

## **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)
<p data-bbox="517 188 946 230" style="text-align: center;"><b>Programming Approach</b></p> <p data-bbox="204 293 791 336"><b>Subject 1: Setup &amp; Configuration</b></p> <ul data-bbox="349 344 842 568" style="list-style-type: none"> <li>• Install drivers</li> <li>• Brain firmware updating</li> <li>• Controller firmware updating</li> <li>• Indicator Lights - Battery</li> <li>• Brain Screen</li> </ul> <p data-bbox="204 631 987 674"><b>Subject 2: Basic implementations Drivetrain</b></p> <ul data-bbox="349 683 826 907" style="list-style-type: none"> <li>• Mechanisms</li> <li>• Straight movement</li> <li>• Rotation</li> <li>• Categories and Blocks in use</li> <li>• Implementations</li> </ul> <p data-bbox="204 969 1190 1057"><b>Subject 3: Conditional statements and Events &amp; Parallel Commands</b></p> <ul data-bbox="349 1066 946 1301" style="list-style-type: none"> <li>• Working principles and mechanisms</li> <li>• Multi-sensing strategy</li> <li>• Broadcasting</li> <li>• Blocks in use</li> <li>• Implementations</li> </ul> <p data-bbox="204 1364 1225 1451"><b>Subject 4: Sensors: Bumper, Touch LED, Inertial, Distance, and Optical, AI Vision sensors</b></p> <ul data-bbox="349 1460 946 1641" style="list-style-type: none"> <li>• Working principles and mechanisms</li> <li>• Blocks in use</li> <li>• Conditional statements in action</li> <li>• Implementations</li> </ul> <p data-bbox="204 1704 759 1747"><b>Subject 5: Tele-operated Mode</b></p> <ul data-bbox="349 1756 807 1937" style="list-style-type: none"> <li>• Pairing a Controller</li> <li>• Button and Joystick Names</li> <li>• Calibrating the Controller</li> <li>• Configuring a Controller</li> </ul>	<p data-bbox="1358 188 1378 219" style="text-align: center;"><b>6</b></p>

Design Approach	6
<p><b>Subject 1: Robot Design I</b></p> <ul style="list-style-type: none"> <li>• VEX-IQ gen-2 classroom core set</li> <li>• The structural pieces</li> <li>• Basics of building wheeled mobile robots</li> <li>• Implementations</li> </ul> <p><b>Subject 2 : Robot Design II</b></p> <ul style="list-style-type: none"> <li>• Gear systems - basics</li> <li>• Essentials of transmission systems – basics</li> <li>• Arms and lifts design – basics</li> <li>• Building VEXRobo</li> <li>• Implementations</li> </ul> <p><b>Subject 3: Robot Arm Motion Control</b></p> <ul style="list-style-type: none"> <li>• The mechanism of moving arms and lifts</li> <li>• Blocks in use</li> <li>• Implementations</li> </ul>	

### **Course Requirements:**

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

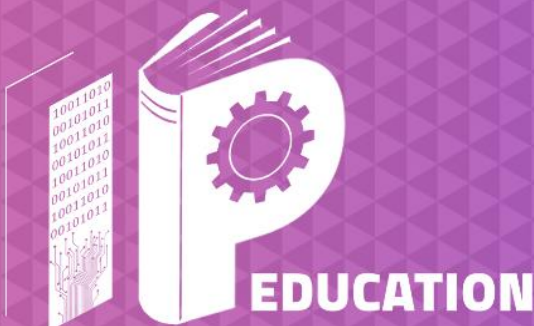
**Learning Objectives:** By the end of this course, trainees will:

**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.



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