Junior Engineer Drone (R&D)

Course Time Table

Start Date: 08 December 2025
Completion Date: 08 March 2026
Total Duration: 3 Months (540 Hours)

Introduction: - The Junior Engineer Drone (Research & Development) course is an advanced technical program designed to prepare professionals for the rapidly expanding drone technology sector. The training focuses on both research and prototype development, enabling learners to explore new drone technologies, understand key electronic and mechanical components, and design drones for industrial and commercial use.

Along with core R&D capabilities, the course also focuses on Agriculture (Agri) Drone Applications, considering the huge demand for drone professionals in the agri sector. Learners will receive hands-on training on agriculture drone flying, spraying systems, crop monitoring sensors, GPS-based farm mapping techniques, and precision agriculture operations. Participants will understand how drones are transforming farming by reducing labor, increasing accuracy, saving time, improving crop health, and enhancing pesticide/fertilizer application efficiency. Special modules include pest and nutrient identification, field survey using NDVI cameras, and automated flight planning for farm spraying.

Through a balanced mix of theory, simulation practice, real-time flying sessions, workshop activities, and prototype development, learners gain expertise in:
• Drone electronics, communication systems, aerodynamics, CAD design
• Drone assembly, testing, troubleshooting, calibration, and safety regulations
• Operation of agriculture drones for spraying and field monitoring
• Designing and developing drone prototypes for manufacturing

By the end of the program, trainees will be job-ready to work in roles across Drone Research & Development, UAV Manufacturing, Agri Drone Operations, Aeronautics, Robotics, and Precision Farming Industry.

Eligibility for Admission

Candidates seeking admission to the **Junior Engineer Drone (R&D)** course must meet **one of the following criteria**:

Educational Qualifications (Any one of the below)

1. **12th Pass (Any Stream)** with **minimum 2 years of work experience**, **OR**
2. **12th Pass + NTC/NAC (1 Year)** with **1 year of work experience**, **OR**

3. **3-Year Diploma after 10th** (Electronics / Electrical / Mechanical / Relevant Field) + **1 year of work experience**, **OR**
4. **NSQF Level 4 Certificate** with **3 years of work experience**, **OR**
5. **Pursuing Final Year of**
    - **B.Tech / B.E / B.Sc (Electronics / Electrical / Mechanical / Robotics / Computer / Aerospace / Relevant Field)**

Additional Conditions

- **Minimum Entry Age:** 21 Years
- Candidates must be **medically fit** to operate drones & electronic tools.

Preferred (Not Mandatory)

- Basic computer knowledge
- Interest in drones, robotics, aviation, electronics, or UAV industry

Weekly Course Plan (08 Dec 2025 – 08 March 2026)

Total Hours: 540 Hours | 36 Hours per Week (Last week 12 Hours)

Week	Dates	Module	Hours
Week 1	08 Dec – 13 Dec	Overview of Drone Technology & Industry	36
Week 2	15 Dec – 20 Dec	Drone Components & Technologies	36
Week 3	22 Dec – 27 Dec	Software Tools & Simulation Basics	36
Week 4	29 Dec – 03 Jan	R&D Design Requirements & Documentation	36
Week 5	05 Jan – 10 Jan	Prototype Development – Part 1	36
Week 6	12 Jan – 17 Jan	Prototype Development – Part 2	36
Week 7	19 Jan – 24 Jan	Prototype Development – Part 3	36
Week 8	26 Jan – 31 Jan	Drone Assembly Workshop (Practical)	36
Week 9	02 Feb – 07 Feb	Simulation Setup & Calibration	36
Week 10	09 Feb – 14 Feb	Simulator Flying Training – Part 1	36
Week 11	16 Feb – 21 Feb	Simulator Flying Training – Part 2	36

Week	Dates	Module	Hours
Week 12	23 Feb – 28 Feb	Drone Operations & Maintenance	36
Week 13	01 Mar – 06 Mar	Employability Skills Training	36
Week 14	07 Mar – 08 Mar	Final Assessments & Certification	12

Brief Weekly Description

Week	Focus Area
Week 1	Orientation, safety, drone basics, industry overview
Week 2	Drone motors, ESC, propellers, batteries, payload, GPS
Week 3	CAD, simulation software, drone data tools
Week 4	R&D methodology, design requirements & documentation
Week 5	Drawings, component selection, budget planning
Week 6	Prototype modification, manufacturing drawings, approvals
Week 7	Aerodynamics, regulatory compliance, testing
Week 8	Hands-on assembly workshop, soldering & multimeter use
Week 9	Simulation setup, models & modes, pre-flight checks
Week 10	Take-off, hovering, basic flying maneuvers
Week 11	Advanced flying, landing, multi-scenario practice
Week 12	Maintenance, troubleshooting, operational case studies
Week 13	Communication skills, resume building, job preparation
Week 14	Viva, project submission, practical exam, certification

DETAILED WEEKLY TOPIC-WISE PLAN

WEEK 1 (08 Dec – 13 Dec 2025) — 36 Hours

Orientation + Introduction to Drone Technologies

Topics

Course structure & safety briefing

Basics of electronics & communication

What is a drone? — history & evolution

Types of drones & classifications

Applications of drones in industry (defence, mapping, logistics, agri, etc.)

