ECE445M Quiz 2 study guide (Spring 2026): 20% **Thur** April 9, 12:30-1:45p, in regular classroom, closed book

Reference material

```
   LDR   Rd, =label    // load 32-bit address of label to Rd
   LDR   Rd, [Rn]      // load 32-bit memory at [Rn] to Rd
   STR   Rt, [Rn]      // store Rt to 32-bit memory at [Rn]
   LDR   Rd, [Rn,#n5]  // load 32-bit memory at [Rn+n5] to Rd
   STR   Rt, [Rn,#n5]  // store Rt to 32-bit memory at [Rn+n5]
   MOV   Rd2, Rn2      // Rd = Rn (any register)
   MOVS  Rd, #imm8     // Rd = M
   ADDS  Rd, Rn, Rm    // Rd = Rn + Rm
   ADDS  Rd, Rn, #imm8 // Rd = Rn + M
   SUBS  Rd, Rn, Rm    // Rd = Rn - Rm
   SUBS  Rd, Rn, #imm8 // Rd = Rn - M
   CPSID I             // disable interrupts, I=1
   CPSIE I             // enable interrupts, I=0
   B     label         // branch to label
   BX    Rm            // branch indirect to location specified by Rm
   BL    label         // branch to subroutine at label
   SVC   #imm8         // invoke the SVC_Handler
   PUSH  {reglist}  // push 32-bit registers onto the stack, R0-R7,LR
   POP   {reglist}  // pop 32-bit numbers off stack into registers, R0-R7,PC
Rd Rdn Rm Rn Rt represent 32-bit registers R0 to R7
Rd2 Rm2 represent 32-bit registers R0 to R15
#n5     any value from 0 to 124 in multiples of 4
#imm8   any value from 0 to 255
```

Lecture notes Lec4, Lec5, Lec6 (no DMA), and Lec7
Book Chapters 4 (review), 5, 6, 7, and 8
Lab 3, 4, and 5

General OS

Midterm Exam Spring 2024 Problem 1b) Stack overflow
Midterm Exam Spring 2024 Problem 1d) PendSV priority
Final Spring 2024 Problem 1a) SVC calls OS_Wait
Midterm Exam Spring 2023 Problem 1) General questions
Midterm Exam Spring 2023 Problem 2) Context switch
Midterm Exam Spring 2022 Problem 1) Context switch
Midterm Exam Spring 2022 Problem 2) Context switch
Final Spring 2022 Problem 1) Context switch
Final Spring 2022 Problem 3) SVC handler
Midterm Exam Spring 2019 Problem 1) Context switch
Midterm Exam Spring 2019 Problem 5) General questions
Midterm Exam Spring 2018 Problem 2) Stack
Midterm Exam Spring 2018 Problem 3) Periodic tasks
Final Spring 2018 Problem 1) General questions
Final Spring 2018 Problem 1a) Priority
Final Spring 2018 Problem 1e) Resource allocation graph
Final Spring 2018 Problem 1f) Priority inversion

Final Spring 2018 Problem 1g) Priority scheduler
Final Spring 2018 Problem 3a) StartCritical EndCritical
Final Spring 2017 Problem 1) Word bank
Final Spring 2017 Problem 6) FIFO queue
Midterm Exam Spring 2016 Problem 2) Priority Scheduling
Midterm Exam Spring 2016 Problem 3) OS_Sleep
Midterm Exam Spring 2016 Problem 4) OS_Kill on thread exit/return
Final Spring 2016 Problem 2) KPN
Spring 2013 Quiz 1, Question 4, Critical section
Spring 2012 Quiz 1, Question 6, Reentrancy.
Spring 2011, Quiz 1, Question 1, time jitter
Spring 2011, Quiz 1, Question 2, reentrant, parameter passing, LR
Spring 2009, Quiz 2, Question 3, FIFO implementation
Fall 2006, Final, Question 4, Critical section
Fall 2005, Quiz2, Question 6, Time-jitter
Fall 2004, Quiz2, Question 5, Definitions and a word bank
Fall 2004, Quiz2, Question 4, Time-jitter
Spring 2013 Quiz 1, Question 6, Assembly language thread switch.
Spring 2013 Quiz 1, Question 3, OS definitions.
Spring 2012 Quiz 1, Question 9, Use OS to debounce a switch.
Spring 2012 Quiz 1, Question 4, Two SPs.
Spring 2012 Quiz 1, Question 5, OS definitions.
Spring 2012 Quiz 1, Question 7, Monitor and deadlocks.
Spring 2012 Quiz 1, Question 8, OS_AddThread and OS_Kill.
Spring 2011 Final, Question 8, bounded waiting
Spring 2011 Final, Question 9, real time OS, minimizing latency
Spring 2011 Final, Question 12, implementing semaphores in a Dual core processor
Spring 2011 Final, Question 16, implementing a thread scheduler one a 16-core processor
Spring 2010 Final, Question 5, definitions d, i, j
Spring 2011, Quiz 1, Question 4, definitions
Spring 2009, Final, Question 5, kill threads that finish executing
Spring 2010, Quiz 1, Question 2, word bank
Spring 2009, Quiz 2, Question 4, Critical section
Spring 2008, Final, Question 2, Effect of OS on time-jitter while sampling an ADC
Spring 2008, Final, Question 5, Critical section, design new instruction
Fall 2006, Final, Question 5, Exponential Queue or multi-level feedback queue scheduling
Fall 2006, Quiz2, Question 5, Resource allocation graph
Fall 2005, Quiz2, Question 5, Cooperative thread scheduler
Fall 2004, Final, Question 9, Path expression
Fall 2003, Final, Question 14, definitions of OS concepts/terms

