**UNLV ME 425/625 – Robotics 1 – Spring 2024 (last updated 01/03/24)**

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| Week | Topic |
| Week 1  01/22/24 | |  |  | | --- | --- | | 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  01/29/24 | |  |  | | --- | --- | | 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  02/05/24 | |  |  | | --- | --- | | 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  02/12/24 | |  |  | | --- | --- | | 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  02/19/24 | **Presidents Day – UNLV Holiday (students use as PLR)** |
| Week 6  02/26/24 | **Project 1 Relay Race: Semi-Finals Competition Day** |
| Week 7  03/04/24 | **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  03/11/24 | **Spring Break – UNLV Holiday** |
| Week 9  03/18/24 | |  |  | | --- | --- | | 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  03/25/24 | |  |  | | --- | --- | | Lecture | Electronics: Robot Sensing, Actuation and Communications | | Lab | DIY Touch Sensor and Voltage Supply  RS-485 Communications  Bluetooth Communications | | Homework | Communications | |
| Week 11  04/01/24 | |  |  | | --- | --- | | Lecture | Path-Planning (Mazes) Part 1: Wall-Following | | Lab | Wall-Following PID Theory | | Homework | Wall-Following and PID Theory | |
| Week 12  04/08/24 | |  |  | | --- | --- | | 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 – Competition Finals**  **Form Teams** |
| Week 13  04/15/24 | |  |  | | --- | --- | | Lecture | **Project 2 Finals PDR and Practice** | | Lab |  | | Homework |  | |
| Week 14  04/21/24 | **Project 2 Relay Race Finals** |
| Week 15  04/29/24 | **Study Week Begins** |
| Week 16  05/06/24 | **Finals Begin** |