

Faculty of Computers and Information Technology

Real Time Systems

Information :

Course Code : DM419

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Digital Media Technology

Area Of Study :

- "Comprehend deeply the basic concepts of real time systems to be ready for further and continuous learning.
- "Show a complete understanding of theoretical foundations for the design and synthesis of real-time systems and applications.
- "Compare, evaluate and select from different solutions to design real time systems.
- "Understand appropriate methodologies to formulate and analyze problems in computing to solve them.
- "Deeply understand real time system to learn emerging concepts in theory and applications of computer science

Description :

Introduction to real time systems; Typical real time applications; Hard versus soft real time systems; A reference model of real time systems; Commonly used approaches to hard real time scheduling; Clock-driven scheduling; Priority-driven scheduling of periodic tasks; Scheduling periodic and Sporadic tasks; Resources and resource access control; Multiprocessor scheduling and resource access control; Scheduling flexible computations and tasks with temporal distance constraints; Real time communications; Real time operating system; Real time programming languages

Course outcomes :

a.Knowledge and Understanding: :

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| 1 - | . Discuss the basic concepts of time that arise in hard & soft real-time applications. |
| 2 - | Explain the principles and algorithms for real-time scheduling and resource access control protocols for single-processor and multi-processor systems |
| 3 - | Select the tools and techniques for analysis, design and development of real time systems |

b.Intellectual Skills: :

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| 1 - | Analyze different hardware interface problems related to real time systems |
| 2 - | Select appropriate algorithms for different real-time scheduling and resource access control protocols |
| 3 - | Analyze different problems description and construct requirements specification for real-time system software |

c.Professional and Practical Skills: :

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| 1 - | . Apply effective information to acquire information about times, events, and sources of error arising in real-time applications |
| 2 - | Use different tools for implementation and documentation of static and dynamic scheduling mechanisms suitable for soft and hard real-time systems |
| 3 - | Deploy effective supporting tools for the development of real time system software |

d.General and Transferable Skills: :

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| 1 - | Work in a team effectively and efficiently considering time and stress management |
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- 2 - Apply communication skills and techniques in presentations and report writing for range of audiences using various methods and tools

ABET Course outcomes :

- 1 - Demonstrate adequate understanding of theoretical foundations for the design and synthesis of real-time systems and applications
- 2 - Identify and select from different solutions to design real time systems

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Basic Real-Time concepts	4	2	2
Hardware Interfacing in Real Time Systems	4	2	2
Kernels of Real-Time Operating Systems	4	2	2
Process Scheduling in Real-Time Operating Systems	4	2	2
Inter-task Communication and Synchronization in Real-Time Operating Systems	4	2	2
Memory Management in Real-Time Operating Systems	4	2	2
Requirements Specification for Real-Time System Software, Formal Methods in Software Specification	4	2	2
Structured and Object Oriented Analysis for Real-Time System	4	2	2
Mid-Term Exam	2		
Properties of Real-Time System Software, Procedural-Oriented and Object Oriented Design for Real Time System	4	2	2
Implementing Real Time Systems using Procedural and Object Oriented Languages	4	2	2
Performance Analysis of Real Time Systems	4	2	2
Fault Tolerance in Real Time Systems	4	2	2
Final Exam	2		

Teaching And Learning Methodologies :

- Interactive Lectures including Discussions
- Tutorials
- Practical Lab Sessions
- Self-Study (Project / Reading Materials / Online Material / Presentations)
- Problem Solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00	4	
Final Exam	40.00	14	
Midterm Exam (s)	30.00	9	
Others (Participations)	5.00		
Presentations	5.00	12	

Quizzes	10.00	5	
Research and Reporting	5.00		

Course Notes :

An Electronic form of the Course Notes and all the slides of the Lectures is available on the Students Learning Management System (Moodle)

Recommended books :

Jane W. S. Liu, Real Time Systems, Prentice Hall, 1st Edition
ISBN: 9780130996510