic behavior.

Lab Assignment 4 (Projected)

- Likely focused on interfaces and modular design.

SuperHeroesChess: Game Project Description

Overview

SuperHeroesChess (SHC) is a two-player strategy game developed in the *Computer Programming Lab* under Prof. Dr. Slim Abdennadher. It reimagines chess by introducing superheroes with unique abilities.

Gameplay Mechanics

- **Objective**: Advance your payload to the enemy's base by eliminating opponent pieces.
- **Board**: A 6x7 grid with hero and sidekick areas and a payload progress panel.
- **Hero Types and Abilities**:
  - **Super**: Smashes two cells in a direction, eliminating enemies.
  - **Medic**: Resurrects fallen allies.
  - **Tech**: Hacks enemy pieces, teleports allies, or restores abilities.
  - **Speedster**: Moves two cells per turn.
  - Others include Ranged and Armored heroes with unique roles.
- **Sidekicks**: Basic units that can transform into heroes upon eliminating enemy heroes.

Game Rules

- **Turn-Based Play**: Players move a piece or activate an ability.
- **Special Mechanics**: Board wrapping allows pieces to reappear on the opposite side.
- **Winning Condition**: Deliver your payload six steps to the opponent's base.

By combining theoretical and practical learning, CSEN401 equips students to design and implement sophisticated software solutions, preparing them for real-world challenges.