EEN521 - Operating Systems

3 credits

B.S.E.E.			B.S.Cp.E.	B.S.I.S.E.	
EEN	EAN	WCN	ECN	IT	SE
elect	elect	elect	**REQ**	elect	**REQ**

2007-8 Catalog Data: The design and implementation of operating systems. Virtual memoriy and memorymanagement, resource allocation, device drivers, process creation, control, communicationsand scheduling, file systems, data protection, security, parallel processing andtime-sharing. The class includes a significant operating system implementationproject.

Prerequisites: EEN318

Texts:

1. Operating System Concepts
   A. Silberschatz, Wiley, ISBN 0471694665, 2007

References: None

Objectives:

1. Provide sufficient understanding of the theory and practical concerns to successfully contribute to the implementation and maintenance of any of the major operating system components.
2. Provide sufficient expertise to construct functional operating system components.
3. Provide understanding of the tasks, responsibilities, and modi operandi of modern operating systems.

Topics:

1. Memory: paging, access protection, virtual memory, page faults and page replacement strategies.
2. File systems:
3. Physical characteristics of media, error detection and correction.
4. Disc structures: i-nodes, partitions, free lists, files and directories, recovery
5. CPU internals: interrupts, mode, privileges, context switching
6. Processes:
7. Implementation: creation, representation, and manipulation
8. Life-cycle: states, swapping, switching, scheduling.
9. Input/output systems: device drivers, blocking/non-blocking, processing, scheduling.
10. Concurrency, inter-process communication, and time-sharing
11. Shared memory, pipes, ASTs, signals, general communication.
12. Resource allocation, peripherals and off-lining, resource locks
13. Deadlocks: causes, avoidance, and cures: semaphores, monitors, allocation
14. Construction of an operating system (practical group project)
15. Design of CPU, creation of emulator and assembler
16. Integrated disc system emulation, creating a file system
17. Implementing virtual memory and interrupt handlers
18. Multi-processing with process creation, deletion, time-sharing.
19. Public demonstration of working system.

Schedule: 150 minutes lecture per week

Professional Component: Engineering topics: 3 credits, design 2 credits
Students design and implement working operating system components.

Prepared by S. Murrell on 2007-12-06, Last updated 2008-08-06

EEN521: This class is assessed for outcomes G_1, and K_7.

Significant contributions of syllabus topics to outcomes

Topic 1: Outcomes C, I
Topic 2: Outcomes A, C
Topic 5: Outcomes A, C
Topic 6: Outcomes C, E
Topic 9: Outcomes C, E
Topic 10: Outcomes A, C, E
Topic 14: Outcomes A, B, C, D, E, I, K
Topic 19: Outcome G

Contributions to all outcomes

Outcome			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
a	A_1	Mathematics	1	2	1													
	A_2	Science and Engineering	3	3	2													
b	B_1	Conduct experiments	0	0	0	0	0	0	2	2	**4**	0						
c	C_1	Design	**4**	2	**4**	**4**	**4**	**4**	2	2	**4**	**4**	3	3				
d	D_1	Teamwork	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
e	E_1	Identify, formulate, solve	**4**	**4**	**4**	2	3	2	2	**4**	**4**	**4**	**4**	3				
f	F_1	Professional and Ethical	0	0	0	0	0	0	0	3	**4**	**4**						
g	G_1	Oral Communications	0	3	3	3	3	3	3	3								
	G_2	Written communications	3	3	3	3	3	1	**4**	**4**	2	2	**4**					
	G_3	Graphical communications	2	0	0	2	1	1	1									
h	H_1	Broad education	1	2	0	3	2											
i	I_1	Life-long learning	**4**	**4**	**4**	0	1	2	3	**4**								
j	J_1	Contemporary issues	0	0	3	3	3											
k	K_1	Analog simulation	0	0	0	0	0											
	K_2	MatLab	0	0	0	0	0	0	0	0								
	K_3	Quartus	0	0	0	0	0	0	0	0								
	K_4	ModelSim	0	0	0	0	0	0	0									
	K_5	Test equipment	0	0	0	0	0	0	0	0	0							
	K_6	Application	0	2	2	0	0	0										
	K_7	Programming Tools	**4**	**4**	**4**	**4**	1	0	3	**4**	**4**	**4**						
	K_8	Development tools	0	0	0	0	0											