



UNITED STATES INTERNATIONAL UNIVERSITY  
Summer Semester 2018  
**SFE 4020 SOFTWARE DESIGN & ARCHITECTURE**

**LECTURER:** Dr. Lawrence Nderu (Ph.D.)

**DAY/TIME:** Tuesday/Thursday 9:00 - 10:40 AM

**VENUE:** ICTC LAB 1

**OFFICE HOURS DAY/TIME:** Tuesday/Thursday 3:00 pm TO 5:00 pm.

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### **Purpose of the Course**

Study of fundamental design concepts, design notations, and architectural design methods for large-scale software systems. Several design methods are presented and compared, with examples of their use. Concepts such as information hiding data abstraction, concurrency, and object-oriented software construction are discussed in depth. Students participate in a group project on software design.

**Prerequisite:** APT 2080: Introduction to Software Engineering

### **Course Learning Outcomes**

At the end of the course, the students will be able to do the following:

- a) Argue the importance and role of software architecture in large-scale software systems.
- b) Design and motivate software architecture for large-scale software systems.
- c) Recognize major software architectural styles, design patterns, and frameworks.
- d) Describe a software architecture using various documentation approaches and architectural description languages.
- e) Generate architectural alternatives for a problem and selection among them.
- f) Use well-understood paradigms for designing new systems.
- g) Identify and assess the quality attributes of a system at the architectural level.
- h) Motivate the architectural concerns for designing and evaluating a system's architecture.
- i) Discuss and evaluate the current trends and technologies such as model-driven and service-

oriented architectures.

j) Evaluate the coming attractions in software architecture research and practice.

### **COURSE INTENDED LEARNING OUTCOMES (CILOS)**

By the end of the semester, successful students will be able to:

1. Analyze systems and select appropriate architectures for them
2. Evaluate architectures both qualitatively and quantitatively
3. Make suitable trade-offs between different architectures

### **Course Content**

<b>Week</b>	<b>Topic and Reading Assignment</b>	<b>Chapter</b>
1	Evolution of the Major Programming Languages	57
2	Describing Syntax and Semantics	131
3	Lexical and Syntax Analysis	185
4	Names, Bindings, and Scopes	221
5	Data Types	259
6	Expressions and Assignment Statements	325
7	Statement-Level Control Structures	353
8	Subprograms	389
9	Implementing Subprograms	441
10	Abstract Data Types and Encapsulation Constructs	471
11	Support for Object-Oriented Programming	513
12	Concurrency	567
13	Exception Handling and Event Handling	621

14	Team project and presentation	
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### **Mode of Delivery**

Lectures and delivery through the Blackboard e-learning platform. Presentations by members of the class, Case discussions, Tutorials, group work, Practical sessions using CASE tools, Library, appropriate software, manual/notes. Throughout the course, the skills will be developed through a combination of theoretical discussions, practical laboratory-based work; classroom based tutorial exercises and directed self-study.

### **Instructional Materials and/or Equipment**

Course text, Handouts, White board, Presentation slides, Blackboard e-learning platform, Journals, CASE tool

### **Course Assessment**

- Quizzes/Assignments: 20%
- These quizzes will test students' understanding of basic concepts and theories of each chapter.
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- Mid-term examination: 20%
- This examination will test the students' knowledge about SDLC focus on basic concept of system analysis.
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- Project and presentation: 30%
- This project will enhance the students' ability to apply their knowledge to the real IS project and encourage them to solve the problem with methodologies.
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- Final examination: 30%

- This examination will evaluate students' knowledge of SDLC and test how to design information systems for an organization.

## **TEXTBOOKS / RECOMMENDED READINGS**

### **Core**

Concepts of Programming Languages, Eleventh Edition, Global Edition, R.W. Sebesta

### **Others**

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- Jeffrey A. Hoffer "Modern Systems Analysis and Design"(5th E). Pearson Prentice Hall. 2008.
- Bentley . Whitten "System Analysis & Design for the Global Enterprise"(7th E) Mcgraw Hill 2009.
- Jeffrey Whitten and Lonnie Bentley, Introduction to Systems Analysis And Design, 1st edition, McGraw-Hill/Irwin, 2006
- Jeffrey O. Grady System Requirements Analysis 1st edition, Academic Press, 2006.
- Selected articles from journals and Magazines