Quiz2, closed book, Thursday 4/3, 12:30 to 1:45 pm, in class. Closed book, closed notes. No electronic devices (laptop, calculator, phones, devices with wireless communication). You are allowed **one** double-sided 8.5 by 11in crib notes. You will not be allowed to communicate in any way with other students. Any starter code or datasheet you need, I will provide. I recommend that you write in your notes things you need to solve the old problems listed below

Software will be written in the abstract. E.g., write software to implement SPI input/output, ADC input, DAC output, UART input/output using simple GPIO input/output. Other than SysTick periodic interrupts, there will be no software specific for the TM4C123.

STUDY GUIDE for Quiz 2 (Quiz 1 stuff plus the following)

Lectures 1-40
ebook Chapters 1-7
Labs 1-7
See PowerPoint for detailed topics
https://www.dropbox.com/scl/fi/bh7ceatiidu58357o9034/Quiz2_Review.pptx?rlkey=n1n9x8b67uh1puincadzcrrew&dl=1

Please look at the old exams, but don't just study these exams.

SSI interfacing

~~Fall 2011 Quiz 2, Question 2~~~~, Bit-bang SSI input (making SSI signals with edge trigger)~~
~~Fall 2012 Quiz 2, Question 2~~~~, Bit-bang SSI output (making SSI signals with edge trigger)~~
Fall 2014 Quiz2, Question 3, SPI timing, set up and hold, timing diagrams
~~Fall 2015 Quiz2, Question 3~~~~, SPI mode, hardware FIFO buffering~~
Fall 2016 Quiz 2, Question 3, Bit-bang SSI input (making SSI signals with GPIO port)
~~Spring 2017 Quiz2, Question 3~~~~, SPI initialization (DSS, SPO SPH)~~
~~Spring 2018 Quiz2, Question 5~~~~, SPI initialization (DSS, SPO SPH), what is the data?~~
~~Fall 2018 Quiz2, Question 3~~~~, SPI initialization (DSS, SPO SPH), what is the data?~~
~~Fall 2019 Quiz2, Question 3~~~~, SPI initialization~~
~~Spring 2022 Quiz2, Question 1~~~~, DAC interface~~
~~Spring 2023 Quiz2, Question 1~~~~, SPI initialization (DSS, SPO SPH)~~
Spring 2023 Quiz2, Question 2, velocity factor, SPI timing
~~Spring 2024 Quiz 2, Question 3~~~~, Bit-bang SSI input (edge trigger)~~
Spring 2023 Final, Question 5, Timing diagram for SPI DAC
Spring 2024 Final, Question 1, Bit-bang SSI input (making SSI signals with GPIO port)

Analog interfacing

Fall 2011 Quiz 2, Question 3, Analog amplifier
~~Fall 2011 Quiz 2, Question 4~~~~, sequencer~~
Fall 2011 Quiz 2, Question 5, ADC types
Fall 2011 Quiz 2, Question 6, Analog amplifier
Fall 2011 Quiz 2, Question 7, Periodic interrupt, DAC output
Fall 2012 Quiz 2, Question 3, Data acquisition design
Fall 2012 Quiz 2, Question 4 Data acquisition design
Fall 2012 Quiz 2, Question 6, Analog amplifier
~~Fall 2014 Quiz 2, Question 5~~~~, Low-pass analog filter, Butterworth 2-pole filter~~
Fall 2014 Quiz 2, Question 7, Analog amplifier
~~Fall 2015 Quiz 2, Question 2~~~~, Sampling, DFT, frequency resolution~~
Fall 2015 Quiz 2, Question 7, Instrumentation amp
Fall 2016 Quiz 2, Question 2, Resolution versus accuracy
Fall 2016 Quiz 2, Question 7, Analog amplifier
Spring 2017 Quiz 2, Question 4, Sampling, aliasing
Spring 2017 Quiz 2, Question 6, Analog amplifier, instrumentation amp (transducer interface)
Spring 2018 Quiz2, Question 6, Sampling, DFT, SNR
Spring 2018 Quiz2, Question 7, Analog amplifier
~~Fall 2018 Quiz2, Question 4~~~~, ADC0_PC_R~~

