**Course title**:

Wind Turbine Control Online Course

**Scope and form:**

Online lectures and Q&A sessions

**Prerequisites:**

Students should have basic programming skills in Matlab.

**Learning objectives:**

Upon completion of this course, participants will be able to:

1. Explain the wind turbine control objectives and how a controller is designed to achieve these objectives.
2. Tune a wind turbine controller in below-rated, above-rated wind and transition regions and evaluate its performance.
3. Understand the supervisory control (cut-in and cut-out procedures) and advanced load reduction control strategies.
4. Implement a basic wind turbine controller and simulate the response of a wind turbine during normal operation.

**Content:**

This course deepens students’ theoretical and practical knowledge of controls in wind turbines. During this course, the student will design and tune their own controller on the DTU 10 MW Reference Wind Turbine of a different wind class. The following topics will be covered: wind turbine control basics and tuning, PID design, pole placement control theory, fatigue load calculations, supervisory control.

**Team mini-project:**

Participants will work in group to design and tune a controller for a given wind turbine model and evaluate its performance in terms of power production and loads. Participants will give a presentation on their design at the end of the training.

**Timetable (old, see Day1\_Part1.ppt):**

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| **Day 1** | |
| 9:00-10:15 | Lecture 1:  Wind turbine control basics:  Open-loop/closed-loop, control objectives, control regions, introduction to PI controller |
| 10:30-11:45 | Lecture 2:  Controller design and tuning: Region 2 (Below-rated region) |
| 11:45-12:00 | Introduction to mini-project and Matlab turbine model |
| **Day 2** | |
| 9:00-10:15 | Lecture 3:  Controller design and tuning: Region 2.5 and 3 (transition and above-rated region) |
| 10:30-11:45 | Q&A on mini-project |
| **Day 3** | |
| 9:00-10:15 | Lecture 4:  Introduction to Supervisory control, advanced control topics and DTU Wind Energy Controller |
| 10:30-11:45 | Mini-project presentations |