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

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| Week | Topic |
| Week 101/23/23 |

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| Lecture | Introduction |
| Lab | BrixCC setup, NXC programming, Studio |
| Programming | NXC data types, if-then, loops, TextOut and FormatNum |
| Homework | NXC programming basicsStudio: Casters |

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| Week 201/30/23 |

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| Lecture | Simple Machines I: Levers, Shafts and Cranks |
| Lab | LEGO levers, shafts and cranksDomabot: Introduction |
| Programming | NXC: strings, motors (OnFwd, Rotate), Buttons, and touch sensor |
| Homework | Levers, Shafts and CranksNXC programming strings and motorsStudio: Lift mechanisms; Grabbing thingsDomabot touch sensor reaction |

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| Week 302/06/23 |

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| 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 LinkagesNXC: Line following with light sensorStudio: Reciprocating motionsDomabot: Line following – Bang-Bang |

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| Week 402/13/23 |

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| Lecture  | Simple Machines III: Ratchets, Drives and GearingLine Following PID (motivated from Bang-Bang) |
| Lab | LEGO ratchets, drives and gearingDomabot: Line following PID**Introduce Project 1 Semi-Finals Rules** |
| Programming | NXC Files |
| Homework | Ratchets, Drives, and GearingNXC: FilesStudio: Oscillating MechanismsDomabot: Line following PID |

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| Week 502/20/23 | **Presidents Day – UNLV Holiday (students use as PLR)** |
| Week 602/27/23 | **Project 1 Relay Race: Semi-Finals Competition Day** |
| Week 703/06/23 | **Midterm**

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|  | Part 1 Closed-book (60-min): Fill-in-the-blanks, essays, etc |
|  | Part 2 Open-book (90-min): Hands-on LEGO construction |

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| Week 803/13/23 | **Spring Break – UNLV Holiday** |
| Week 903/20/23 |

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| Lecture | Path-Planning (Mazes) Part 1: Wall-FollowingDC motor theory and open-loop step response |
| Lab | Ultrasonic sensorDomabot: Wall Following Bang-BangMotor Open-Loop Step Response |
| Programming | NXC Timing |
| Homework | DC motor theory and open-loop step responseNXC TimingDomabot: Wall-Following |

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| Week 1003/27/23 |

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| Lecture | Path-Planning (Mazes) Part 2: Obstacle-AvoidancePID TheoryElectronics 1: Robot Sensing (Numbering Systems) |
| Lab | Domabot: Obstacle Avoidance PIDElectronics: ohm1\_0.nxc; touch1\_0.nxc; volt1\_0.nxc |
| Homework | PID TheoryNumbering systems binary/decimalDomabot: Obstacle Avoidance |

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| Week 1104/03/23 |

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| Lecture | Electronics 2: Robot Actuation |
| Lab | Domabot: Maze SolvingElectronics: Relays and Transistors |
| Homework | NXC: Relays and TransistorsDomabot: Maze Solving |

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| Week 1204/10/23 |

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| Lecture | Electronics 3: Robot Communication (I2C PCF8574)**Introduce Project 2 Finals Rules** |
| Lab | Electronics: 8-LED output, 8-DIP input |
| Homework | NXC: LED, DIP |

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| Week 1304/17/23 |

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| Lecture | Electronics 4: Robot Interfaces (Serial, Bluetooth)**Project 2 Finals PDR and Practice** |
| Lab | Serial (ASCII) and Bluetooth |
| Homework | NXC: Bluetooth |

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| Week 1404/24/23 | **Project 2 Relay Race Finals** |
| Week 1505/01/23 | **Study Week Begins** |
| Week 1605/08/23 | **Finals Begin** |