

**1. Course Number and Course Title:**

COE312 – Software Design for Engineers

**2. Credits Hours:**

2-3-3

**3. Prerequisites and/or Co-Requisites:**

Prerequisites: CMP220 (Programming II) and COE241 (Microcontrollers: Programming and Interfacing) or COE251 (Introduction to Computer systems)

Co-requisites: None

Competencies : Basic knowledge of programming in C/C++, microcontrollers and computer systems.

**4. Name and Contact Information of Instructor:**

Dr. Imran Zualkernan

**5. Course Description (Catalog Description):**

Covers software design patterns. Considers advanced Java programming, including multi-threading, collection, I/O and communication libraries. Addresses the use of Java to implement wired and wireless communication interfaces, including reading and writing, serial, parallel, synchronous and asynchronous streams and sockets. Focuses on the design of message and event-based software architectures. Includes course project.

**6. Textbook and other Supplemental Material:**

**Primary:** Herbert Schildt, *Java Beginner's Guide*, Oracle Press, Eight Edition

**Supplemental:** Eric Freeman, Bert Bates, Kathy Sierra, Elisabeth Robson, *Head First Design Patterns*, O'Reilly Media; 1 edition (November 4, 2004).

**7. Learning Outcomes:**

Upon completion of the course, students will be able to:

1. Use Java to build non-trivial multi-threaded applications
2. Effectively utilize I/O and Collection classes in Java applications
3. Characterize and use design patterns in software application design
4. Design and build event-based software/hardware architectures
5. Design and build message-based software/hardware architectures
6. Write simple communication programs using Sockets

**8. Teaching and Learning Methodologies:**

Methods include lectures; problem and project-based learning methods (homework, simulation-based projects) and class discussions.

**9. Course Topics and Schedule:**

Topic	Weeks
Arduino Programming and Sensors	Week 1
Arduino Programming and Wireless networks	Week 2
Introduction to Java programming	Week 3
Introduction to Java programming	Week 4
I/O Package in Java	Week 5
I/O and Collections in Java	Week 6
Introduction to multi-threading in Java	Week 7

Synchronization in multi-threading using Java	Week 8
Introduction Design Patterns	Week 9
Introduction Design Patterns	Week 10
Advanced Design Patterns	Week 11
Message-based Software Architectures	Week 12
Event-based Software Architectures	Week 13
Socket Programming using Java	Week 14
Revision	Week 15
Final Exam	Week 16