1. **Course number and name:**
   COE 424 - Advanced Digital System Design

2. **Credits and contact hours**
   3 -2-3

3. **Prerequisite and/or Co-requisite**
   Prerequisite/Concurrent: COE341 (Computer Architecture & Organization)

4. **Name and contact information of instructor**
   Dr. Assim Sagahyroon

5. **Course Description (Catalog Description)**
   Covers advanced digital design techniques, structured design methods for advanced digital design, case studies of complex digital circuits, hardware description languages (HDL) and PLD implementations, reliable design and testing techniques.

6. **Textbook, title, author, and year**
   M. D. Ciletti, *Advanced Digital Design with the Verilog HDL".* Prentice Hall Publishers, second edition, 2011

   Other supplemental materials
   None

7. **Course Learning Outcomes**
   Upon completion of the course, student will be able to:
   1. Describe and design hardware at the *Structural*, *RTL* and *Behavioral* level using an HDL (Hardware Description Language)
   2. Design combinational circuits using an HDL
   3. Design synchronous Finite State Machines using an HDL
   4. Use industry-standard CAD simulation environment to build and test the functionality of a circuit
   5. Apply synthesis techniques to generate optimized hardware
   6. Design using Programmable Logic devices (e.g. FPGAs)
   7. Demonstrate a basic understanding of VLSI testing

8. **Teaching and Learning Methodologies**
   Includes lectures, labs, homework and quizzes and class discussion

9. **Course Topics and Schedule**

Topic	Weeks
Review of combinational and synchronous sequential circuits	1
Introduction to digital design methodology	0.5
Use of Hardware description languages (HDLs) in the design cycle of ASICs	0.5
structural, RTL and behavioral level design using an HDL	2

Combinational circuits design using an HDL	2
Design of synchronous Finite State Machines (FSM) using an HDL	2
Test benches generation	1
Synthesis techniques of combinational logic circuits	1
Synthesis techniques of sequential logic circuits	2
Design and implementation of digital circuits using Programmable Logic devices	2
Introduction to VLSI testing	1
Review	1
Total	16