ENGI301: Syllabus

Fall 2022

Course Hours: Tuesday / Thursday 8:00p – 9:15p

Office Hours: Sunday 8:00p – 9:00p; or by request

Lecture Topics:

- Course Overview / Scheduling
- Introduction to Electronics
    - Resistors, Capacitors, Inductors, Transistors, Diodes
    - Basic Circuit Analysis
- Understanding Datasheets
- Soldering
- Introduction to development platforms
    - Pocket Beagle
    - Getting development tools on the Internet
    - Using the Linux command prompt
    - Downloading and Installing Linux Packages
- Introduction to Binary Numbers
    - Binary conversion
    - Binary Interpretation
- Introduction to Computer Architecture
    - CPU, Memory Map, Registers
    - Input / Output
    - Pin Multiplexing
- Communication Protocols
    - I2C, UART, SPI
- Introduction to Coding
    - Functional vs Object Oriented
    - Introduction to Python
        - Functions / Operators / etc.
        - Accessing system resources
    - Virtual Memory
- Printed Circuit Board (PCB) Design
    - Libraries
        - Creating a symbol from a datasheet
        - Creating a footprint from a datasheet
    - Schematics
        - Transforming a high-level block diagram into schematics
    - Layout
        - Placement & Routing

Assignments:

- Homework
    1. Circuit analysis
    2. Installation of software development tools and soldering
    3. Fritzing Diagrams, Binary Conversion, and Linux Basics
    4. Python coding
- Project
    1. Creating an Embedded System
        - Creating a high-level block diagram
        - Choosing components
        - Connecting components to create the embedded system
        - Writing software to complete the application
        - Uploading to Hackster.io to document the project and give back to community
    2. Creating a Printed Circuit Board (PCB)
        - Creating a symbol / footprint in a library
        - Creating schematics
        - Placement and Layout
        - Uploading to MacroFab so that PCB could be manufactured in the future