ECEXXX: Smart Electronic System Design Paradigm

Instructor: **Mr. Narang N. Kishor (G)** from **Narnix Technolabs**

Faculty Co-ordinator: **Dr. Mohammad Hashmi**

Credits: **4**

Pre-requisites: Basic courses in: Analog Design, Digital Hardware Design & Microcontroller /Embedded Design.

Post Condition (student capability after the course):

After successfully completing the course, a student will have the capability to:

I. Grasp fundamental concepts in product architecting like customer needs identification, requirements formulation, functional decomposition as well as function-form mapping during conceptual design.
II. Synthesize and analyze existing architecting approaches to enhancing creativity while reducing ambiguity and complexity.
III. Utilize out-of-the-box holistic system thinking in developing a system's conceptual model and architecture.
IV. Define system architecture, modeling, form, function, structure and behavior.
V. Describe how a system's function emerges from its form and behavior.
VI. Apply a 10-Step Design Process.
VII. Build a knowledge base of the latest technological innovations.
VIII. Understand & practice the crucial Design Imperatives: Safety, Security, Reliability, Standards, Compliances and Environmental Considerations.
IX. Develop a holistic and system-level perspective on smart sustainable electronic designs.

Brief Description **(no. of hours indicated in parentheses)**

Design Paradigm (2): Evolution of industry from craft manufacturing to mass customization and how it drives product development, fundamental concepts in product architecting, Multidisciplinary, complex project-product lifetime management, etc.

Design Processes (3): Various Design Process Approaches with special emphasis on 10 step Design Process.

Block Diagrams (3): Deriving System Block Diagram out of Problem statements.

Basic Building Blocks (4): **I**ntroduction to the essential building blocks of any Electronic System or Product Design, study & analysis of salient features of the essential building blocks.

Components/Device Selection (9): Analog Components & Devices, Discreet as well as LSIs & ASICs, Digital Devices, ICs & LSIs, MCUs & Peripheral Devices, Sensors – MEMS & Linear/Digital Control & Driver Devices & ICs etc.

Datasheet Interpretation (3): All the categories of Components and devices enumerated above.

Design Imperatives (3): Safety, Security, Reliability, Standards, Compliances and Environmental Considerations.

Innovation & Design Thinking (3): Out-of-the-box thinking that fosters a holistic approach and creative solutions,

"Design Charrette" Sessions (9): Sessions of 'Design Charrette' to invoke the sense of independent thinking & expression of design implementation approaches among the students to consolidate the learnings of design paradigm by virtue of Live Design Problem Solving exercises.

Evaluation

- **Mid-Sem Exam: 20%**
- **End-Sem Exam: 20%**
- **Class-Participation, Test and Discussion: 20%**
- **Project: 40%**

The discussion will be on design problems and the students will be assesses on the insight of any given problem. The project is essential component of this course and will involve development of innovative designs.

Course Resources:

There is no text book. The students will rely on class notes and assigned readings, if any.