Updated 2/8/2026

Lab 1 Assembly language, arrays, functions
- LDR(S/H/B), STR(S/H/B), EORS, ANDS, ORRS, BICS, different branches
  - 2017 Fall: 1.d
  - 2018 Fall: 2a, 6
  - 2019 Spring: 2, 7
  - 2019 Fall: 3, 4, 9
  - 2020 Spring: 1.c, 1.d, 1.e, 7
  - 2024 Spring: 1.a
  - 2024 Fall: 1.c understanding LDRH
  - 2025 Spring: 2
  - 2025 Fall: 1a
  - 2025 Fall: 7 string compare in assembly
- Left shifting and right shifting, signed and unsigned, add, sub, mul
  - 2017 Fall: 1.e, 1.f
  - 2017 Fall: 2
  - 2018 Fall: 2a
  - 2019 Spring: 1b, 7
  - 2019 Fall: 3, 9
  - 2022 Fall: 1c
  - 2024 Spring: 1.b
  - 2024 Fall: 1.a
  - 2025 Spring: 1a
- Big Endian/Little Endian
  - 2019 Fall: 3, 4
  - 2020 Spring: 1.d
  - 2022 Fall: 7
  - 2024 Fall: 1.c understanding LDRH
  - 2025 Spring: 1b
  - 2025 Fall: 1a
- Friendly v. Unfriendly coding
  - 2019 Spring: 5
  - 2019 Fall: 7b
  - 2020 Spring: 5b
- RAM/ROM/Volatile/Nonvolatile
  - 2017 Fall: 1c
  - 2018 Fall: 1 where are things located?
  - 2023 Fall: 1a
- How many bits/bytes in a memory address on Cortex M
- Calculations with number of bits after add, subtract, multiply, divide
  - 2019 Fall: 1.b
  - 2020 Spring: 1.b
- While loop/for loop, if statements

- 2018 Fall: 3
- 2019 Fall: 9
- 2022 Fall: 1b
- Different data types, Size of char, int, Boolean
  - 2019 Spring: 1.c, 1.e
  - 2024 Spring: 9 accessing a string in assembly
- Overflow
  - 2019 Spring: 1.c
  - 2019 Fall: 1.c
- What happens when PUSH/POP; What happens to Link Register/PC (during BL or BX LR or POP {PC})
  - 2017 Fall: 6
  - 2018 Fall: 2a, 2b 2c
  - 2019 Spring: 6
  - 2019 Fall: 8
  - 2020 Spring: 6
  - 2022 Fall: 6
  - 2023 Fall: 7a
  - 2024 Spring: 1.c swap using push/pop
  - 2024 Spring: 8
  - 2024 Fall: 6a
  - 2025 Spring: 6
  - 2025 Fall: 1b

Lab 2 Switch interface, LED interface, timing delay
- Positive v. negative logic for switches/LEDs (interface the circuit) (calculations)
  - 2017 Fall: 7
  - 2018 Fall: 4
  - 2019 Spring: 4a 4b
  - 2019 Spring: 4a 4b (change LED current to 10mA and use the ULN2003)
  - 2019 Fall: 6, 7
  - 2019 Fall: 7 (change LED current to 10mA and use the ULN2003)
  - 2020 Spring: 4
  - 2020 Spring: 4 (change LED current to 10mA and use the ULN2003)
  - 2022 Fall: 4 switch
  - 2022 Fall: 5 LED
  - 2022 Fall: 5 LED (change LED current to 10mA and use the ULN2003)
  - 2023 Fall: 4a, switch circuit
  - 2023 Fall: 5a, LED circuit
  - 2023 Fall: 5a, LED circuit (change LED current to 10mA and use the ULN2003)
  - 2024 Spring: 2, switch interface in negative logic
  - 2024 Spring: 5 LED circuit
  - 2024 Fall: 5a, switch interface with PIPU
  - 2025 Spring: 4 negative logic switch

