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

<table>
<tr><th>Week</th><th>Topic</th></tr>
<tr><td>Week 1<br>01/22/24</td><td>
<table>
<tr><td>Lecture</td><td>Introduction</td></tr>
<tr><td>Lab</td><td>BrixCC setup, NXC programming, Studio</td></tr>
<tr><td>Programming</td><td>NXC data types, if-then, loops, TextOut and FormatNum</td></tr>
<tr><td>Homework</td><td>NXC programming basics<br>Studio: Casters</td></tr>
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<tr><td>Week 2<br>01/29/24</td><td>
<table>
<tr><td>Lecture</td><td>Simple Machines I: Levers, Shafts and Cranks</td></tr>
<tr><td>Lab</td><td>LEGO levers, shafts and cranks<br>Domabot: Introduction</td></tr>
<tr><td>Programming</td><td>NXC: strings, motors (OnFwd, Rotate), Buttons, and touch sensor</td></tr>
<tr><td>Homework</td><td>Levers, Shafts and Cranks<br>NXC programming strings and motors<br>Studio: Lift mechanisms; Grabbing things<br>Domabot touch sensor reaction</td></tr>
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<tr><td>Week 3<br>02/05/24</td><td>
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<tr><td>Lecture</td><td>Simple Machines II: Cams, Springs and Linkages</td></tr>
<tr><td>Lab</td><td>LEGO cams, springs and linkages</td></tr>
<tr><td>Programming</td><td>NXC: Infrared light sensor<br>Domabot: Line following Bang-Bang</td></tr>
<tr><td>Homework</td><td>Cranks, Cams, and Linkages<br>NXC: Line following with light sensor<br>Studio: Reciprocating motions<br>Domabot: Line following – Bang-Bang</td></tr>
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<tr><td>Week 4<br>02/12/24</td><td>
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<tr><td>Lecture</td><td>Simple Machines III: Ratchets, Drives and Gearing<br>Line Following PID (motivated from Bang-Bang)</td></tr>
<tr><td>Lab</td><td>LEGO ratchets, drives and gearing<br>Domabot: Line following PID<br>Introduce Project 1 Semi-Finals Rules</td></tr>
<tr><td>Programming</td><td>NXC Files</td></tr>
<tr><td>Homework</td><td>Ratchets, Drives, and Gearing<br>NXC: Files<br>Studio: Oscillating Mechanisms<br>Domabot: Line following PID</td></tr>
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<tr><td>Week 5<br>02/19/24</td><td>Presidents Day – UNLV Holiday (students use as PLR)</td></tr>
<tr><td>Week 6<br>02/26/24</td><td>Project 1 Relay Race: Semi-Finals Competition Day</td></tr>
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<tr><td>Week 7<br>03/04/24</td><td>Midterm<br><br>Part 1 Closed-book (60-min): Fill-in-the-blanks, essays, etc<br>Part 2 Open-book (90-min): Hands-on LEGO construction</td></tr>
<tr><td>Week 8<br>03/11/24</td><td>Spring Break – UNLV Holiday</td></tr>
<tr><td>Week 9<br>03/18/24</td><td><table><tr><td>Lecture</td><td>DC motor theory and open-loop step response</td></tr><tr><td>Lab</td><td>NXC File Handling<br>NXC Timers<br>Motor Open-Loop Step Response<br>NXC Ultrasonic Sensors</td></tr><tr><td>Homework</td><td>DC motor theory and open-loop step response NXC Timing</td></tr></table></td></tr>
<tr><td>Week 10<br>03/25/24</td><td><table><tr><td>Lecture</td><td>Electronics: Robot Sensing, Actuation and Communications</td></tr><tr><td>Lab</td><td>DIY Touch Sensor and Voltage Supply<br>RS-485 Communications<br>Bluetooth Communications</td></tr><tr><td>Homework</td><td>Communications</td></tr></table></td></tr>
<tr><td>Week 11<br>04/01/24</td><td><table><tr><td>Lecture</td><td>Path-Planning (Mazes) Part 1: Wall-Following</td></tr><tr><td>Lab</td><td>Wall-Following PID Theory</td></tr><tr><td>Homework</td><td>Wall-Following and PID Theory</td></tr></table></td></tr>
<tr><td>Week 12<br>04/08/24</td><td><table><tr><td>Lecture</td><td>Path-Planning (Mazes) Part 2: Obstacle-Avoidance<br>Obstacle-Avoidance PID Theory</td></tr><tr><td>Lab</td><td>Domabot: Obstacle Avoidance PID<br>Maze Solving</td></tr><tr><td>Homework</td><td>Domabot: Obstacle Avoidance<br>Maze<br>Prop Mount</td></tr></table><br>Introduce: Project 2 – Competition Finals<br>Form Teams</td></tr>
<tr><td>Week 13<br>04/15/24</td><td><table><tr><td>Lecture</td><td>Project 2 Finals PDR and Practice</td></tr><tr><td>Lab</td><td></td></tr><tr><td>Homework</td><td></td></tr></table></td></tr>
<tr><td>Week 14<br>04/21/24</td><td>Project 2 Relay Race Finals</td></tr>
<tr><td>Week 15<br>04/29/24</td><td>Study Week Begins</td></tr>
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| Week 16<br>05/06/24 | **Finals Begin** |