**UNLV ME 425/625 – Robotics 1 – Fall 2023 (last updated 11/10/23)**

|  |  |
| --- | --- |
| Week | Topic |
| Week 1  08/28/23 | |  |  | | --- | --- | | 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  09/04/23 | **Labor Day – UNLV Holiday** |
| Week 3  09/11/23 | |  |  | | --- | --- | | 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 4  09/18/23 | |  |  | | --- | --- | | 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 5  09/25/23 | |  |  | | --- | --- | | 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 6  10/02/23 | **Project 1 Relay Race PLR Day (no lecture)** |
| Week 7  10/09/23 | **Project 1 Relay Race: Semi-Finals Competition Day** |
| Week 8  10/16/23 | **Midterm**   |  |  | | --- | --- | |  | Part 1 Closed-book (60-min): Fill-in-the-blanks, essays, etc | |  | Part 2 Open-book (90-min): Hands-on LEGO construction | |
| Week 9  10/23/23 | |  |  | | --- | --- | | Lecture | DC motor theory and open-loop step response | | Lab | NXC File Handling  NXC Timers  Motor Open-Loop Step Response  NXC Ultrasonic Sensors | | Homework | DC motor theory and open-loop step response  NXC Timing | |
| Week 10  10/30/23 | |  |  | | --- | --- | | Lecture | Electronics: Robot Sensing, Actuation and Communications | | Lab | DIY Touch Sensor and Voltage Supply  RS-485 Communications  Bluetooth Communications | | Homework | Communications | |
| Week 11  11/06/23 | |  |  | | --- | --- | | Lecture | Path-Planning (Mazes) Part 1: Wall-Following  Wall-Following PID Theory | | Lab | Domabot: Wall-Following PID | | Homework | Wall-Following and PID Theory | |
| Week 12  11/13/23 | |  |  | | --- | --- | | Lecture | Path-Planning (Mazes) Part 2: Obstacle-Avoidance  Obstacle-Avoidance PID Theory | | Lab | Domabot: Obstacle Avoidance PID  Maze Solving | | Homework | Domabot: Obstacle Avoidance  Maze  Prop Mount |   **Introduce: Project 2 - Finals**  **Form Teams – 2 people per team** |
| Week 13  11/20/23 | **No Lecture:** Teams demonstrate can navigate Everblock Maze  Homework: None |
| Week 14  11/27/23 | **No Lecture**: Course Revealed and **PDR** (demonstrate wall-following and obstacle avoidance robots)  Homework: None |
| Week 15  12/04/23 | **Study Week Begins**  **Project 2 Relay Race Finals** |
| Week 16  12/11/23 | **Finals Begin** |