**Faculty of Computers & Information Technology**

**Real Time Systems**

**Information :**

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| **Course Code :** | DM419 | **Level :** | Undergraduate | **Course Hours :** | 3.00- Hours |

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| **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 |

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**d.General and Transferable Skills: :**

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

**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  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 :**

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| 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 | |

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|---|---|---|---|
| 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

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