Software Engineering, 4010-362, Engineering of Software Subsystems — Required

Catalog Description: An introduction to the principles at the foundations of contemporary software design. Topics include software subsystems modeling, design patterns, design tradeoffs, and component-based software development, with a focus on application of these concepts to concrete design problems. The relationship between design and related process issues such as testing, estimation, and maintenance are also discussed.

Prerequisite(s): 4010-361

Textbook(s) and/or Required Materials: Design Patterns: Elements of Reusable Object-Oriented Software. E. Gamma, R. Helm, R. Johnson, and J. Vlissides. Addison-Wesley, 1995 [referred to as GoF for the "Gang of Four"]

Course Objectives:

Level 1: Knowledge

- List the design pattern classifications
- Identify the classification of a pattern

Level 2: Comprehension

- Contrast different implementations of a pattern
- Contrast difference in intentions between structurally similar patterns
- Discuss the general effects of design pattern usage on design principles such as cohesion and coupling

Level 3: Application

- Demonstrate the use of patterns in isolated software subsystems
- Apply appropriate patterns in the design of a small software system

Level 4: Analysis

- Analyze the design of a software system to identify logical components
- Select appropriate design patterns to refactor an existing design
- Compare design tradeoffs between different patterns and/or different implementations of the same pattern
- Compare benefit of pattern usage versus non-usage

Topics Covered:

Design Principles
Classification of Patterns
Structural patterns: Adapter, Composite, Façade, Proxy, Decorator
Behavioral patterns: Iterator, Observer, Mediator, Visitor, Command, Memento, State, Strategy, Chain of Responsibility
Creational patterns: Abstract Factory, Builder, Singleton, Factory Method, Prototype
Refactoring
Mutability

Anti-patterns
Project design presentations

Class/Lab Schedule: 4 Hours of studio classroom.

Contribution of Course to Meeting Professional Component:

Engineering Topics	=	4	Credits

Relationship to Program Outcomes (depth of coverage): #3 (heavy); #4 (heavy); #5 (heavy); #7 (medium); #8 (heavy); #9 (light); #11 (heavy)

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