



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

Semester III	Credits:4	Subject Code: MS32001	Lectures: 48
---------------------	------------------	------------------------------	---------------------

Course Outcomes:

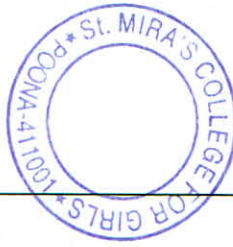
At the end of this course, the learner will be able to:

- 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

Board of Studies	Name	Signature
Chairperson	Ms Ashwini Kulkarni	



<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>
---	---------------------

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.

Board of Studies	Name	Signature
Chairperson	Ms Ashwini Kulkarni	



- 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

Board of Studies	Name	Signature(in white cell)	
Chairperson	Ms. Ashwini Kulkarni		
Faculty	Ms. Swati Pulate		
Faculty	Ms. SmitaBorkar		
Subject Expert (Outside SPPU)	Prof. Mr. AniketNagne		
Subject Expert (Outside SPPU)	Dr. ManishaDivate		
VC Nominee	Dr. Manisha Bharambe		
Industry Expert	Ms. SnehalBiyala		
Alumni	Ms. MamtaChoudhary		

Board of Studies	Name	Signature
Chairperson	Ms Ashwini Kulkarni	