Course Curriculum

Course Code : SE 3211
Course Title : Software Design and Architecture
Course Credit: 2 Credit (Theory course)
Credit Hour : 14 X 2 = 28 hours (1 class equivalent to 1 hour lecture)

Week	Topic	Content (Lesson Plan)	Reference Book & Chapter
WEEK 01	**Fundamentals** **(IAE)**	**Class 1:** What is Software Architecture and What isn't Architectural Structures and Views Architectural Patterns	**LPR (Ch. 1)**
		Class 2: Importance of Software Architecture Inhibiting or Enabling a System's Quality Attributes Predicting System Qualities Defining Constraints of an Implementation	**LPR (Ch. 2)**
WEEK 02		**Class 3:** Influencing the Organizational Structure Enabling Evolutionary Prototyping Improving Cost and Schedule Estimates Supplying a Transferable, Reusable Model Allowing Incorporation of Independently Developed Components **ASSIGNMENT-01 (online)**	**LPR (Ch. 2)**
	Role of Software Architect **(IAE)**	**Class 1:** The Architecture Definition Process Software Architect as a Software Designer, Domain Expert, Software Technologist, Standards Compliance Expert, Software Engineering Economist Architectural Specializations The Architect's Skills & Responsibilities	**NEW (Ch. 5) & RNM (Ch. 17)**
WEEK 03	**Context of Software Architecture** **(IAE)**	**Class 1:** Technical Context Project Life-cycle Context Business Context Professional Context	**LPR (Ch. 3)**
	Architectural Process **(IAE)**	**Class 1:** Guiding Principles Process Outcomes Supporting Activities Process Exit Criteria **TOPIC PRESENTATION-01, 02 [group] (online)**	**NEW (Ch. 7)**

WEEK 04		**Class 2: (Concerns, Principles & Decisions)** Problem-Focused Concerns Solution-Focused Concerns Other Real-World Constraints What Makes a Good Concern Architectural Principles & Decisions	**NEW (Ch. 8)**
		Class 3: (Engaging Stakeholders) Selection of Stakeholders Classes of Stakeholders Stakeholders' Responsibilities	**NEW (Ch. 9)**
WEEK 05	**System Scenario (DCD)**	**Class 1:** Types of Scenarios Uses for Scenarios Identifying and Prioritizing Scenarios Capturing & Applying Scenarios	**NEW (Ch. 10)**
		Class 2: What Makes a Good Scenario? Effective Use of Scenarios Introducing Scenario: The *ICDE* System Overview *ICDE*: Context, Business Goals, Constraints **ASSIGNMENT-02 (online)**	**NEW (Ch. 10) & IGS (Ch. 2)**
WEEK 06	**Quality Attributes Consideration (DCD)**	**Class 1:** Performance: Throughput, Response Time, Deadlines Scalability: Request Load, Simultaneous Connections, Data Size, Deployment Design Trade-offs	**IGS (Ch. 3)**
		Class 2: Modifiability, Security, Availability, Integration Other Quality Attributes Apply on *ICDE* system	**IGS (Ch. 3)**
WEEK 07	**Architectural Styles & Patterns (DCD)**	**Class 1:** Introduction to Styles Architectural Patterns MVC Architecture Client-Server Architecture	**RNM (Ch. 4) & NEW (Ch. 11)**
		Class 2: Pipe & Filter Layered Event Based Peer to Peer	**RNM (Ch. 4) & FRH (Ch. 2)**
WEEK 08		**Class 3:** Publish Subscribe Mobile Code Interpreter Blackboard **TOPIC PRESENTATION-03, 04 [group] (online)**	**NEW (Ch. 11) & FRH (Ch. 2)**

	Architectural Modelling **(DCD)**	**Class 1:** Modelling Concepts Ambiguity, Accuracy, and Precision Complex Modelling: Mixed Content and Multiple Views Evaluating Modelling Techniques	**RNM (Ch. 6)**
WEEK 09	**Applying Design Patterns** **(DCD)**	**Class 1:** Patterns in Software Architecture Enabling Techniques for Software Architecture Non-functional Properties of Software Architecture	**FRH (Ch. 6)**
		Class 2: Structural Decomposition Organization of Work Master-Slave Access Control Command Processor **ASSIGNMENT-03 (online)**	**FRH (Ch. 3)**
WEEK 10	**Architectural Technologies** **(IAE)**	**Class 1: (Middleware)** Middleware Technology Classification Distributed Objects Message-Oriented Middleware Application Servers	**IGS (Ch. 4)**
		Class 2: (Service-Oriented) Service-Oriented Systems Web Services SOAP and Messaging UDDI, WSDL, and Metadata	**IGS (Ch. 5)**
WEEK 11		**Class 3: (REST - REpresentational State Transfer)** Web Interface State Transfer Idea & Format Design the Web Service	**RNM (Ch. 11)**
	Architectural Viewpoints **(IAE)**	**Class 1:** Functional, Information, Concurrency, Development Concerns Models Problems and Pitfalls Checklist	**NEW (Ch. 17-20)**
WEEK 12	**Architectural Perspectives** **(IAE)**	**Class 1:** Security, Performance & Scalability, Availability & Resilience Applicability to Views Concerns & Perspective Architectural Tactics Problems and Pitfalls **ASSIGNMENT-04 (online)**	**NEW (Ch. 25-27)**

	Architecture Evaluation **(IAE)**	**Class 1:** Evaluation Factors Architecture Trade-off Analysis Method Lightweight Architecture Evaluation Analysis Goals: Completeness, Consistency, Compatibility, Correctness **TOPIC PRESENTATION-05, 06 [group] (online)**	**LPR (Ch. 21)**
WEEK 13	**Architecture Reconstruction** **(DCD)**	**Class 1:** Architecture Reconstruction Process Raw View Extraction Database Construction View Fusion Architecture Analysis: Finding Violations	**LPR (Ch. 20)**
	Aspect Oriented Architectures **(DCD)**	**Class 1:** Introduction to Aspect-Oriented Programming Example of a Cache Aspect Aspect-Oriented Architectures State-of-the-Art Performance Monitoring	**IGS (Ch. 13)**
WEEK 14	**Model-Driven Architecture** **(DCD)**	**Class 1:** MDA: Portability, Interoperability, Reusability State-of-Art Practices and Tools MDA and Software Architecture MDA for *ICDE* Capacity Planning	**IGS (Ch. 14)**
	Cutting-Edge Architecture **(DCD)**	**Class 1:** The Ecosystem of Edge-Dominant Systems Changes to the Software Development Life Cycle Implications for Architecture Implications of the Metropolis Model **PAPER PRESENTATION-individual (online)**	**LPR (Ch. 27)**
Final Examination			**ALL**

Reference Books:

LPR *Software Architecture in Practice* (3rd Edition). Len Bass, Paul Clemens, Rick Kazman. Addison Wesley 2013

RNM *Software Architecture: Foundations, theory and practice*. Richard N. Taylor, Nenad Medvidovic, Eric Dashofy. Wiley, 2010

NEW *Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives* (2nd Edition). Nick Rozanski and Eoin Woods. Addison Wesley, 2012

IGS *Essential Software Architecture* (2nd Edition). Ian Gorton. Springer, 2006

FRH *Pattern Oriented Software Architecture: A System of Patterns*. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal. Wiley, 1995