**Spring Semester L-3, T-1**

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| **COURSE INFORMATION** | | | | | | | | | |
| Course Code  Course Title | | : CSE 307  : Operating System | Lecture Contact Hours  Credit Hours | | : 3.00  : 3.00 | | | | |
| **PRE-REQUISITE** | | | | | | | | | |
| Course Code: CSE-323  Course Title: Computer Architecture | | | | | | | | | |
| **CURRICULUM STRUCTURE** | | | | | | | | | |
| Outcome Based Education (OBE) | | | | | | | | | |
| SYNOPSIS/RATIONALE | | | | | | | | | |
| The Operating System course provides a comprehensive understanding to the modern Operating System. The course begins with the history of operating system and the review of computer hardware and concentrates on operating system concepts, system structure, process and threads, memory management, file system and related security aspects. It also deals with multiprocessor systems, virtualizations and cloud. | | | | | | | | | |
| **OBJECTIVE** | | | | | | | | | |
| 1. Developing the basic idea about Internals and design principles of OS.  2. Learning the techniques for achieving protection and security in multi-level complex environment. | | | | | | | | | |
| **LEARNING OUTCOMES& GENERIC SKILLS** | | | | | | | | | |
| No. | Course Learning Outcome | | | Bloom’s Taxonomy | CP | CA | | KP | Assessment Methods |
| CO1 | Classify, identify and analyse modern operating systems; concept for virtualization, cloud and multiple processor systems. | | | C1-C3 | 1 |  | | 3 | T, F |
| CO2 | Understanding and analysing process, threads, memory and file management system; | | | C4 | 1 |  | | 1, 3 | T,F |
| CO3 | Able to develop and design algorithms for deadlock and memory management. | | | P3 | 7 | 3 | | 6 | PR, ASG |
| (CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam) | | | | | | | | | |
| **COURSE CONTENT** | | | | | | | | | |
| |  | | --- | | OS Introduction of Operating System, Types of OS; Process: process managements, process states, job and process scheduling, CPU scheduling algorithms, process coordination, critical section problems, semaphores, Inter-Process Communication (IPC), classical IPC problems, multiprocessing and time sharing,; Memory management: swapping, memory allocation schemes, Paging and segmentation, virtual memory, page replacement strategies, working sets, demand paging; Input/output: hardware/software, disk, disk scheduling algorithms, Secondary storage management, terminals, clocks; Deadlock: resource allocation, detection, prevention, avoidance and recovery; File management; Virtualization : Types and techniques for efficient virtualization, memory and i/o virtualizations, virtual appliances, Cloud :clouds as a service, virtual machine migration, Check pointing; Multiple Processor Systems: Multiprocessor, Multicomputer, Distributed Systems, Research on Multiple Processor Systems; Operating system security and protection; case study of some operating systems. | | | | | | | | | | |
| **SKILL MAPPING** | | | | | | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | No. | Course Learning Outcome | PROGRAM OUTCOMES (PO) | | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | CO1 | Classify, identify and analyse modern operating systems; concept for virtualization, cloud and multiple processor systems. | H |  |  |  |  |  |  |  |  |  |  |  | | CO2 | Understanding and analysing process, threads, memory and file management system; |  | H |  |  |  |  |  |  |  |  |  |  | | CO3 | Able to develop and design algorithms for deadlock and memory management. |  |  | H |  |  |  |  |  |  |  |  |  |   (H – High, M- Medium, L-low) | | | | | | | | | |
| **TEACHING LEARNING STRATEGY** | | | | | | | | | |
| Teaching and Learning Activities | | | | | | | Engagement (hours) | | |
| Face-to-Face Learning | | | | | | |  | | |
| Lecture | | | | | | | 42 | | |
| Practical / Tutorial / Studio | | | | | | | - | | |
| Student-Centred Learning | | | | | | | - | | |
| Self-Directed Learning | | | | | | |  | | |
| Non-face-to-face learning | | | | | | | 18 | | |
| Revision | | | | | | | 21 | | |
| Assessment Preparations | | | | | | | 20 | | |
| Formal Assessment | | | | | | |  | | |
| Continuous Assessment | | | | | | | 2 | | |
| Final Examination | | | | | | | 3 | | |
| Total | | | | | | | 106 | | |
| **TEACHING METHODOLOGY** | | | | | | | | | |
| Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method | | | | | | | | | |

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| **COURSE SCHEDULE** |
| |  |  |  |  | | --- | --- | --- | --- | | **Week** | **Lecture** | **Topics** | **LECTURER** | | **1** | Lec 1  Lec 2  Lec 3 | Introduction evolution, goals and Components of OS, types of OS | **Class Test 1** | | **2** | Lec 4  Lec 5  Lec 6 | Process managements, process states and state transition, process control blocks | | **3** | Lec 7  Lec 8  Lec 9 | Job and process scheduling, scheduling levels, objective and criteria CPU scheduling algorithms | | **4** | Lec 10  Lec 11  Lec 12 | Process coordination, critical section problems, semaphores, | **Class Test 2** | | **5** | Lec 13  Lec 14  Lec 15 | Language constructs, classical problems of process coordination, Inter-process communication, message and mailbox etc. | | **6** | Lec 16  Lec 17  Lec 18 | Memory management memory allocation  schemes, Paging and segmentation, virtual memory | | **7** | Lec 19  Lec 20  Lec 21 | Page replacement strategies, working sets,  demand paging | | **8** | Lec 22  Lec 23  Lec 24 | File system functions file organization logical and physical file maps, tree structure filesystems | **Class Test 3** | | **9** | Lec 25  Lec 26  Lec 27 | I/O programming Device management techniques. Interrupts processing parallel processing. | | **10** | Lec 31  Lec 32  Lec 33 | Secondary storage management, disk scheduling algorithms | | **11** | Lec 28  Lec 29  Lec 30 | Space allocation,catalogs, file access control mechanism | **Mid Term / Project** | | **12** | Lec 34  Lec 35  Lec 36 | Deadlock, deadlock prevention. avoidance direction and recovery | | **13** | Lec 37  Lec 38  Lec 39 | Operating system security, timesharing,Types and techniques for efficient virtualization, memory and i/o virtualizations, virtual appliances | | **14** | Lec 40  Lec 41  Lec 42 | Clouds as a service, virtual machine migration, Check pointing; Multiple Processor Systems:Multiprocessor, Multicomputer, Distributed Systems, Research on Multiple Processor Systems; Operating system security and protection; case study of some operating systems. | |
| **ASSESSMENT STRATEGY** |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | | | CO | Blooms Taxonomy | | Components | | Grading | | Continuous Assessment (40%) | Test 1-3 | 20% | CO 1 | C1, C2 | | CO 2 | C3, C4 | | Observation | 5% | CO 1 | C1, C2 | | CO 2 | C3, C4 | | Mid term | 15% | CO 3 | P3 | | Final Exam | | 60% | CO 1 | C1, C2 | | CO 2 | C3, C4 | | CO 3 | P3 | | Total Marks | | 100% |  | |   **(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)** |
| **REFERENCE BOOKS** |
| 1. Modern Operating Systems (4th) - Andrew S. Tanenbaum; Prentice Hall  2**.** Operating Systems: Internals and Design Principles – (9th) -William Stallings  3. Operating System concepts - A. Silberschatz, P.B. Galvin, Greg Gagne |
| **REFERENCE SITE** |
| https://sites.google.com/site/cse307operatingsystem/ |

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