



Computer Science Paper I
Software Architecture and Design Patterns
[Compulsory Core Course]

Semester III	Credits:4	Subject Code: MS32001	Lectures: 48
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Course Outcomes:
At the end of this course, the learner will be able to:
<ul style="list-style-type: none"> ● Learn how to add functionality to designs while minimizing complexity. ● Interpret the code qualities required to maintain code flexible ● Analyze the common design patterns ● Explore the appropriate patterns for design problems

Unit 1: Introduction to Software Architecture	12
<ul style="list-style-type: none"> ● Chapter 1: Applying UML <ul style="list-style-type: none"> ○ UML The Notation ○ Process Unified Process / Rational Unified Process inception, elaboration, construction, transition ○ How various components fit in the life cycle The artifacts at end of each process / discipline ● Chapter 2 : Software Architecture <ul style="list-style-type: none"> ○ What Software Architecture is and what it isn't? ○ Why is architecture important? ○ Architectural structures and views ○ Introduction to SOLID design principles ● Chapter 3 : Architectural Styles: <ul style="list-style-type: none"> ○ Architectural Styles ○ Pipes and Filters ○ Data Abstraction and Object – Oriented Organization ○ Event-Based, Implicit Invocation ○ Layered Systems Repositories ○ Interpreters ○ Other familiar Architectures ○ Heterogeneous Architectures. 	<p>2</p> <p>4</p> <p>6</p>

Unit 2: Design Patterns and GRASP	26
<ul style="list-style-type: none"> ● Chapter 4 : Introduction to Patterns <ul style="list-style-type: none"> ○ What is a Pattern & Design Pattern? ○ What makes a Pattern? (GOF) ○ Describing Design Patterns. ○ Pattern Categories & Relationships between Patterns. 	04

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<ul style="list-style-type: none"> ○ Organizing the Catalog. ○ Patterns and Software Architecture. ● Chapter 5 : Study of Design Patterns <ul style="list-style-type: none"> ○ Creational Patterns-singleton, factory method, abstract factory ○ Structural Patterns-adapter, decorator, facade ○ Behavioral Patterns- Iterator, observer, strategy, command and state (study of intent, applicability, participants, structure, collaboration and consequences) ● Chapter 6: GRASP(General Responsibility Assignment Software Patterns) <ul style="list-style-type: none"> ○ Expert, Creator, High Cohesion, Low Coupling ○ Controller, Polymorphism, Pure Fabrication, Indirection ○ Don't Talk to Strangers. 	<p>12</p> <p>10</p>
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Unit 3: Frameworks	14
<ul style="list-style-type: none"> ● Chapter 7 : Study of Frameworks: <ul style="list-style-type: none"> ○ Frameworks as reusable chunks of architecture ○ The framework lifecycle, development using frameworks ○ Spring Core Framework ○ Spring Boot Framework ○ Microservices with Spring ○ Web Architectures: Google Web Tool Kit, Spring, Hibernate etc. ○ Selection of proper framework ○ Comparing Frameworks ○ Advantages of Spring ○ Web based Case Study 	

Unit 4: Case Study	8
<ul style="list-style-type: none"> ● Chapter 8 : Case Study (any one of the web Architecture) <ul style="list-style-type: none"> ○ Take a Framework and find Patterns in the Frame work. ○ Benefits of Patterns in the chosen Framework ○ How Pattern interact in the selected Framework. 	

Reference Books:
<ul style="list-style-type: none"> ● Craig Larman ,Applying UML and Patterns ● Douglas Schmidt ,Design patterns in Java , Publisher O'Reilly ● E. Gamma, Richard Helm, Ralph Johnson , John Vlissides (GoF), Design Patterns – Elements of Reusable Object-oriented Software ● Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal ,Pattern – Oriented Software Architecture (POSA) Volume 1 ● Kathy Sierra, Bert Bates, Elisabeth Robson, Eric Freeman, Head First Design Pattern Publisher: O'Reilly Media, Inc.

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- Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice.
- Mary shaw and David Garlan ,Software Architecture- Perspectives on an emerging discipline
- Ranga Rao Karanam, Mastering Spring 5: An effective guide to build enterprise applications *using Java Spring and Spring Boot framework*, 2nd Edition by ; PACKT publishing
- Rod Johnson, Alef Arendsen, Thomas Risberg, Colin Sampaleanu , Professional Java Development with the Spring Framework 1st Edition by ; WROX publication
- Sam Newman, Building Microservices-Designing Fine-Grained Systems Publisher: O'Reilly Media

- Websites:**
- **MicroServices**
 - <https://www.youtube.com/playlist?list=PLqq-6Pq4lTTZSKAFG6aCDVDP86Qx4INas>
 - **Spring Framework**
 - <https://youtu.be/GB8k2-Egfv0>
 - **Lecture Series**
 - <https://www.youtube.com/watch?v=YXISkWq04jk&list=PLqq-6Pq4lTTbx8p2oCgcAQGQyqN8XeA1x&index=4>
 - https://www.tutorialspoint.com/spring/spring_architecture.htm

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