

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
OPERATING SYSTEMS	CSE 535	1	3 + 0	3	10

<b>Prerequisites</b>	
----------------------	--

<b>Language of Instruction</b>	English
<b>Course Level</b>	Graduate (Second Cycle)
<b>Course Type</b>	Compulsory
<b>Course Coordinator</b>	
<b>Instructors</b>	
<b>Assistants</b>	
<b>Goals</b>	The goal of the course is to study general design principles of modern operating systems(OS) and concurrent programming.
<b>Content</b>	Fundamental OS kernel components and their design principles with hands on experience on a real operating system.

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1. Knowledge of process management component design principles and ability to design synchronization primitives under realistic hardware constraints and conditions	3,4	1,2,3	A,C,D
2. Knowledge of memory management component design principles for virtual memory systems	3,4	1,2	A,C,D
3. Knowledge of file system component design principles and secondary storage management issues	3,4	1,2	A,C,D
4. Knowledge and ability to use modern design techniques for the design of kernel system calls supporting multi-processing and multi-threading systems	3,4,5	1,2,3	A,C,D
5. Knowledge and ability to use modern operating system components and tools for the	3,4,5	1,2,3	C,D

design of multi-threaded concurrent systems with realistic constraints in real life applications.			
6. Ability to conduct experiments, gather data, analyze and interpret results for investigating engineering solutions to OS kernel design problems.	5	3	C,D
7. Ability to work efficiently in intra-disciplinary teams and to work individually.	6	3	A,C,D

<b>Teaching Methods:</b>	1: Lecture, 2: Question-Answer, 3: Lab
<b>Assessment Methods:</b>	A: Testing, B: Experiment, C: Homework, D: Term Project

<b>COURSE CONTENT</b>		
<b>Week</b>	<b>Topics</b>	<b>Study Materials</b>
1	Introduction and historical perspective	
2	Processes and Threads: creation and dispatching, context switch	
3	Cooperating vs Independent Processes, IPC , Atomic Operation, Race Condition	
4	Synchronization Problem: Mutual Exclusion, Critical Section, Implementing Locks	
5	Classical IPC Problems, bounded buffers, Synhronization: Scheduling Constraints, Semaphores	
6	CPU Scheduling	
7	Midterm I	
8	Monitors, Condition Variables, Deadlocks	
9	Memory Management: Contiguous Allocation, Protection with Base & Bound Registers, Segmentation, Paging, Translation Lookaside Buffers	
10	Virtual Memory, Demand Paging, Page Replacement, Thrashing, Working Set	
11	Secondary Storage Management, Disk Allocation, Disk Scheduling	
12	Midterm II	
13	File Systems: Naming and Directories	
14	Atomic Transactions, Protection and Security	

RECOMMENDED SOURCES	
<b>Textbook</b>	A.Silberschatz et al, "Operating System Concepts", Addison Wesley
<b>Additional Resources</b>	Lecture Notes: <a href="http://cse.yeditepe.edu.tr/v2/en/academic/course-pages">http://cse.yeditepe.edu.tr/v2/en/academic/course-pages</a> Lab material: <a href="http://cse.yeditepe.edu.tr/v2/en/academic/course-pages">http://cse.yeditepe.edu.tr/v2/en/academic/course-pages</a> A. Tanenbaum, "Modern Operating Systems", Prentice Hall G. Nutt, "Operating Systems, Addison Wesley

MATERIAL SHARING	
<b>Documents</b>	
<b>Assignments</b>	
<b>Exams</b>	

ASSESSMENT		
IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	57
Quizzes	2	7
Assignment	3	21
Term Project	1	15
<b>Total</b>		<b>100</b>
<b>CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE</b>		30
<b>CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE</b>		70
<b>Total</b>		<b>100</b>

<b>COURSE CATEGORY</b>	Expertise/Field Courses
------------------------	-------------------------

COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Knowledge on advanced computer architectures					
2	Knowledge on advanced computer system design issues					X
3	Knowledge on theory of computer science	X				

4	Ability to read, understand, present and criticise research work from the literature.					X
5	Knowledge on advanced telecommunications and next generation computer networks					

<b>ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION</b>			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	14	5	70
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Mid-terms	2	5	10
Homework	3	4	12
Term Project	1	100	20
Final examination	1	10	10
<b>Total Work Load</b>			258
<b>Total Work Load / 25 (h)</b>			10,1
<b>ECTS Credit of the Course</b>			10