Institute of Business Administration

CSE 331: Operating Systems

(Tentative Course Outline and Syllabus)

IBA SMCS

School of Mathematics and Computer Science

Fall 2024

Institute of Business Administration
School of Mathematics and Computer Science

CSE 331: Operating Systems

"UNIX is a simple operating system, but you have to be a genius to understand simplicity." – **Dennis Ritchie**

1 Logistics

Course:	CSE 331: Operating Systems
Class timings:	Mondays & Wednesdays 11:30AM - 12:45PM
Class room:	AMAN CED BUILDING G-22 (Finance Lab)
Instructor(s):	Waseem Arain, M.
Email:	warain@iba.edu.pk
Phone:	(021) 38104700 Ext: 1608
Office:	Tabba, Room 209
Office hours:	Mondays - Thursdays 09:00AM - 10:00AM
LMS:	
TA:	
TA email:	

2 Course Description/Objectives

To help students gain a general understanding of the principles and concepts governing the functions of operating systems and acquaint students with the layered approach that makes design, implementation and operation of the complex OS possible.

3 Course Learning Outcomes

The cognition levels are based on Bloom's revised taxonomy.[1]

[1] Anderson, Lorin W.; Krathwohl, David R., eds. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Allyn and Bacon

Course Learning Outcome		
CLO	**Description**	**Domain**
CLO-1	Understand the three fundamental tasks of an OS as Virtualization, Concurrency, and Persistence	Cognitive
CLO-2	Implement security feature(s) in any operating system	Psychomotor
CLO-3	Understand the legal issues related to licensing of operating systems	Cognitive

3.1 CLO's to PLO's Mapping

An example CLO-PLO mapping.

	PLO-2	PLO-3	PLO-8
CLO-1	✓		
CLO-2		✓	
CLO-3			✓

4 Format and Procedures:

The LMS site will be used to share the syllabus, give out assignments, and to share other course resources.

The University's standard policies on attendance, inclusivity, office hours, and academic integrity apply in this course. These are described in later sections below.

5 Course Requirements

- Class participation policy: Background reading for next session and active participation in class discussions.
- **Textbook:**
  - *xv6: a simple, Unix-like teaching operating system* by Russ Cox, Frans Kaashoek and Robert Morris, September 5, 2022.
- **Reference:**
  - *Operating Systems: Three Easy Pieces* by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, Arpaci-Dusseau Books, August 2018 (Version 1.00).

6 Grading Procedures

Grades will be computed as follows.

Tentative

Assessments	**Weights**
Assignments	20%
Quizzes	20%
Project	10%
Midterm	15%
Final	35%

- One of the main tools for learning the concepts we discuss in class are the problem sets. The 'personal struggle' you engage in with these problem sets will allow you to develop the skills necessary for success as a theoretical computer scientist. Always spend some time thinking about these problems on your own before asking for hints, looking up solutions etc. Do not go in search of solutions online; learning the material happens when you are working on problems rather than looking up complete solutions.

  You are welcome to collaborate on problem sets, provided that:

  1. You write up your solutions individually
  2. You clearly cite the names of all collaborators and sources. Failure to do so will result in zero credit. An additional key requirement is that you should be able to explain what you submit. Inability to do so will result again in zero credit.

- Instructions regarding project will be shared later.

- There will be two type of quizzes, announced and unannounced or pop-up quizzes. Kahoot will be used, so install it in your mobile to be quiz-ready in the class.

7 Late Work & Makeup Policy

No late solutions will be accepted and no make-up for exams or any of the quizzes will be given. If you have a valid medical excuse (for any of the quizzes, problems set, exams, etc.), the percentage of your grade corresponding to the missed work will be shifted to the final exam. Valid excuses require supporting documentation.

8 Attendance Policy

IBA attendance policy applies.

9 Academic Integrity

Each student in this course is expected to abide by the IBA Code of Conduct. Scholastic dishonesty shall be considered a serious violation of these rules and regulations and is subject to strict disciplinary action as prescribed by IBA regulations and policies. Scholastic dishonesty includes, but is not limited to, cheating on exams, plagiarism on assignments, and collusion.

Kindly refer to `https://examination.iba.edu.pk/CheatingPlagiarism.php` for more details.

- **PLAGIARISM:** Plagiarism is the act of taking the work created by another person or entity and presenting it as ones own for the purpose of personal gain or of obtaining academic credit. Plagiarism includes the submission of or incorporation of the work of others without acknowledging its provenance or giving due credit according to established academic practices. This includes the submission of material that has been appropriated, bought, received as a gift, downloaded, or obtained by any other means. Students must not, unless they have been granted permission from all faculty members concerned, submit the same assignment or project for academic credit for different courses.
- **CHEATING:** The term cheating shall refer to the use of or obtaining of unauthorized in- formation in order to obtain personal benefit or academic credit.
- **COLLUSION:** Collusion is the act of providing unauthorized assistance to one or more person or of not taking the appropriate precautions against doing so.

  Any student violating academic integrity a second time in this course will receive a failing grade for the course, and additional disciplinary sanctions may be administered.
- **SHARING CREDENTIALS:** It has been observed that some students share their credentials (log in id's and passwords) of LMS, portal, email, etc., with with other students. These credentials are private and confidential and not to be shared with anyone. Any violation will be considered as aiding in plagiarism/collusion/cheating and appropriate action might be taken against such students.

10 Office hours

Office hours are mentioned in the schedule. Please take an appointment via email beforehand, if you want to come after office hours.

11 Communication and information dissemination

- Discord server is setup for the course and its URL shared on LMS. It will be used to share resources and information and to answer/discuss your queries and concerns.

12 Tentative breakdown of classes (week-wise)

Week	Topic(s)	Notes
1:	**The need for the operating system, components, types by structure**	
2:		
3:	**Processes**	Problem set 1 out
4:	The entity queues, creation, termination	Quiz 1
5:		
6:	**Switching context, threads**	
7:		Problem set 2 out
8:	**Midterm Week**	
9:	**Process scheduling**	
10:		Quiz 2
11:	**Process synchronization**	
12:	Conditions, mutexes, and semaphores. **Deadlocks**	Problem set 3 out
13:		Quiz 3
14:	**Memory management** Segments, paging, segmentation and multi-level paging, virtual memory	
15:	Review	Quiz 4
16:	**Final Exam**	

13 Program Learning Outcomes/Graduate Attributes

Graduate attributes (program learning outcomes - PLO's) taken from `https://www.seoulaccord.org/document.php?id=79`.

PLO-1. Academic Education

[Educational depth and breadth]

Completion of an accredited program of study designed to prepare graduates as computing professionals

PLO-2. Knowledge for Solving Computing Problems

[Breadth and depth of education and type of knowledge, both theoretical and practical]

Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements

PLO-3. Problem Analysis

[Complexity of analysis]

Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines

PLO-4. Design / Development of Solutions

[Breadth and uniqueness of computing problems, i.e., the extent to which problems are original and to which solutions have previously been identified or codified]

Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations

PLO-5. Modern Tool Usage

[Level and appropriateness of the tool to the type of activities performed]

Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations

PLO-6. Individual and Team Work

[Role in, and diversity of, the team]

Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings

PLO-7. Communication

[Level of communication according to type of activities performed]

Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions

PLO-8. Computing Professionalism and Society

[No differentiation in this characteristic except level of practice]

Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice

PLO-9. Ethics

[No differentiation in this characteristic except level of practice]

Understand and commit to professional ethics, responsibilities, and norms of professional computing practice

PLO-10. Life-long Learning

[No differentiation in this characteristic except level of practice]

Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional