

Branch Name:	Computer Engineering (Software Engineering)
Program Code:	ET203
Course Title:	Real Time Operating Systems
Course Code:	2ET2030106T
Pre-requisite Course:	Fundamentals of Operating Systems

Course Objective:

The objectives of this course are:

The course aims to make the student understand various types of scheduling in real-time environment along with designing fault tolerant systems. It also helps learning dynamic behavior of various real-time databases. The course also intends to make the student understand software and system design process for microcontroller based real time systems and applies their programming skills to develop real time systems

Teaching and Examination Scheme:

Teaching and Examination Scheme:													
Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Introduction: Structures of Real-Time System, Issues in Real-Time Computing, Task Classes, Performance Measures for Real-Time Systems, Estimating Program Run Times	5	21
2	Task Assignment and Scheduling: Classical Uniprocessor Scheduling algorithm, Cooperative scheduling, Preemptive scheduling, Uniprocessor Scheduling of IRIS Tasks, Task Assignment, Mode Changes, Fault Tolerant Scheduling	5	20
3	Real-Time Databases: Basic Definitions, Real-Time Vs General-Purpose Databases, Main Memory Databases, Transaction Priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling algorithm, A Two Phase Approach To Improve Predictability.	6	25
4	Fault Tolerant Techniques: Fault Types, Fault Detection, Fault and error Containment, Redundancy, Data Diversity, Reversal Checks, Integrated Failure Handling, Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models	5	21
5	Real-Time Communication: Network Topologies, Protocols, Clocks Synchronization.	3	13

Reference Books:

□ Krishna and Shin, "Real-Time Systems," Tata McGraw Hill. 1999.

- Jane W. Liu, "Real-Time Systems" Pearson Education, 2001.
- Rajib Mall, "Real-Time Systems: Theory and Practice," Pearson, 2008.
- Doug Abbott, "Linux for Embedded and Real-Time Applications", Third Edition, Elsevier, 2013
- Ivan Cibrario, Bertolotti and Gabriele Manduchi, "Real Time Embedded Systems", CRC press, 2012

List of Open-Source Software/learning website:

- www.nptel.ac.in/courses/106105036/
- faculty.cs.tamu.edu/bettati/Courses/663/2013C/course_homepage.html

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
COL1	Understand the structure of various types of Scheduling Real-Time Tasks	Understanding (1) Applying (1)
COL2	Assess and design fault tolerant systems	Applying (1)
COL3	Understand the dynamic behavior of various Real-Time Databases.	Applying (3)
COL4	Understand software and system design process for microcontroller based real time systems, comprehend intricacies of real time databases, apply programming skills to develop real time systems	Applying (3)
COL5	Understand the Real-Time Communication.	Applying (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