Course Syllabus

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CS 338 OFFICIAL TITLE:  EECS 338N. Intro to Operating Systems and Concurrent Programming. 4 Units.

OFFICIAL DESCRIPTION:  Intro to OS:  OS Structures, processes, threads,
CPU scheduling, deadlocks, memory management, file system implementations,
virtual machines, cloud computing. Concurrent programming: fork, join,
concurrent statement, critical section problem, safety and liveness
properties of concurrent programs, process synchronization algorithms,
semaphores, monitors. UNIX systems programming: system calls, UNIX System
V IPCs, threads, RPCs, shell programming. Offered as EECS 338 and EECS
338N. Prereq: EECS 233 with a C or higher.

LEAD INSTRUCTOR: Ronald P. Loui, Ph.D.; r.p.loui@gmail.com for high
priority, start with 338 in all subject lines; 216-308-4865 texts ok
(identify yourself please), calls not generally answered unless expected;
rxl637@case.edu for routine requests or submission of non-canvas content.

Office Where: AW Smith 329, moving to Crawford Hall, SAGES Cafe if
necessary / When: 5:20-6p Tue/Thu (after lecture)
TA Meeting Where: When: Before labs

TA info:

Naren Nallapareddy, PhD candidate, CWRU. nxn151@case.edu
Daniel Luo, Undergraduate, CWRU. dyl24@case.edu

Tu Where: AW Smith 329 LECTURE When: 4-5:15p
Th Where: AW Smith 329 LECTURE When: 4-5:15p *except 9/19 (Nord 410)
W Where: White Bldg 411 LAB When: 4:50-6:05p
MIDTERM EXAM:  Tue Oct 15 in class 45m
FINAL EXAM:  Wed Dec 11 TBD location 12-3p


INSTRUCTOR'S GOALS:  Cover much of the conventional classic OS textbook
material appropriate for the level and reputation of the school, quality
and variety of students.  Give sufficient technical work and material for
accreditation if necessary.  Introduce c programming with kernel level
calls without tears.  Provide students with a lasting career boost in
systems and a special experience.

PREREQS:  Maturity and independence working with computer systems,
familiarity as a programmer or power user.  CS major or minor assumed.
Ability to begin editing programs in c and to process/visualize log data.

TEXT:  Operating Systems Concepts, by Silberschatz, Galvin, Gagne.
8th and 9th editions are online, (c) 2013, 2012, ISBN:978-1-118-06333-0

We will also make liberal use of youtube snippets, stackoverflow posts,
material linked on scholar.google, wikipedia, and similar, especially
online Linux material.  This is a course for engineers but nonmajors with
technical depth may also benefit.  This course is Ubuntu- and c-centric
but requires no specific prior knowledge of either.

ORDER OF MATERIAL
1 What is an OS, OS issues/Goals/Markets (IN_SURVEY)
2 OS's and Programmable Devices Past, Present, Future
3 Probing, Performance, Configuration, and Monitoring
4 Virtual Machines, Containerization, Orchestration (Q)
5 Security, Reliability (Q)
6 Memory (Q)
7 Processes (Q) (FEEDBACK_SURVEY)
8 Scheduling (Q)
9 IO (Q)
10 File Systems (Q, Q)
11 Synchronization (Q, Q)
12 The OS in Perspective (OUT_SURVEY)

AUG
27 [SURVEY] YOU
28 [LAB 1] QUEUE SIMULATION [HW 1] WHO LOOKUPS/C SQUARES
29 OS ABSTRACTION/CONTROL/MIN/MAX/WHY/WHAT IF

SEP
3 OS PAST/PRESENT/THEMES/ERAS
4 [LAB 2] DINING PHILOSOPHERS/HW1 C CODE INTERACTIVE [HW 2] CORMACK/DOCKER MODERN OS TALK/SUMMARY/PARSING TOP IN
C
5 OS PRESENT/FUTURE/MODERN/RESEARCH/BATCH IS BACK

