AeroBay Curriculum <> GRADE 11-12		
Session Number	**Session Topic (Grade 11-12)**	**Objective**
Session 1	**World of Design & Automation** Welcome to the World of Design & Automation, where creativity meets machines! In this session, students step into the shoes of young engineers as they design and build simple mechanisms that mimic automated systems found in real-life industries.	Students will explore the basic principles of design and automation by creating simple mechanical systems that perform specific tasks. Through hands-on building and problem-solving, they will understand how automation helps reduce effort and improve efficiency in real-world scenarios.
Session 2-3	**Design non electric mover (Skateboard)** Get ready to roll! In this thrilling session, students will design their own non-electric skateboard prototype and dive into the science of motion, balance, and speed. From testing surfaces to perfecting stability, it's all about building a mover that rides smoothly—powered only by physics and smart design! **Software included: Software for designing**	Students will design and prototype a non-electric mover that demonstrates the principles of mechanical motion, balance, and energy transfer. Through experimentation and testing, they will understand how surface texture, wheelbase length, friction, and rider weight affect motion.
Session 4-5	**Develop your skateboard** Time to hit the road—no batteries needed! In this action-packed session, students will design and build their own skateboard prototype using everyday materials. As they test and tweak their movers, they'll uncover the secrets of balance, motion, and control—all while having serious fun! **Kit included: Student's design (Take away)**	Students will explore the principles of motion, friction, and balance by designing a non-electric skateboard. Through hands-on testing and iteration, they'll learn how weight distribution, surface interaction, and wheel placement affect movement.
Session 6	**Sky Pioneers: Introduction to Drone Technology** Take flight into the world of drones! In this session, students will explore the fundamentals of drone technology, understand how multi-copter drones work, and get hands-on experience with basic drone controls. **Lab material included: Drone (Hands on)**	Students will learn the principles of aerodynamics, thrust, lift, and stability in drone flight. They will also understand the applications of drone technology in various fields, including surveillance, delivery, and disaster management.
Session 7	**Circuit Masters: Exploring Electronics in Motion** Unravel the magic behind electronics! In this session, students will dive into the world of ESCs, motors, power distribution boards, and batteries, discovering how these components power modern machines, including drones, robots, and RC vehicles.	Students will understand the role of electronic speed controllers (ESCs), motors, and power distribution in electrical systems. They will explore how energy flows through circuits and gain hands-on experience in assembling and troubleshooting electronic components.
Session 8-9	**Skyframe Build: Assembling Your Drone Frame** Get ready to construct the backbone of your drone! In this session, students will assemble a sturdy drone frame, learning about aerodynamics, structural integrity, and the importance of lightweight materials in aviation. **Lab machinery : Drone (Hands on Session)**	Students will understand the design principles behind drone frames, explore material selection for stability and weight optimization, and gain hands-on experience in assembling a functional drone structure.
Session 10-11	**Drone Brain: Mastering Flight Controllers** Unlock the intelligence behind drone navigation! In this session, students will explore how flight controllers process sensor data, stabilize flight, and enable precise movement. **Lab tools included: Drone**	Students will understand the role of flight controllers in drone operation, learn about gyroscopes, accelerometers, and PID tuning, and gain hands-on experience configuring a flight controller for stable flight.
Session 12	**Command & Control: Firmware and Transmitter Mastery** Take full control of your drone! In this session, students will explore how firmware programs the brain of a drone and how transmitters communicate flight commands for seamless operation.	Students will understand the role of firmware in drone functionality, learn how to configure and update firmware, and explore transmitter settings for precise flight control.

Session 13	**Sky Sim: Master the Virtual Skies** Take control and fly like a pilot! Understand control surfaces, hand-eye coordination, and real-time flight mechanics as you navigate the virtual skies. **Software included: Simulation software** **Lab tools included: Transmitter, AA Batteries, Simulation cables**	students will develop a practical understanding of flight control and aircraft maneuvering through flying simulations using a transmitter. They will explore the functions of control surfaces, enhance their hand-eye coordination, and gain confidence in handling a virtual aircraft.
Session 14-15	**RC Takeoff: Pilot the Skies** Let's experience the thrill of real flight! In this action-packed session, you will take control of an RC plane using a transmitter, witnessing the principles of flight in action. **Ground activity: Ground flying by trainer**	Students will gain first-hand experience in flying an RC plane using a transmitter. They will understand how control surfaces like ailerons, elevators, and rudders affect flight and develop precision and coordination through real-time piloting.
Session 16-17	**Test your mega launcher - Sling shot** Load, aim, and launch! In this high-energy session, students will build and test a mega slingshot to explore how stored energy transforms into motion. They'll adjust angles, tension, and mass to test distance and accuracy—just like real engineers working on catapults and launchers! **Kit included: Sling Shot(Take away)**	Students will build a functional slingshot and investigate how elastic potential energy converts into kinetic energy. By modifying tension, angle, and projectile weight, they will analyze how these variables affect range and speed. The session encourages experimentation and application of motion physics to design an efficient and accurate launcher.
Session 18-19	**Hand Escalator** Who needs electricity when you can engineer brilliance by hand? In this hands-on session, students will build a working escalator mechanism that moves small items upward through manual rotation and smart design—demonstrating mechanical movement and the beauty of simple machines. **Kit included: Hand Excalator (Take away)**	Students will construct a manually operated escalator using pulleys, wheels, and inclined planes. As they rotate the system to lift objects, they'll explore the fundamentals of work, energy transfer, and mechanical advantage. The session promotes real-world mechanical thinking by combining creativity with core physics and engineering principles.
Session 20-21	**Let's automate your Escalator (IoT)** Turn your simple machine into a smart machine! In this advanced session, students will integrate IoT components into their hand escalator design—using sensors, microcontrollers, and code to detect objects and automate movement. Welcome to the world where mechanics meets automation! **Hands on session**	Students will learn how to convert a manual escalator into an automated system by integrating IoT technology. Using infrared or ultrasonic sensors for object detection, microcontrollers (like Arduino) for control logic, and motors for movement, they'll explore how smart systems work in modern-day automation.
Session 22	**Future in Your Hands: Build a Bionic Hand** Step into the world of biomedical innovation! In this session, students will create a functional model of a bionic hand that mimics the natural movement of human fingers using pulleys and tension cords. It's a fusion of biology, design, and mechanics that makes science come alive—one finger at a time. **Kit included: Prosthetic hand (Take away)**	Students will build a prosthetic-style bionic hand from MDF and simulate finger movements through a string-and-pulley system. They'll explore how tendons work in the human body and translate that knowledge into a mechanical model that imitates gripping and movement. This project blends anatomy, mechanics, and design thinking to build empathy-driven innovation.
Session 23-24	**Code your Bot (Quad Bot)** Get ready to breathe life into your robot! In this session, students will build and code a four-legged walking bot—learning how programming, sensors, and precise movement work together to make machines walk, react, and think like living beings. **Kit included: Quad Bot (Group)**	Students will construct a quad-legged bot and use microcontrollers to write code that controls its movement and coordination. By experimenting with walking gaits, turning mechanics, and sensor-based navigation, they'll develop a strong understanding of mechatronics, logic building, and real-world robotic systems.