Course Title:	CS-811, Component-Based Software Engineering
Credit Hours:	3+0
Pre-requisites:	▪ Software Engineering ▪ Object Oriented Programming
Course Description:	This course introduces the fundamental concepts and state-of-the-art research in Component-Based Software Development (CBSD) from the perspective of Software Engineering. It explains how the component-based development has evolved from Object Orientation (OO) and emphasizes its importance. It examines the important topics in design, architecture and implementation of component-based systems. The course will start with a brief historical perspective of the evolution of CBSD over the years, and then cover the fundamental concepts in common component-based systems. Advanced topics such as recursive components, formal methods in CBSD and semantics base matching of components may also be covered.
Learning Outcomes:	On successful completion of this course students will be able to: 1. Explain precisely what CBSE is and why it is as important to software development as the assembly line was to the industrial revolution 2. Avoid common mistakes while succeeding with difficult and important cultural, budgetary, and process issues 3. Compare and contrast various CBSE procedures to ensure good software development practices 4. Describes a layered method for designing and building complex distributed component systems using the Unified Modeling Language 5. Understand common component technologies, such as CORBA CCM, OSGi, Fractal and Service Component Architecture.
Text Books:	▪ Component software: Beyond Object-Oriented Programming (2/Ed.) By Clemens Szyperski, Dominik

	Gruntz, Stephan Murer, Addison-Wesley, 2002. ▪ Component-Based Software Engineering: Putting the Pieces Together, Authors: George T. Heineman and William T. Councill, Addison-Wesley 2001.
Reference Books:	▪ Component Based Software Development: Case Studies, by Kung-Kiu Lao, World Scientific, 2004. ▪ Service- and Component-Based Development, Authors: Hedley Apperly, Ralph Hofman, Steve Latchem et al., Pearson Education, 2003. ▪ Foundations of Component-Based Systems, Gary T. Leavens and Murali Sitaraman, Cambridge University Press, 2000.
Course Contents:	▪ Introduction to Component-Based Systems o History and Overview o From Objects to Components o Basics of Construction o Componentization ▪ Interfaces and Requirements o Contracts o Interaction Protocols o Component Bindings ▪ Component compositions, component publication and refinement ▪ Architectural Description of Component-Based Systems o CBSD and UML o COTS: Specifications o Architectural Requirements o Acquisition Process ▪ Aspect-Oriented Approach o Agile Software Development ▪ Software Systems Synthesized from Components o Characteristics and Properties o Case Study: CORBA Component Model

	○ Fault-based Testing of CCM ○ Case Study: OSGi Component Model ▪ Service Component Architecture ▪ Reflection and Recursive Composition ○ Fractal Component Model ▪ ARIFS Methodology ▪ Component Adaptation ○ Case Study: REBOUND ▪ Web-Enabled Component Based Architecture ▪ Measurement and Control ▪ Embedded Systems ▪ Formal Methods and Semantics ○ Matching of Component Specification