

## Agenda – Module #1

### Chapter 1: Introduction to Software Engineering Design

#### **Overview:**

Software design is an indispensable phase of the software engineering process for creating and evaluating software models that guide the construction effort for developing high-quality software systems, on-time, and within budget. Conceptually, design is the process of transforming functional and non-functional requirements into models that describe the technical solution before construction begins. To achieve this, the concept of software design, its activities, and tasks must be well-understood so that a problem-solving framework for designing quality into software products can be established. In today's modern software systems, there are numerous design principles, processes, strategies, and other factors affecting how designers execute the software design phase. When equipped with the proper design foundation knowledge, an understanding of the designer's roles and responsibilities can be acquired, allowing designers to become effective in designing large-scale software systems under a wide variety of challenging conditions. This module presents the fundamental concepts of software engineering design, within context, and provides the motivation for the rest of the course.

#### Module Objectives:

- *Understand software design from the engineering perspective.*
- *Understand the importance of software design in developing complex products.*
- *Become familiar with the issues that make software design challenging.*
- *Understand the software design process and differentiate between its activities.*
- *Become familiar with software design principles, considerations, and strategies.*

#### **Session 1: Motivation and General Design Concepts (30 - 45 minutes)**

This session introduces the concept of design as it applies generally to other fields. Examples of large-scale systems are presented, where the need for design is evident. It also provides a brief review of the software development life-cycle phases to provide context for the design phase in the development of software systems. Finally, the concept of problem-solving as it applies to the design of systems is explored. A holistic framework for problem-solving is proposed and discussed.

Slides – Chapter 1 – Session I

#### **Session 2: Overview of Software Engineering Design (30 - 45 minutes)**

This session provides focused discussions on design as it applies to software systems. Reasons for studying software design for both product development and project management are provided and a list of design challenges explained. Finally, the software design process is presented and a clear distinction between the design phase and the distribution of its activities is established. This session provides a birds-eye view of the topics that will be covered during the course.

Slides – Chapter 1 – Session II

### **Session 3: Software Design Fundamentals (30 - 45 minutes)**

This session finalizes the introduction part of the course. It focuses on the different roles of designers and fundamental design principles. Some of these include: modularization, abstraction, encapsulation, and others. Popular design strategies and practical design considerations are also presented.

Slides – Chapter 1 – Session III

### **Homework #1**

Read chapter 1 and answer review questions 1-18. Submit your answers as a word or PDF document.

### **Quiz #1**

*See Quiz #1.*