10 MONITORING/LOGGING
11 [LAB 3] HW1 and HW2 C CODE COMPILE AND RUN BETS [HW 3] LINUX SYS COMMANDS/VIZ PROCESS MEMORY
12 PERFORMANCE/CONFIG

17 VIRTUAL MACHINES/QUBES OS
18 [LAB 4] VIRTUAL MEMORY/SWAPPING/CACHING/IPT/TLB SIMULATION [HW 4] BARE METAL VS KVM/CPU/MEM/DISK CHARTING
19 CONTAINERIZATION/ORCHESTRATION (GUEST)

24 SECURITY/PERIMETER/DEPTH/OBSCURITY/PSEUDONYMIZATION/MTD/RANSOM
25 [LAB] XC/OPT TA LAB LINUX [HW 5] TANENBAUM/MINIX TALK/WHAT LOOKUPS/OS BUGS/C STRINGS
26 DLP/ISOLATION/MIRRORS/RELIABILITY/REDUNDANCY/BACKUPS/HEATR [QUIZZES 1/2 MAIN MEMORY/VIRTUAL MEMORY]

OCT
1 MEMORY/PHYSICAL/VIRTUAL/DENNING'S WORKING SETS
2 [LAB] XC/OPT TA LAB C [HW 6] FRAG/SWAP BOOK Qs/PIGS AND SWAPPING
3 ANDROID/BELADY'S ANOMALY/PAGING

8 PROCESSES/THREADS/PIDS
9 [LAB] TA LAB MIDTERM QS
10 SCHEDULING AND SHARED MEMORY [QUIZZES 3/4 ON PROCESSES/THREADS]

15 [MIDTERM, GRADES DUE 10/21] [FEEDBACK SURVEY]
16 [LAB] None
17 MIDTERM COMMENTS/PRIORITIES/LINUX CFS/VRUNTIMES/C MALLOC/FORK

22 [FALL BREAK]---------------NO LECTURE--------------
23 [LAB] None [HW 7/8] CPU SCHEDULING BOOK Qs
24 FORK/PTHREAD/RATE MONOTONIC SCHEDULING/EDF [QUIZ 5 CPU SCHEDULING]

29 STORAGE/SPOOLING/POLLING/SCHEDULING/IO/BLOCK/CHAR/DMA/RAID
30 [LAB 5] DISK DEFRAGMENTATION [HW 9/10/11] DISK SCHEDULING/FILE SYSTEMS BOOK Qs
31 FILE SYSTEMS/JOURNALS/INODES/ALLOCATION TABLES [QUIZZES 6/7/8 FILE SYSTEMS/IO SYSTEMS]

NOV
5 SYNCHRONIZATION
6 [LAB 6] SEMAPHORES/PETERSON'S ALGORITHM
7 DEADLOCKS [QUIZZES 9/10]

12 ADVANCED/MODERN REVISIT OF MEMORY
13 [LAB] None [HW 12/13/14] TBA
14 ADVANCED/MODERN REVISIT OF PROCESSES [QUIZ 10]

19 ADVANCED/MODERN REVISIT OF I/O
20 [LAB] None
21 ADVANCED/MODERN REVISIT OF SECURITY/ROBUSTNESS

26 [LECT] FROM THOMPSON TO TEVANIAN AND TOMORROW
27 [LAB] None
28 [TGIVING]---------------NO LECTURE--------------

DEC
3 [SURVEY] MARKETS/USERS/NEEDS/HARDWARE/PERSPECTIVES/IMPACT/LONGEVITY/LINUS
4 [LAB] LAST CHANCE PAPER INTERACTIVE
5 [PAPER DUE] OS REVIEW/STUDENT PAPER ABSTRACTS

10 [READING DAYS]---------------NO LECTURE--------------
11 [FINAL EXAM 12p-3p]


GRADED WORK:
1 final exam 25% (hard)
1 late-midterm exam 15% (hard)
1 paper (3pp) 20% (hard)
10x 2% 2/3-min in-lecture quizzes 20%
6x 1% lab attendance and 14x 1% hw/deliverables 20%

