**UNLV ME 425/625 – Robotics 1 – Spring 2023 (last updated 01/12/23)**

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| Week | Topic |
| Week 1  01/23/23 | |  |  | | --- | --- | | Lecture | Introduction | | Lab | BrixCC setup, NXC programming, Studio | | Programming | NXC data types, if-then, loops, TextOut and FormatNum | | Homework | NXC programming basics  Studio: Casters | |
| Week 2  01/30/23 | |  |  | | --- | --- | | Lecture | Simple Machines I: Levers, Shafts and Cranks | | Lab | LEGO levers, shafts and cranks  Domabot: Introduction | | Programming | NXC: strings, motors (OnFwd, Rotate), Buttons, and touch sensor | | Homework | Levers, Shafts and Cranks  NXC programming strings and motors  Studio: Lift mechanisms; Grabbing things  Domabot touch sensor reaction | |
| Week 3  02/06/23 | |  |  | | --- | --- | | Lecture | Simple Machines II: Cams, Springs and Linkages | | Lab | LEGO cams, springs and linkages | | Programming | NXC: Infrared light sensor  Domabot: Line following Bang-Bang | | Homework | Cranks, Cams, and Linkages  NXC: Line following with light sensor  Studio: Reciprocating motions  Domabot: Line following – Bang-Bang | |
| Week 4  02/13/23 | |  |  | | --- | --- | | Lecture | Simple Machines III: Ratchets, Drives and Gearing  Line Following PID (motivated from Bang-Bang) | | Lab | LEGO ratchets, drives and gearing  Domabot: Line following PID  **Introduce Project 1 Semi-Finals Rules** | | Programming | NXC Files | | Homework | Ratchets, Drives, and Gearing  NXC: Files  Studio: Oscillating Mechanisms  Domabot: Line following PID | |
| Week 5  02/20/23 | **Presidents Day – UNLV Holiday (students use as PLR)** |
| Week 6  02/27/23 | **Project 1 Relay Race: Semi-Finals Competition Day** |
| Week 7  03/06/23 | **Midterm**   |  |  | | --- | --- | |  | Part 1 Closed-book (60-min): Fill-in-the-blanks, essays, etc | |  | Part 2 Open-book (90-min): Hands-on LEGO construction | |
| Week 8  03/13/23 | **Spring Break – UNLV Holiday** |
| Week 9  03/20/23 | |  |  | | --- | --- | | Lecture | Path-Planning (Mazes) Part 1: Wall-Following DC motor theory and open-loop step response | | Lab | Ultrasonic sensor  Domabot: Wall Following Bang-Bang  Motor Open-Loop Step Response | | Programming | NXC Timing | | Homework | DC motor theory and open-loop step response  NXC Timing  Domabot: Wall-Following | |
| Week 10  03/27/23 | |  |  | | --- | --- | | Lecture | Path-Planning (Mazes) Part 2: Obstacle-Avoidance  PID Theory  Electronics 1: Robot Sensing (Numbering Systems) | | Lab | Domabot: Obstacle Avoidance PID  Electronics: ohm1\_0.nxc; touch1\_0.nxc; volt1\_0.nxc | | Homework | PID Theory  Numbering systems binary/decimal  Domabot: Obstacle Avoidance | |
| Week 11  04/03/23 | |  |  | | --- | --- | | Lecture | Electronics 2: Robot Actuation | | Lab | Domabot: Maze Solving  Electronics: Relays and Transistors | | Homework | NXC: Relays and Transistors  Domabot: Maze Solving | |
| Week 12  04/10/23 | |  |  | | --- | --- | | Lecture | Electronics 3: Robot Communication (I2C PCF8574)  **Introduce Project 2 Finals Rules** | | Lab | Electronics: 8-LED output, 8-DIP input | | Homework | NXC: LED, DIP | |
| Week 13  04/17/23 | |  |  | | --- | --- | | Lecture | Electronics 4: Robot Interfaces (Serial, Bluetooth)  **Project 2 Finals PDR and Practice** | | Lab | Serial (ASCII) and Bluetooth | | Homework | NXC: Bluetooth | |
| Week 14  04/24/23 | **Project 2 Relay Race Finals** |
| Week 15  05/01/23 | **Study Week Begins** |
| Week 16  05/08/23 | **Finals Begin** |