- 2025 Spring: 5 LED interface
- 2025 Spring: 7 interface 8 LEDs
- 2025 Fall: 5 find the mistakes in switch/LED circuit
- Properties of LEDs (non-Ohmic device), Ohm's Law and Power
  - 2017 Fall: 1.a What is V_{OL}
  - 2019 Spring: 1.d, 4
  - 2019 Fall: 1.a, 1.d, 2
  - 2020 Spring: 1.a
  - 2022 Fall: 1c 1d 1e
  - 2024 Fall: 1.c
- I/O programming (no initialization, just input and output)
  - 2017 Fall: 5, both C and assembly
  - 2018 Fall: 3, convert assembly to C
  - 2020 Spring: 5 Input output in C
  - 2022 Fall: 4b switch input in assembly
  - 2022 Fall: 5b LED output in C
  - 2024 Spring: 4 two inputs and one output in assembly
  - 2024 Spring: 7 GPIO output
  - 2024 Fall: 6a, LED output in assembly, friendly
  - 2025 Fall: 6 find the mistakes in switch/LED software
- Voltage/current/power
  - 2017 Fall: 1.b power
  - 2019 Spring: 1d
  - 2019 Spring: 4b
  - 2019 Fall: 1.a
  - 2022 Fall: 1.a 1.b
  - 2024 Spring: 1.d 1.e
- How to use a multimeter
  - 2025 Spring: 4iv measure current
  - 2025 Spring: 5vi measure voltage
  - 2025 Fall: 4 how to measure current
- Duty Cycle / PWM
  - 2017 Fall: 8 (in C)
  - 2019 Spring: 5
  - 2023 Fall: 8a (find bugs in assembly)
  - 2024 Spring: 3b number of duty cycles
  - 2024 Fall: 2
  - 2025 Spring: weird pattern on 8 LEDs using an array
- AAPCS
  - 2019 Spring: 1.b, 7

Lab 3 C programming, functions, arrays
- C prototypes, functions, parameters, invocation

- If then (assembly to C, C to assembly)
    - 2017 Fall: 3, understand, convert C to assembly
    - 2019 Spring: 3, convert assembly to C
    - 2020 Spring: 3, convert C to assembly
    - 2022 Fall: 2, understand, convert C to assembly
    - 2024 Fall: 3a, convert C to assembly
- While-loop (assembly to C, C to assembly)
    - 2017 Fall: 4, understand, convert C to assembly
    - 2018 Fall: 6, string search, both C and assembly
    - 2019 Spring: 2
    - 2020 Spring: 2, 7
    - 2023 Fall: 2a, convert C to assembly
    - 2023 Fall: 3a, factorial in C
    - 2024 Spring: 6 convert C to assembly
    - 2024 Fall: 4a, convert assembly to C
    - 2025 Spring: 2 convert C to assembly
    - 2025 Spring: 3 convert assembly to C
    - 2025 Fall: 2 convert C to assembly
- Debug C (understanding syntax)
    - 2019 Spring: 1.a
    - 2019 Spring: 1.e
    - 2024 Spring: 3a, shift and EOR
    - 2024 Spring: 6 what does this C function do?
    - 2024 Fall: 1.b what does this C code do?
- Accessing array (in both Assembly and C)
    - 2018 Fall: 5, debugging dump
    - 2019 Fall: 5 find the minimum in array
    - 2019 Fall: 9 needs an array
    - 2020 Spring: 2, array access
    - 2022 Fall: 3, array access in C
    - 2024 Fall: 9a find the minimum in array
- Local v. global variables, data types, scope and allocation
    - 2019 Spring: 2
    - 2019 Fall: 1.e, 1.f
    - 2019 Fall: 3 (global variable, convert C to assembly)
    - 2020 Spring: 3 (global variable, convert C to assembly)
    - 2022 Fall: 1.c. 1.d 1.e
    - 2024 Spring: 3c uint16_t data type
    - 2025 Fall: 3 convert assembly to C

- Intrusiveness of debugging methods
    - 2024 Fall: 7a, classify debugging method