Semaphore implementation, applications, deadlocks

Midterm Exam Spring 2024 Problem 1c) Semaphores and a priority scheduler
Midterm Exam Spring 2024 Problem 2) Blocking semaphores
Midterm Exam Spring 2024 Problem 3) and 4) Semaphores

Midterm Exam Spring 2023 Problem 3) and 5) Semaphores
Midterm Exam Spring 2022 Problem 4) Synchronization Deadlock
Midterm Exam Spring 2022 Problem 5) Synchronization
Midterm Exam Spring 2019 Problem 2) Passing data between threads
Midterm Exam Spring 2019 Problem 3) Semaphores
Final Spring 2019 Problem 1) Synchronization
Midterm Exam Spring 2018 Problem 1) Deadlock critical section
Midterm Exam Spring 2018 Problem 4) Semaphores
Final Spring 2018 Problem 2) Semaphores
Final Spring 2017 Problem 2) Deadlock
Final Spring 2017 Problem 7) Semaphores
Final Spring 2017 Problem 9) Blocking semaphores with bounded waiting
Midterm Exam Spring 2016 Problem 1) Critical sections and deadlocks
Midterm Exam Spring 2016 Problem 5) Synchronization and deadlock
Final Spring 2016 Problem 1) FIFO queue
Final Spring 2016 Problem 4) SVC call
Midterm Exam Spring 2015 Problem 1) Critical section
Midterm Exam Spring 2015 Problem 2) Stack size
Midterm Exam Spring 2015 Problem 3) Weighted round robin
Midterm Exam Spring 2015 Problem 5) Semaphore application
Midterm Exam Spring 2015 Problem 6) Semaphore application
Final Spring 2015 Problem 1) Hold and wait
Spring 2013 Quiz 1, Question 5, using semaphores.
Spring 2011 Final, Question 11, FIFO with semaphores
Spring 2011, Quiz 1, Question 5, application of semaphores
Spring 2011, Quiz 1, Question 6, new implementation of semaphores
Spring 2010, Quiz 1, Question 4, alternate words for signal and wait
Spring 2010, Quiz 1, Question 5, what happens if an ISR calls OS_Wait
Spring 2010, Quiz 1, Question 6, implementing mutual exclusion
Spring 2010, Quiz 1, Question 7, application of semaphores
Spring 2009, Quiz 2, Question 5, Fork and join
Spring 2008, Quiz2, Question 4, use of semaphores
Fall 2006, Quiz2, Question 9, Fork
Fall 2004, Quiz2, Question 2, Three thread rendezvous
Fall 2004, Quiz2, Question 3, Binary semaphore
Fall 2005, Quiz2, Question 4, Reader/writer problem

Fixed Scheduler and real-time applications

Midterm Exam Spring 2024 Problem 5) Fixed scheduling
Final Spring 2024 Problem 5) Fixed scheduling
Midterm Exam Spring 2023 Problem 4) Fixed scheduling
Midterm Exam Spring 2022 Problem 3) Fixed scheduling
Final Spring 2022 Problem 2) Fixed scheduling
Midterm Exam Spring 2019 Problem 4) Scheduling
Final Spring 2019 Problem 2) Scheduling
Midterm Exam Spring 2018 Problem 5) Real time scheduling

Midterm Exam Spring 2015 Problem 4) Real-time scheduler
Final Spring 2015 Problem 2) Real-time scheduling

Debugging

Exam 1 Spring 2024 Problem 1a) Debugging
Spring 2013 Quiz 1, Question 2, Control and observability.

Process management

Final Spring 2023 Problem 2) Process scheduler
Final Spring 2022 Problem 4) Process loader
Final Spring 2019 Problem 4) Process management
Final Spring 2017 Problem 4) Position independent data

Heap

Final Spring 2024 Problem 4) Heap
Final Spring 2023 Problem 3) Heap
Final Spring 2019 Problem 3) Heap
Final Spring 2018 Problem 6) Heap
Exam2 Spring 2017 Problem 2) Heap
Final Spring 2016 Problem 3) Heap

File System

Final Spring 2024 Problem 1c) Internal vs external fragmentation
Final Spring 2024 Problem 3) File system
Final Spring 2023 Problem 4) File system
Final Spring 2022 Problem 6) File system
Final Spring 2019 Problem 5) File System
Final Spring 2018 Problem 4) File system
Exam2 Spring 2017 Problem 4) File system
Final Spring 2017 Problem 8) File system
Final Spring 2016 Problem 6) File system
Final Spring 2015 Problem 5) File system
Spring 2014, Quiz2, Question 4, File system with an index table
Spring 2014, Final, Question 11, File system with FAT
Spring 2013, Quiz2, Question 4, File system file table
Spring 2012, Quiz2, Question 4, File system in flash EEPROM
Spring 2011, Quiz2, Question 5, Wear leveling disk system
Spring 2011, Quiz2, Question 6, Disk clustering
Spring 2011, Final, Question 7, FAT file system
Spring 2010, Quiz2, Question 4, File system logger

Spring 2010, Quiz2, Question 5, High reliability File system
Spring 2009, Quiz1, Question 1, Contiguous Allocation
Spring 2008, Quiz1, Question 1, File translation table
Spring 2008, Quiz1, Question 2, Block size
Fall 2006, Quiz1, Question 2, Bit vector free space
Fall 2006, Quiz1, Question 3, File system