**UNIVERSITY OF GUYANA**

**FACULTY OF NATURAL SCIENCES**

**DEPARTMENT OF COMPUTER SCIENCE**

**Course Number:** CSE 4102

**Course Name:** Operating Systems

**Course Credit:** 4

**Description:** This course is a fourth year first semester course intended for students pursuing the four year full time degree program. This course seeks to take the student on a journey beginning with elementary Boolean logic and culminating with the design and implementation of a simple digital computer system. The course will emphasize handling complexity by embracing abstraction, designing clean interfaces and the “keep it as simple as possible” approach to systems design.

**Exemption(s):** There are no exemptions for this course.

**Pre-requisites:**

**Follow-On Courses:** none

**Learning Outcomes:**

By the end of this course students will be able to:

1. describe the evolution of operating systems.
2. use system calls and APIs provided by x86 and MIPS.
3. explain the functions of the OS Kernel.
4. describe scheduling and memory management algorithms using pseudo code.
5. describe techniques for addressing concurrency, interrupts and security of processes
6. define file system structures in a modern programming language and write algorithms for the traversal of such structures.
7. explain the abstractions provided by virtual machines.

**Course Content:**

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| --- | --- | --- | --- |
| **WEEK** | **TOPICS** | **Lecture HOURS** | **Lab HOURS** |
| 1 | Historical perspective on the development of operating systems   * Unix * Linux * Windows * Mobile Device OS   Labs | 3 |  |
| 2 | Basic operating system functions and libraries   * + System calls   + access in x86 and MIPS   Labs | 3 | 2 |
| 3 | * Application Programmer Interfaces   Labs | 3 | 2 |
| 4 | * Kernel   + Organisation   + layers   Labs | 3 | 2 |
| 5 | * User mode and system mode   + Privileges   + priority   + resource allocation   Test #1  Labs | 2  1 | 2 |
| 6 | Scheduling and dispatch   * + Program vs Process   + Scheduling   + Context switching   + Resource allocation   Labs | 3 | 2 |
| 7 | Memory management   * virtual memory * memory organisation * memory management algorithms * Thrashing   Assignment #1  Labs | 3 | 2 |
| 8 | * Concurrency   + States and state diagrams   + structures   + Synchronisation   + Multiple processor issues   Labs | 3 | 2 |
| 9 | * Interrupts   + Types   + priority   + Actions on interrupt * interrupt handlers   Labs | 3 | 2 |
| 10 | * Security and protection   + Segments   + introduction to paging   + protection schemes   Assignment #2  Labs | 3 | 2 |
| 11 | * File system concepts   + Structures   + Access algorithms   Test # 2  Labs | 2  1 | 2 |
| 12 | * Virtual Machine   + Concept   + Design   + OS interaction   Labs | 3 | 2 |
| 13 | * Virtual Machine   + Concept   + Design   OS interaction  Labs | 3 | 2 |
| 14 | Revision |  |  |
| 15 | Final Examination |  |  |
| **Total** | **65 Contact Hours** | **39** | **26** |

**Method of Teaching:**

Lectures 3 x 13 = 39 hrs.

Laboratories/ Tutorials 2 x 13 = 26 hrs.

**Method of Assessment:**

**Coursework (40%)**

Tests (20%)

Assignments (20%)

**Final Examination (60%)**

**Text and Recommended Reading(s):**

* Operating Systems: Principles and Practice by Thomas Anderson and Michael Dahlin
* Operating System Concepts by Abraham Silberschatz
* The Design of the Unix Operating System by Maurice J Bach