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COURSE BROCHURE

Wind Energy Fundamentals for Engineers and Technicians Training Course

13 – 17 September 2027
Madrid

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Ref: 3140_119293 **Date:** 13 – 17 September 2027 **Location:** Madrid **Fees:** 6200 GBP

Wind Energy Fundamentals for Engineers and Technicians is a 1-week training course for engineers and technicians new to wind power projects, who leave with a wind turbine site and yield briefing for their own project. Wind now forms a growing share of new supply, so organisations need staff who read wind data, turbines and grid connection with confidence. Jupiter Prime Training delivers this course on wind energy fundamentals.

Why Wind Energy Fundamentals Matter Now

Three forces shape wind power today. Taller turbines with larger rotors change site choice, loads and work at height. Network operators expect wind farms to hold voltage and ride through faults. Maintenance crews also face longer climbs and harder rescues. Owners and lenders judge projects on predicted annual output, so weak measurement or careless loss estimates undermine the case. Organisations that grasp these basics choose sites, turbines and maintenance plans soundly; those that do not face lower output, unplanned stoppages and avoidable safety incidents.

Who Gains Most from Wind Energy Fundamentals

- Electrical engineers responsible for collector cables, transformers and the connection point
- Mechanical technicians who inspect gearboxes, bearings, blades and yaw systems
- Project engineers who prepare site layouts, turbine selection notes and construction sequences
- Operations staff who monitor turbine alarms, availability and production
- Health and safety staff who plan rescue, climbing and lifting arrangements

Mixed groups from one developer, utility or service company gain most, sharing one picture of how a turbine makes electricity.

Wind Energy Fundamentals Capabilities

Participants move from the physics of moving air to the turbine, the wind farm and the network.

- Calculate the power available in the wind from speed, air density and rotor swept area — turbine sizing choices
- Assess a wind speed distribution and a power curve together to estimate annual output — project owners and lenders
- Specify the main turbine components and how they share mechanical loads — procurement and maintenance staff
- Weigh onshore and offshore site constraints — layout decisions
- Apply grid connection requirements for reactive power and fault ride-through — network operators

- Build a safe working at height and rescue plan for routine turbine tasks — site supervisors

Key Wind Energy Fundamentals Terms

- Power curve — the chart that shows the electrical output of a turbine at each wind speed.
- Capacity factor — actual energy produced divided by the energy at full rating over the same period.
- Wake loss — the drop in output of a downwind turbine caused by slower air behind an upwind rotor.
- Pitch control — turning the blades about their long axis to limit power in strong winds.
- Yaw system — the drive and brakes that turn the nacelle so the rotor faces the incoming wind.
- Wind shear — the change of wind speed with height above ground.

Wind Energy Fundamentals Day by Day

Day 1: The Wind Resource and Its Measurement

- Wind Power Equation and Air Density — Rotor Size and Site Altitude
- Wind Speed Distribution and Annual Averages — Expected Energy at a Site
- Measurement Masts and Remote Sensing Devices — Choosing a Measurement Campaign
- Wind Shear and Turbulence Intensity — Tower Height and Turbine Class
- Wind Rose and Prevailing Direction — Turbine Spacing and Row Orientation

Day 2: Inside the Wind Turbine

- Rotor, Blades and Hub Assembly — Load Paths and Blade Inspection Priorities
- Gearbox and Direct Drive Arrangements — Reliability and Maintenance Access Trade-Offs
- Generator Types and Power Converters — Electrical Behaviour Seen by the Network
- Pitch and Yaw Systems — Power Limiting and Storm Shutdown
- Tower, Nacelle and Foundation Types — Transport, Lifting and Ground Conditions

Day 3: From Power Curve to Energy Yield

- Power Curve Reading and Cut-In Speeds — Matching Turbines to Site Winds
- Capacity Factor and Availability Figures — Judging Realistic Annual Output
- Wake Effects and Turbine Layout — Spacing Choices Across a Wind Farm
- Loss Categories From Icing to Curtailment — Net Energy Estimate Adjustments
- Onshore and Offshore Site Comparison — Foundations, Access and Weather Windows

Day 4: Grid Connection and Turbine Operation

- Collector Cable Network and Turbine Transformers — Losses and Layout Routing
- Reactive Power and Voltage Support — Meeting Network Operator Requirements
- Fault Ride-Through and Frequency Response — Wind Farm Behaviour During Disturbances
- Supervisory Control and Turbine Alarms — Daily Operating Decisions
- Preventive and Condition-Based Maintenance Plans — Gearbox, Bearing and Blade Care

Day 5: Practising the Wind Turbine Site and Yield Briefing

- Safe Working at Height and Rescue From the Nacelle — Climbing and Lifting Approvals
- Site Wind Data Review Exercise — Applying Measurement and Shear Methods
- Turbine Selection Exercise for a Chosen Site — Applying Component and Power Curve Checks
- Connection and Maintenance Outline for the Site — Applying Grid and Operating Methods
- Wind Turbine Site and Yield Briefing — Presenting Output, Risks and Next Steps

Applying Wind Energy Fundamentals After the Course

- Review the power curve, wind speed distribution and loss assumptions behind the output estimate of a current or planned wind farm.
- Walk through the climbing, rescue and lifting arrangements for one turbine task with the site crew.

Wind Energy Fundamentals Questions FAQ

What are wind energy fundamentals and why do they matter now?

Wind energy fundamentals cover how moving air becomes electricity: the wind resource, the turbine, energy yield and the grid connection. They matter because wind farms are judged on output, network behaviour and safe maintenance.

Which roles gain most from wind energy fundamentals?

Engineers and technicians who are new to wind projects gain most. That includes electrical, mechanical, project, operations and safety staff.

How does a wind energy fundamentals course differ from a resource assessment course?

This wind energy fundamentals course covers the whole chain at an introductory level. A specialist resource assessment course goes deeper into measurement correction and statistical yield studies.

What do you bring back from wind energy fundamentals training?

You bring back a site and yield briefing for a real or sample wind farm. It sets out wind data, turbine choice, output with losses, connection, maintenance and safety.

Wind Energy Fundamentals: The Way Forward

The wind turbine site and yield briefing gives project and operations staff a shared starting point. Its first use is to test whether a proposed site and turbine produce enough energy to justify further study. After the first use, revisit the loss assumptions and maintenance plan once real operating data from the turbines arrives.