UAV industry demand & future opportunities

Introduction to DGCA regulatory overview

WEEK 2 (15 Dec – 20 Dec 2025) — 36 Hours

Drone Components & Technologies

Topics

Drone frame structures (quad, hexa, octa)

Propeller types & thrust concepts

Motors & ESC working principles

Battery types, power ratings & power distribution boards

GPS modules, IMU, barometer, magnetometer

Payload systems & camera modules

Market research & use-case mapping techniques

WEEK 3 (22 Dec – 27 Dec 2025) — 36 Hours

Simulation Software & Data Tools

Topics

Introduction to drone simulation environments

Topics

Installation & interface of popular simulators

CAD design software basics

3D model visualization for drones

Data collection & flight log interpretation

Hands-on software simulations

Assignment – create & submit simulated drone model

WEEK 4 (29 Dec 2025 – 03 Jan 2026) — 36 Hours

Design Requirements & R&D Process

Topics

Pre-design parameters & requirement analysis

Identifying technical limitations & design challenges

Drafting design specifications

R&D documentation and reporting method

Understanding BOM (Bill of Material)

Prototype planning worksheet preparation

WEEK 5 (05 Jan – 10 Jan 2026) — 36 Hours

Prototype Development – Part 1

Topics

Engineering drawing & interpretation

Product benchmarking & comparison

Component selection for prototype

Man-hour planning and budgeting

Revision of design specifications

Topics

Milestone planning for R&D

WEEK 6 (12 Jan – 17 Jan 2026) — 36 Hours

Prototype Development – Part 2

Topics

Design modification for upgraded performance

Editing manufacturing drawings

Structural integrity evaluation

Using engineering laws for drone design

Internal approval hierarchy – prototype designs

Review session with instructor

WEEK 7 (19 Jan – 24 Jan 2026) — 36 Hours

Prototype Development – Part 3

Topics

Aerodynamic principles & payload optimisation

Drone structural weight calculation

Balance of lift / thrust / drag

Compliance with aviation standards

Testing procedures & test checklist creation

Practical Design Lab Session

WEEK 8 (26 Jan – 31 Jan 2026) — 36 Hours

Drone Assembly Workshop (Hands-On)

Topics

Safety tools

ESC–motor calibration

Fitting propellers, GPS module & sensors

Wiring of power system & connectors

Flight controller integration

Internal testing & corrections

WEEK 9 (02 Feb – 07 Feb 2026) — 36 Hours

Simulation Setup & Calibration

Topics

Drone simulator hardware installation

Connecting controllers & sensors

Switching models & modes in simulator

PID tuning basics

Pre-flight checks & virtual testing

Hands-on flying setup on simulator

WEEK 10 (09 Feb – 14 Feb 2026) — 36 Hours

Simulator Flying – Stage 1

Topics

Basic take-off & hover

Yaw, pitch & roll control

Directional movement & flight bounding

Obstacle avoidance practice

Emergency handling drills

- **WEEK 11 (16 Feb – 21 Feb 2026) — 36 Hours**

Simulator Flying – Stage 2

Topics

Advanced maneuvers

Autonomous flight missions

Circle, square & grid patterns

Landing techniques

Multi-scenario simulation (night / wind / fog)

Flight evaluation & score chart

WEEK 12 (23 Feb – 28 Feb 2026) — 36 Hours

Drone Operations & Maintenance

Topics

Real-world flying SOP

Spray drones operation & tank system

Preventive maintenance schedule

Troubleshooting & repair techniques

Ground support equipment overview

Spare part & stock management

WEEK 13 (01 Mar – 06 Mar 2026) — 36 Hours

Employability Skills Training

Topics

Communication & teamwork

Customer service & work ethics

Topics

Resume writing & mock interviews

Job search guidance

Entrepreneurship basics for drone business

Introduction to DGCA drone licensing & opportunities

WEEK 14 (07 Mar – 08 Mar 2026) — 12 Hours

Final Assessment & Certification

Topics

Theory examination

Practical flying & assembly assessment

Viva-voce

Project submission

Certification & closing ceremony

Total 540 Hours

Component	**Hours**
Theory	180
Practical / Lab	250
OJT / Drone Flying	50
Employability Skills	60
TOTAL	**540 Hours**