Fall 2018 Quiz2, Question 5, Central Limit Theorem
~~**Fall 2018 Quiz2, Question 7**, ADC sequencer~~
Fall 2018 Quiz2, Question 8, ADC resolution
Fall 2018 Quiz2, Question 9, Analog amplifier with instrumentation amp
Fall 2018 Quiz2, Question 10, Analog amplifier with op amp
Fall 2019 Quiz2, Question 5, Sampling jitter
Fall 2019 Quiz2, Question 6, Sampling, DFT, SNR, aliasing, ADC type
Fall 2019 Quiz2, Question 7, Analog amplifier
Fall 2019 Quiz2, Question 8, Shunt diode (no calculator, so leave it in equation form)
Spring 2022 Quiz2, Question 3, Analog amplifier (~~frequency resolution~~)
Spring 2023 Quiz2, Question 3, Transducer interface, and fixed point
Spring 2023 Quiz2, Question 5, Analog amplifier with instrumentation amp
Spring 2023 Quiz2, Question 8, Understanding R-2R DAC
Spring 2024 Quiz2, Question 1, Sampling, SNR
Spring 2024 Quiz2, Question 2, MC34119 amp
Spring 2024 Quiz2, Question 5, Analog amplifier with op amp
~~**Spring 2024 Quiz2, Question 8**, Student's t-test to determine resolution~~
Spring 2024 Quiz2, Question 9, Central Limit Theorem
Spring 2024 Final, Question 2, Build a resistor string DAC
Spring 2023 Final, Question 11, Given the circuit, determine the transfer function
Spring 2024 Final, Question 9, Analog amplifier with instrumentation amp
Spring 2024 Final, Question 10, Shunt diode

Capacitors

Fall 2011 Quiz 2, Question 1, How to choose capacitors
Fall 2015 Quiz 2, Question 5, Gain versus frequency of RC HPF circuit
Fall 2016 Quiz 2, Question 6, Gain versus frequency of BPF circuit
Spring 2022 Quiz2, Question 4, Tantalum capacitor
Spring 2022 Quiz2, Question 2, Ceramic capacitor
Spring 2023 Quiz2, Question 6, Filter type
Spring 2024 Final, Question 8, What type of filter is it?

Fixed Point

Fall 2012 Quiz 2, Question 5, Binary fixed-point
Fall 2014 Quiz 2, Question 6, Decimal fixed-point
Fall 2015 Quiz 2, Question 6, Decimal fixed-point, prevent overflow
Fall 2016 Quiz 2, Question 6, Decimal fixed-point
Spring 2017 Quiz 2, Question 2, Fixed-point math
Spring 2017 Quiz 2, Question 5, Fixed-point equation
Spring 2018 Quiz2, Question 4, Fixed-point equation
Fall 2018 Quiz2, Question 6, Fixed-point add multiply, divide functions
Fall 2019 Quiz2, Question 4, Fixed-point design
Fall 2023 Quiz 2, Question 3, Binary fixed-point
Spring 2023 Quiz2, Question 7, Binary fixed-point
Spring 2024 Quiz2, Question 4, Binary fixed-point

Interrupt programming concepts and implementations

~~**Fall 2012 Quiz 2, Question 7**, Edge-trigger interrupts~~
Fall 2014 Quiz 2, Question 2, Busy-wait versus interrupt
~~**Fall 2014 Quiz 2, Question 4**, Edge-trigger interrupts, priority~~
~~**Fall 2014 Quiz 2, Question 8**, Timer interrupts, input capture~~
~~**Fall 2015 Quiz 2, Question 4**, Edge-trigger interrupts, priority~~
~~**Fall 2016 Quiz 2, Question 5**, Timer-triggered ADC interrupts~~
~~**Spring 2017 Quiz 2, Question 7**, Edge-trigger interrupts, blush-less DC motor interface~~
~~**Spring 2018 Quiz2, Question 8**, Edge-trigger interrupts~~
~~**Fall 2018 Quiz2, Question 2**, Edge-trigger interrupts~~

~~**Fall 2019 Quiz2, Question 9**, Input capture interrupts~~
~~**Spring 2022 Quiz2, Question 2**, Edge trigger interrupts~~
Spring 2023 Quiz2, Question 2, GPIO edge detection using periodic interrupts
~~**Spring 2023 Quiz2, Question 4**, Edge trigger interrupts~~
Spring 2023 Final, Bonus, When Valvano does this, to what embedded system concept is he referring?

Systems and interfacing

Fall 2012 Quiz2, Question 1, Regulator
Fall 2014 Quiz2, Question 1, Regulator
Fall 2015 Quiz2, Question 1, Regulator
Fall 2016 Quiz2, Question 1, Regulator
Spring 2017 Quiz2, Question 1, Regulator
Spring 2018 Quiz2, Question 1,2,3, Regulator
Fall 2018 Quiz2, Question 1, Regulator
Fall 2019 Quiz2, Question 1, Regulator
Fall 2019 Quiz2, Question 2, PN2222 (solve it with a IRLD120 MOSFET)
Spring 2022 Quiz2, Question 6, Power budget
Spring 2023 Quiz2, Question 4, Recognition of capacitor type by shape
Spring 2023 Quiz2, Question 5, Determine value of ceramic capacitor by marking.
Spring 2023 Quiz2, Question 6, Estimate battery life.
Spring 2024 Quiz2, Question 7, Estimate battery life.
Spring 2024 Final, Question 6, Regulator