FIRST EDUCATION

Intro to Robotics Programming | Course Overview

Year-Long Course Outline with CTE Competencies

Equipment Requirements – XRP robot, *FIRST* Tech Challenge Starter Bot, *FIRST* Robotics Competition Kit Bot

Course Description

This year-long introductory course engages students in the logic of robotics through a flexible "level-up" approach. Students begin with Block-based logic and transition to Text-based scripting (Python) or Object-Oriented Programming (Java) using authentic *FIRST* platforms. Beyond basic syntax, students explore how robots interact with the broader digital world—from analyzing sensor data patterns to understanding the wireless networking protocols that enable remote control.

Course Outcomes

COMPETENCY	STUDENT OUTCOMES
Apply Multisensory Logic to Program Robotic Systems	Students will use Blocks, Python, or Java to apply program structure and flow (loops, conditionals, functions) to complete complex robotics tasks.
Utilize AI for Development and Troubleshooting	Students will use AI tools to diagnose logic errors, refactor code, and generate technical documentation for robot subsystems.
Analyze Sensor Data to Inform Software Decisions	Students will collect, interpret, and visualize telemetry data from sensors to evaluate robot performance and justify software iterations.
Demonstrate Systems Thinking and Networking	Students will explain how robots utilize Wi-Fi, IP addressing, and data packets to communicate between controllers and driver stations.
Implement Advanced Control and Navigation	Students will incorporate sensor fusion, PID control, and odometry to achieve precise autonomous movement and mechanism positioning.
Apply Industry Standard Version Control	Students will utilize GitHub for collaborative coding, managing branches and merging code within a team environment.
Communicate Using Technical Documentation	Students will produce flowcharts, pseudocode, and Engineering Notebook entries that follow software industry standards for clarity.
Collaborate Effectively in Programming Teams	Students will demonstrate teamwork skills including code reviews, shared responsibility, and modular software design in group tasks.

Industry Certifications

- Certiport: IT Specialist – Software Development / Java
- Certiport: IT Specialist – Software Development / Python
- **Certiport**: IT Specialist – Artificial Intelligence
- Python Institute: PCEP – Certified Entry-Level Python Programmer

FIRST Training learning content that can be used to implement this course.

XRP Trainings	FIRST Robotics Competition	Engineering Explorations Course	FIRST Tech Challenge Skill Builders
XRP Blocks Programming Drivetrain	XRP- Intro to Java Programming I	Unit 1 | Welcome to *FIRST*	Chassis and Drive Systems Lesson and Challenges
XRP Blocks Programming Sensors	XRP- Intro to Java Programming II	Unit 2 | Build a Bot	Intakes Lesson and Challenges
XRP Python Programming Drivetrain	Module 2: How FRC Robots Work	Unit 3 | Make it Move	Programming Lesson and Challenges
XRP Python Programming Sensors	Module 9: Electrical and Programming	Unit 4 | Programming Autonomous Robots	
		Unit 5 | Build & Program Manipulators	
		Unit 6 | The Ball Game	

Standards Alignments

Organization	Aligned Standards
NGSS	HS-ETS1-1, HS-ETS1-2, HS-ETS1-3, HS-ETS1-4, HS-PS2-1, HS-PS2-2, HS-PS3-1, HS-PS3-3, HS-PS4-5
ISTE	1.1.a, 1.1.c, 1.1.d, 3.1.a, 3.1.b, 4.4.a, 4.4.b, 4.4.c, 4.4.d, 5.5.a, 6.6.a, 7.7.b, 7.7.c | ITEEA (STEL): 2O, 3J, 4H, 5G, 6E, 7H, 7I, 8H, 8I
ITEEA (STEL)	2O, 3J, 4H, 5G, 6E, 7H, 7I, 8H, 8I
NIMS	Measurement Materials & Safety (MMS), Job Planning Benchwork & Layout, Quality & Continuous Improvement, Workforce Readiness
NBEA	Information Technology I.A, Information Technology II.A, Information Technology III.A, Communication III.A, Career Development I.B, Management III.A
ACTE-CRP	CRP1, CRP2, CRP4, CRP5, CRP6, CRP8, CRP9, CRP11, CRP12