

TOT Program

Course Syllabus

Course Title: FLL - Advanced Design & Programming

Prerequisites: Basics of LEGO-based Design & Programming

Credit hours: 18

Target audience: Trainers and Teachers

Course Description:

This is a TOT course meant for trainers who are interested in participating and competing in FLL (First-Lego-League) competition. Trainees are going to get specialized hands-on training based on advanced design and programming skills, Starting from the design matters such as (gear system and transmission, robot core and attachment, structuring robots' bases ...etc.), passing by the judging framework and rules, game field, game element, mission accomplishing strategies, and not ending with advanced coding skills (variables, arrays, PD controllers, acceleration, etc.). As well as, trainers are going to assimilate sophisticated skills and concepts, all forehead mentioned will be delivered within a context of implementations and practical applications.

The Content	Duration (hour)
<p data-bbox="363 152 1101 197">Game Field & Strategies of accomplishing</p> <ul data-bbox="351 253 1086 398" style="list-style-type: none"> • Introduction to FLL 2025/2026 – Robot Game • Game field and count points rules • Mission Accomplishing strategies 	18
<p data-bbox="517 461 946 506">Programming Approach</p> <p data-bbox="204 562 722 607">Subject 1: Utilizing Variables</p> <ul data-bbox="351 618 927 752" style="list-style-type: none"> • The principle of variables in coding • Blocks in use • Implementations <p data-bbox="204 808 786 853">Subject 2: Motor rotation sensor</p> <ul data-bbox="351 864 802 999" style="list-style-type: none"> • The programming concept • Blocks in use • Implementations <p data-bbox="204 1055 504 1099">Subject 3: Arrays</p> <ul data-bbox="351 1111 802 1245" style="list-style-type: none"> • The programming concept • Blocks in use • Implementations <p data-bbox="204 1301 1034 1346">Subject 4: Introduction to Control Engineering</p> <ul data-bbox="351 1357 879 1637" style="list-style-type: none"> • Traditional control • P and D controllers • Line follower • Moving in straight perfectly • Accurate rotating (pivot & spin) • Acceleration & deceleration 	
<p data-bbox="579 1720 884 1765">Design Approach</p> <p data-bbox="204 1821 1123 1921">Subject 1: Introduction to Design and Programming judging</p> <ul data-bbox="351 1933 1233 2145" style="list-style-type: none"> • Explanation of the judging criteria for robot design and programming and the judging rubric. • Focusing on strength points to achieve the highest scores in the arbitration process. • Implementations 	

Subject 2 : Main Robot for FLL

- Explaining the mechanism of designing a robot for the FLL competition, with practical examples and designs specific to the competition using the SPIKE PRIME kit.

Subject 3: Challenge solving strategy

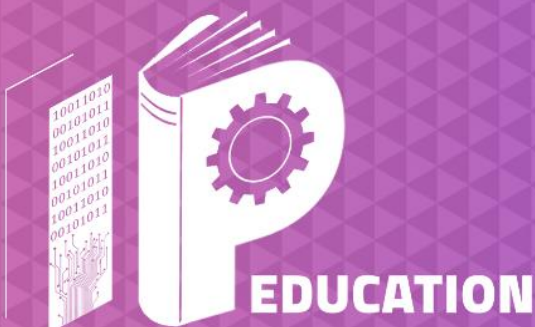
- Explaining the mechanism for developing strategies to solve the challenge with the best possible performance and highest possible scores.

Subject 4: Design robot arms to solve the challenge

- Explain the design and build of robot extensions, how to attach arms to extensions .
- Learn how to design and build practical applications used in solving FLL missions.

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

- Assimilate the robot game rules for the current year
- Comprehend and experience a group of mission accomplishing strategies
- Acquire the ability to design a core robot and the required attachments
- Acquire the ability to utilize a lot of advanced programming skills to accomplish the missions
- Be able to train and practice with students efficiently



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