

**COMP 304 (01) OPERATING SYSTEMS**

Spring 2021

**1. Course Information**

<b>Instructor:</b>	Didem Unat, dunat@ku.edu.tr
<b>KU Credits:</b>	3.00
<b>ECTS Credits:</b>	6.00
<b>Prerequisite(s):</b>	Prerequisite: (COMP. 132 and (COMP. 303 or Comp 200)) or COMP 201 or consent of the instructor
<b>Class Location &amp; Meeting Times:</b>	- Monday, Wednesday 11:30-12:45
<b>PS (Yes/No):</b>	Yes
<b>DS (Yes/No):</b>	No
<b>Lab (Yes/No):</b>	No
<b>Language of Instruction:</b>	English
<b>Office Hours:</b>	Wed 13.00-14.00
<b>Teaching Assistant(s):</b>	

	<b>E-Mail</b>	<b>Phone</b>	<b>Office - Office Hours</b>
•Muhammad Aditya Sasongko	MSASONGKO17@KU.EDU.TR		- MWF 5:30PM-6:30PM
•Najeeb Ahmad	NAHMAD16@KU.EDU.TR		- MWF 5:30PM-6:30PM
•Fareed Mohammad Qararyah	FQARARYAH18@KU.EDU.TR		- MWF 5:30PM-6:30PM
•Mandana Bagheri Marzijarani	MMARZIJARANI20@KU.EDU.TR		- MWF 5:30PM-6:30PM
•Endi Merkuri	EMERKURI20@KU.EDU.TR		- MWF 5:30PM-6:30PM

**2. Course Description**

Introduction to operating systems concepts, process management, memory management, virtual memory, input-output and device management, file systems, job scheduling, threads, process synchronization, deadlocks, interrupt structures, case studies of operating systems.

**3. Course Overview**

An operating system is an essential part of any computer system. The purpose of this course is providing a clear understanding of the concepts that underlie operating systems. Fundamental concepts and algorithms that will be covered are based on those used in existing commercial operating systems. The aim is to present these topics in a general setting that is not tied to one particular operating system. Throughout the course, examples that pertain to the most popular operating systems such as Unix, Linux and Windows XP will be studied as well.

**4. Course Learning Outcomes (CLOs):**

<b>CLO #</b>	<b>Upon successful completion of this course, students will be able to...</b>
1	Gain knowledge and deep understanding of fundamental concepts in operating systems
2	Gain the ability to develop and understand concurrent programs and synchronization

3	Evaluate the efficiency aspect of using system resources and resource management
4	Understand relationships between operating system and computer architecture
5	Learn necessary concepts for memory management and file system management

## 5. Assessment Methods

Method	Description	Weight %
Homework	Three Written and Coding Assignments	10.00
Project	Three Extensive Coding Projects	36.00
Midterm Exam	Written Exam	20.00
Final Exam	Written Exam	34.00
<b>Total:</b>		100.00

## 6. Instructional Material and Learning Resources

- Operating System Concepts, Edition: 9 (ISBN: 1118129385)  
**Author:** A. Silberschatz, Galvin, Gagne  
**Publisher:** Wiley  
**Material Type:** Textbook  
**Material Status:** Required
- Linux Kernel Development, Edition: 3 (ISBN: 0672329468)  
**Author:** Robert Love  
**Publisher:** Addison-Wesley Professional  
**Material Type:** Textbook  
**Material Status:** Recommended
- Active Use of Course Page on Blackboard: <https://ku.blackboard.com/>
- KOLT Tutoring: <http://kolt.ku.edu.tr/>

## 7. Course Schedule

Meeting Times	Subject
WEEK 1	Introduction, operating systems concepts and strategies, operating system structure organization, multiprogramming, brief history of operating systems, system calls, user and kernel modes, system boot
WEEK 2-3	Process Management: Process concept, concurrent programming and Unix processes, operations on processes, inter-process communication, cooperating processes, producer-consumer shared- memory solution
WEEK 4	CPU Scheduling: concepts, criteria, CPU scheduling algorithms, algorithm evaluation and performance, real-time CPU scheduling
WEEK 5-6	Process Synchronization: race conditions, critical section problem and their solutions, semaphores, monitors, locks, busy waiting vs blocking, deadlock and starvation classical problems, condition variables, synchronization examples
WEEK 7	Thread Management: threads, multithreading models, POSIX Threads API, case studies of operating systems
WEEK 8	Deadlocks: system model, characterization, deadlock prevention, deadlock avoidance, deadlock detection and recovery
WEEK 9	Memory Management: memory allocation, internal and external fragmentation, swapping, paging, page table structure, segmentation, operating system examples
WEEK 10	Virtual Memory: demand paging, page fault, page replacement algorithms, allocation of frames, thrashing, working set model, operating system examples
WEEK 11	I/O Systems: mass storage structure, disk scheduling, file systems, file system implementation, protection and security, case studies
WEEK 12	Distributed file systems, Google File System, Hadoop File System

WEEK 13	Distributed Systems and Networking: network operating systems, client/server model, multithreaded server models, Unix system calls for client/server communication
WEEK 14	Influential Operating Systems: Atlas, MULTICS, IBM OS/360, MS- DOS, Mach, Linux, Android

## 8. Student Code of Conduct and Academic Grievance Procedure

[Student Code of Conduct](#)

[Statement on Academic Honesty with Emphasis on Plagiarism](#)

[Academic Grievance Procedure](#)

## 9. Course Policies

All deadlines are final. Late homework and project submissions will receive 0 credit. Course Elements: There will be projects and homework related to concepts covered in class. Besides, there will be a midterm and a final exam. During class/PS hours, quizzes may be given, in order to help students better understand the material and follow the course attentively. Quizzes will not be graded. Final makeup exam and remedial exam will take place on the same day at the same time. A student can take either of them but not both. Midterm makeup exam is on the last week of the instructions at the PS hour. Midterm makeups are not cumulative.

## 10. Other

Attendance and Policy: The students are required to attend classes on time. Random attendance will be taken.

Remedy Exam: Remedy exam will replace three written and coding assignments and contribute to 30% of your grade.