UNLV ME 425/625 – Robotics 1 – Fall 2024 (last updated 07/20/24)

Week	Topic

Week 1 — 08/26/24

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 — 09/02/24

Labor Day – UNLV Holiday

Week 3 — 09/09/24

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 4 — 09/16/24

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 5 — 09/21/24

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 6 — 09/30/24

Project 1 Relay Race PLR Day (no lecture)

Week 7 — 10/07/24

Project 1 Relay Race: Semi-Finals Competition Day

Week 8 10/14/24	**Midterm** Part 1 Closed-book (60-min): Fill-in-the-blanks, essays, etc Part 2 Open-book (90-min): Hands-on LEGO construction	
Week 9 10/21/24	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 10/28/24	Lecture	Path-Planning (Mazes) Part 1: Wall-Following Wall-Following PID Theory
	Lab	Domabot: Wall-Following PID
	Homework	Wall-Following and PID Theory
Week 11 11/04/24	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 - Finals **Form Teams – 2 people per team**	
Week 12 11/11/24	**Veterans Day – UNLV Holiday**	
Week 13 11/18/24	Teams demonstrate can navigate Everblock Maze	
	Lecture	Electronics: Robot Sensing, Actuation and Communications
	Lab	DIY Touch Sensor and Voltage Supply RS-485 Communications Bluetooth Communications
	Homework	Communications
Week 14 11/25/24	**No Lecture**: Course Revealed and **PDR** (demonstrate robots can wall-follow, avoid obstacle, and extinguish lit candle) Homework: None	
Week 15 12/02/24	**Study Week Begins** **Project 2 Relay Race Finals**	

Week 16 12/09/24	**Finals Begin**