In-lecture lookup points EXTRA CREDIT

Ingress, Egress, and Blind-Customer-Feedback Surveys EXTRA CREDIT

A > 90%
B > 80%
C > 70%
D > 60%
pass > 60%

Grades are not curved, but may be rescaled nonlinearly before summing
to correct any miscalibration (not to fit a Gaussian)

Lecture attendance is strongly encouraged.  Please do not attend if
you are very ill or think you might be catching something contagious.
Ask questions freely, but practice good timing.  BYOD; you may want
to have a real keyboard.  Lab attendance is graded.  No make-ups.
Late work 50% max.  Only a missed final or midterm can be negotiated
(usually by normalization at lead instructor's discretion).

Policies of this university will be respected and followed. We
strive for higher standards of decency and discipline. Note that
individual/group work is occasionally monitored for anomalies and may
trigger interventions.  Remind instructors to comply with FERPA, which
includes written permission to disclose information on recommendation
letters.

Please complain to me privately whenever you think of a complaint so I
can try to improve what I am doing.  Please realize that small-sample
feedback usually cannot redirect a large ship with its own momentum,
and different students have different needs; however, often one who
speaks speaks for many, and that leadership is strongly encouraged.
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Course Summary:

Date	Details	
Wed Aug 28, 2019	YOU Survey	due by 11:59pm
Wed Sep 4, 2019	HW 1	due by 11:59pm
Wed Sep 11, 2019	HW 2	due by 11:59pm
Wed Sep 18, 2019	HW 3	due by 11:59pm
Wed Sep 25, 2019	HW 4	due by 11:59pm
Wed Oct 2, 2019	HW 5	due by 11:59pm
Wed Oct 9, 2019	HW 6	due by 11:59pm
Sat Oct 12, 2019	QUIZ 3 SILBERSCHATZ CH 3 PROCESSES	due by 11:59pm
	QUIZ 4 SILBERSCHATZ CH 4 THREADS	due by 11:59pm
Wed Oct 23, 2019	QUIZ 5 CPU SCHEDULING (CH6 ed 9, CH5 ed 8 with CH19sec5 ed 8)	due by 11:59pm
Wed Oct 30, 2019	HW 7&8 (2pts)	due by 11:59pm
Sat Nov 2, 2019	QUIZ 6&7&8 (Chs 11, 12, 13 in 9th ed., Chs 10, 11, 13 8th ed. FILE SYSTEMS, I/O SYSTEMS) (3 pts)	due by 11:59pm
Wed Nov 6, 2019	HW 9&10&11 (3pts)	due by 11:59pm
Sat Nov 16, 2019	QUIZ 9&10 (Chs 5&7 in 9th ed, Chs 6&7 in 8th ed) PROCESS SYNCHRONIZATION, DEADLOCKS) 2pts	due by 11:59pm
Wed Nov 20, 2019	HW 12&13&14 (3 pts)	due by 11:59pm
Fri Dec 6, 2019	3-PAGE PAPER DUE DEC 5	due by 11:59pm
Thu Dec 12, 2019	Exit Quiz 1pt	due by 11:59pm
	FINAL EXAM	
	First Day Survey (IN_SURVEY)	
	IN CLASS EXTRA CREDIT	
	LAB 1	
	LAB 2	
	LAB 3	
	LAB 4	
	LAB 5 DISK DEFRAGMENTATION GAME	
	LAB 6 DINING PHILOSOPHERS REDUX	
	LAB TA1 OPTIONAL	
	LAB TA2 OPTIONAL	
	MIDTERM ADJUSTMENTS	
	MIDTERM SCORES	
	QUIZ 1 SILBERSCHATZ CH 8 MAIN MEMORY	
	QUIZ 2 SILBERSCHATZ CH 9 VIRTUAL MEMORY	

May 2020

26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Course assignments are not weighted.