Department of Robotics

Course Syllabus

Course Title: **VEX-IQ GEN-2 – level-1**

Prerequisites: **none**

Credit hours: **12**

Target Audience: Trainers and Teachers

Course Description:

This is a hands-on course; trainees will be introduced to the robotics world through the VEX-IQ GEN-2 platform using the classroom kit and external sensors (such as vision & AI vision sensors). Trainees will learn how to design and program functioning robots through a methodological and sequential procedure, profound knowledge and skills that are related to blockly-coding are going to be delivered to trainees by working on the VEXcode IQ and VEXcode VR software. Furthermore, they learn a variety of mechanical design concepts and practically apply them to get different robot designs and constructions.

The Content	Duration (hour)
Programming Approach **Subject 1: Setup & Configuration** • Install drivers • Brain firmware updating • Controller firmware updating • Indicator Lights - Battery • Brain Screen **Subject 2: Basic implementations Drivetrain** • Mechanisms • Straight movement • Rotation • Categories and Blocks in use • Implementations **Subject 3: Conditional statements and Events & Parallel Commands** • Working principles and mechanisms • Multi-sensing strategy • Broadcasting • Blocks in use • Implementations **Subject 4: Sensors: Bumper, Touch LED, Inertial, Distance, and Optical, AI Vision sensors** • Working principles and mechanisms • Blocks in use • Conditional statements in action • Implementations **Subject 5: Tele-operated Mode** • Pairing a Controller • Button and Joystick Names • Calibrating the Controller • Configuring a Controller	6

Design Approach	6
Subject 1: Robot Design I • VEX-IQ gen-2 classroom core set • The structural pieces • Basics of building wheeled mobile robots • Implementations **Subject 2 : Robot Design II** • Gear systems - basics • Essentials of transmission systems – basics • Arms and lifts design – basics • Building VEXRobo • Implementations **Subject 3: Robot Arm Motion Control** • The mechanism of moving arms and lifts • Blocks in use • Implementations	

Course Requirements:

1. Laptop
2. VEX-IQ GEN-2 classroom Kit (it can be replaced with VEXcode VR software)

Learning Objectives: By the end of this course, trainees will:

1. **Knowledge and Understanding**

   A. Understand the functionalities of the components of the kit such as electronic parts and building parts.
   B. Deeply, understand the required programmatic commands for robot motion, screen, sounds, and lights functionalities.
   C. Comprehend the basic skills and concepts of mobile VEX IQ gen-2 robots mechanical design of robots such as vehicles and tanks.

2. **Skills and capabilities:**

   A. Design and build different mobile robots.
   B. Use many programmatic commands and programming skills to control and program mobile robots to perform various missions.
   C. Develop and effectively employ the skill of problem-solving, to find different solutions in terms of robots design and programming, many of their soft skills and thinking approaches as well.
   D. Recognize and use the basics of programming and designing VEX IQ gen-2 robots which qualifies them to step up into more advanced courses.
   E. Acquire and develop a bunch of relevant engineering skills and practices.