



## WIND POWER SYSTEMS

17<sup>th</sup> - 22<sup>nd</sup> March 2009

Join students on our MSc Renewable Energy and the Built Environment programme and gain a comprehensive overview of wind power systems.



Aimed at engineers, planners, system specifiers and architects amongst others, the course covers stand-alone and grid connected systems, wind analysis and turbine siting, generators, rotor design and speed control.

### COURSE OVERVIEW

The course begins at 1600 on Tuesday 17<sup>th</sup> March and finishes at 1400 on Sunday 22<sup>nd</sup> March. Breakfast each day is at 0830, lunch at 1300 and supper at 1800. Tea and coffee breaks are also provided.

#### Main Topics of Study:

- Standalone and Grid connected wind system.
- Wind analysis and turbine siting.
- Generators.
- Rotor design and speed control.

#### Lectures:

- Wind availability and variability, velocity and power duration curves.
- Wind turbine parameters.
- Turbine types and efficiency.
- Standalone systems: anatomy of wind/battery systems, integration of wind with other energy sources, assessing energy requirements, system design and sizing, siting of machines, affects of height and roughness, power loss in cables.
- Grid connected systems: basic principles, evaluation of system types, regulations and economics.
- Analysis of wind energy extraction, efficiency considerations (the Betz limit) Statistical analysis of wind speed and energy availability, the Weibull and Rayleigh distributions.
- Rotor design and generators: basic aerodynamics, calculation of blade width etc.
- Types of generator and evaluation of their characteristics.
- Speed governing and overspeed protection, yaw drive and control.

#### Practicals:

- Visit to local wind farm, Tour of CAT small wind turbine, generator types and characteristics, wind loggers and data analysis.

## **COURSE TUTORS**

This course is developed and taught by lecturers from the Graduate School of the Environment. See [www.cat.org.uk/graduateschool](http://www.cat.org.uk/graduateschool) for details.

## **FOOD AND ACCOMMODATION**

The course fee covers full board accommodation at CAT, tuition and course materials. All food is vegetarian, and we are happy to cater for special diets – please let us know your requirements when booking.

There are a small number of single rooms available at an extra cost of £10 per night. Please indicate when you book if you would like a single room.

## **ACCOMMODATION FOR NON-PARTICIPANTS**

Depending on course numbers it is sometimes possible to accommodate friends and family. The cost for a non-participant is £45 per day (full board). Please contact the Course Administrator about availability. We regret that we are unable to offer crèche facilities.

## **DIRECTIONS**

CAT is 3 miles north of Machynlleth on the A487 and is clearly sign posted. To arrive by train you need to come via Shrewsbury to Machynlleth. You can walk to CAT from the station (about 45 minutes) or take a taxi. A single journey costs about £4.50. There are infrequent buses. CAT is registered on [www.liftshare.com](http://www.liftshare.com) as a public group. If you require or can offer a lift, please check the website.

## **WHAT TO BRING**

We provide bedding but you will need to bring a towel. A torch is useful for moving between buildings at night. It is also advisable to bring wet weather gear and strong footwear as we are based in an old slate quarry.

## **COURSE FEES**

£600

## **TO RESERVE A PLACE**

A £100 non-refundable deposit is required to secure your booking. Please book in one of the following ways:

**Online:** [www.cat.org.uk/courses](http://www.cat.org.uk/courses)

**By phone:** 01654 705981

**By post:** The Courses Administrator, CAT, Machynlleth, Powys SY20 9AZ. Cheques should be made payable to 'CAT Charity Ltd'

## **PAYMENT OF BALANCE**

Before the course you will receive an information pack and an invoice for the balance. If the balance is not paid two weeks before the course start date, we reserve the right to offer the place to another.

## **CANCELLATION FEES**

We regret that except in cases of illness supported by a doctor's note, we will make the following cancellation charges:

More than six weeks before the course – half the fee is forfeit;

Less than four weeks before the course – the full fee is forfeit.

CAT reserves the right to cancel any courses. Should this be necessary, deposits and fees will be returned in full. CAT also reserves the right to modify the published programme.

## **JOSH BROWN BURSARY FUND**

We have a Bursary Fund for people from 'less developed' countries. Details are available on our website.

## **CONTACT CAT COURSES**



Tel: 01654 705981

Email: [courses@cat.org.uk](mailto:courses@cat.org.uk)

Web: [www.cat.org.uk/courses](http://www.cat.org.uk/courses)