

|                              |                                             |
|------------------------------|---------------------------------------------|
| <b>Branch Name:</b>          | Computer Engineering (Software Engineering) |
| <b>Program Code:</b>         | ET203                                       |
| <b>Course Title:</b>         | Embedded Systems Practical                  |
| <b>Course Code:</b>          | 2ET2030108P                                 |
| <b>Pre-requisite Course:</b> | None                                        |

**Course Objective:**

The objective of this course is to introduce students to learn introduction of embedded systems and discuss the important features of commercial embedded systems. This course is intended to explain the network for embedded systems, to study different issue with embedded systems. Students are expected to learn about the Introductory and Fundamental issues of Real Time Systems.

**Teaching and Examination Scheme:**

| Credit | Teaching Scheme<br>Hours per week |   |   |       | Evaluation Scheme (Marks) |      |      |      |                   |      |      |      |                  |
|--------|-----------------------------------|---|---|-------|---------------------------|------|------|------|-------------------|------|------|------|------------------|
|        |                                   |   |   |       | Theory (Marks)            |      |      |      | Practical (Marks) |      |      |      | Total<br>(Marks) |
|        | L                                 | T | P | Total | SEE                       |      | CCA  |      | SEE               |      | CCA  |      |                  |
|        |                                   |   |   |       | Min.                      | Max. | Min. | Max. | Min.              | Max. | Min. | Max. |                  |
| 1      | -                                 | - | 2 | 2     | —                         | —    | —    | —    | 10                | 25   | 10   | 25   | 50               |

**Course Contents:**

| Unit No | Topics                                                                  | Total Hours |
|---------|-------------------------------------------------------------------------|-------------|
| 1.      | Introduction of AVR kit with reference to embedded system.              | 02          |
| 2.      | Perform LED ON without Delay using AVR.                                 | 02          |
| 3.      | Perform Blinking LED using AVR (Control LEDs).                          | 02          |
| 4.      | Driving a 7-Segment numerical Display.                                  | 02          |
| 5.      | Generate pattern by running LEDs using PWM.                             | 02          |
| 6.      | Display a Text on LCD Display.                                          | 02          |
| 7.      | Introducing a Sensor – Flex Sensor.                                     | 02          |
| 8.      | Perform experiment on Humidity and Temperature Sensor.                  | 02          |
| 9.      | Controlling a Stepper motor by switch according to reading from switch. | 02          |
| 10.     | Controlling a Servo motor using AVR.                                    | 02          |
| 11.     | Introducing GSM Interfacing Board.                                      | 03          |
| 12.     | Introducing GPS Interfacing Board.                                      | 03          |

**Reference Books:**

- Kamal, Raj. Embedded systems 2E. Tata McGraw-Hill Education, 2008.
- Wolf, Marilyn. Computers as components: principles of embedded computing system design. Elsevier, 2012.
- Fursin, Grigori, et al. "Milepost gcc: Machine learning enabled self-tuning compiler." International Journal of Parallel Programming 39.3 (2011): 296-327.
- Mazidi, Muhammad Ali, Sarmad Naimi, and Sepehr Naimi. AVR microcontroller and embedded systems: using assembly and C. Prentice Hall Press, 2010
- Furber, Steve B. ARM system Architecture. Addison-Wesley Longman Publishing Co., Inc., 1996.

**List of Open-Source Software/learning website:**

- <https://www.cs.uic.edu/~ajayk/DCS-Book>
- <http://cs-www.cs.yale.edu/homes/aspnes/classes/465/notes.pdf>
- <http://nptel.ac.in/courses/106106107/>

**Course Learning Outcomes (CLO):**

| Course Outcomes | Description                                                                                                          | Bloom's Taxonomy Level            |
|-----------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| COL1            | Understand how the Embedded Systems require most of the knowledge acquired during their study.                       | Understanding (2)<br>Applying (1) |
| COL2            | Develop a firm and enlightened grasp of concepts of different issues related with network and database.              | Applying (1)                      |
| COL3            | Apply the ideas, the techniques, and the knowledge acquired for the purpose of Research on area of real time system. | Applying (2)                      |
| COL4            | Working skills in theory and application of Embedded Systems.                                                        | Understanding (1)                 |

**Mapping of CLO with PO and PSO**

| Course Learning Outcomes | Program Outcomes (POs) |     |     |     |     |     |     |     |     |      |      |      | Program Specific Outcomes(PSOs) |      |      |      |
|--------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|---------------------------------|------|------|------|
|                          | PO1                    | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1                            | PSO2 | PSO3 | PSO4 |
| CLO1                     | H                      | M   | M   |     | M   |     |     |     |     |      |      |      |                                 |      |      |      |
| CLO2                     | H                      | M   |     |     | M   |     |     |     |     |      |      | L    |                                 |      |      |      |
| CLO3                     | H                      | M   | M   |     | M   |     |     |     |     |      |      |      |                                 |      |      |      |
| CLO4                     | M                      | M   | M   |     | M   |     |     |     |     |      |      | L    |                                 |      |      |      |
| CLO5                     | M                      | M   |     |     |     |     |     |     |     |      |      | L    |                                 |      |      |      |

**H: High, M: Medium, L: Low**