| Course Name | Embedded and Real-time Systems |
| --- | --- |
| Prerequisite course | Operating system, Microprocessor |
| Corequisite course | |
| References | 1. E. Lee and S. Seshia, "Introduction to Embedded Systems - A Cyber-physical Systems Approach," UC Berkeley, 2017.<br>2. Peter Marwedel, "Embedded System Design: Foundations of Cyber-Physical Systems, and the Internet of Things," Springer, 2018.<br>3. S. Siewert and J. Pratt, "Real-time Embedded Components and Systems," 2016.<br>4. G.C. Buttazzo, "Hard Real-Time Computing Systems," 2011.<br>5. F, Cottet, J. Delacronix, C. Kaiser, and Z. Mammeri, "Scheduling In Real-time Systems," Wiley, 2002 |
| Course instructor | Dr. Atena Abdi |
| Syllabus | 1. Introduction and basic concepts on embedded and real-time systems<br>   o Requirements, Challenges and applications<br>2. Design flow of embedded systems<br>   o Modeling, design and analysis<br>3. Behavioral modeling and model of computation<br>   o Sequential and concurrent control models (HCFSM, State chart, Petri net)<br>   o Synchronous data flow graphs<br>4. Main components and design details of embedded systems<br>   o Hardware components of embedded systems<br>      o Sensors and actuators: different types and modeling<br>      o Processors: different types and parallelism property<br>      o memory, I/O and interfaces<br>      o interrupt concept and modeling<br>   o Software design and requirements in embedded systems<br>   o Concurrency and real-time requirements<br>   o Real-time operating systems<br>      o Multitasking and its implementation types<br>      o Scheduling<br>         ▪ Periodic and aperiodic scheduling algorithms<br>      o Schedulability and evaluation metrics of scheduling algorithms<br>      o Scheduling anomalies<br>      o Scheduling in multiprocessor systems<br>      o Power-aware scheduling |