Course offered for the PhD program
in Civil, Chemical and Environmental Engineering
Curriculum in Fluid Dynamics and Environmental Engineering
Curriculum in Structures, Materials and Geotechnics

a.a. 2020/2021

(possibility of participation for students in other PhD cycles or other PhD courses)

1. Title

Introduction to Wind Energy and Wind Turbines

2. Course description

The course intends to describe the main technical aspects inherent wind energy and wind turbines. It is articulated into 5 lessons. After a brief introduction to wind energy, first lesson depicts main typologies of wind turbines, dealing also with wind energy technology and wind turbine components. Second lesson supplies main elements inherent the wind in the atmospheric boundary layer, dealing with mean wind and atmospheric turbulence. Third lesson describes optimum production and the basic concepts of wind turbines aerodynamics, dealing with force acting on a blade and active control. Fourth lesson deals with wind resource assessment and power production. The final lesson show wind tunnel experimental test over a scale model of a vertical axis wind turbine.

3. Course Organization

The course consists of lectures and technical applications.

4. Teacher

Luisa Pagnini

5. Duration and credits

The course consists of 5 lessons for a total of 10 hours (2 credits)

6. Activation mode and teaching period

The course is annual and will be held in January 2021; 2 lessons/week starting from the 3rd week of January . The minimum number of participants to activate the course is 5.

7. Deadline for registration

The deadline for applications is 31st Dec. 2020. Confirmation can be sent by e-mail to luisa.pagnini@unige.it

8. Final exam

Oral exam

9. References

E. Hau. “Wind turbines. Fundamental, technologies, application, economics”. Springer-Verlag, Berlin, Heidelberg, 2006.

L.C. Pagnini, L., Piccardo, G., Repetto, M.P. (2018). Full scale behavior of a small size vertical axis wind turbine, Renewable Energy, 127, pp. 41-55

IEC 61400-12-1, “Wind turbines: Part 12.1 - Power performance measurements of electricity producing wind turbines”. International Electrotechnical Commission, Geneva, Switzerland, 2005.

E. Simiu, R.H. Scanlan. “Wind effects on structures”. John Wiley, New York, 1996.

Guidelines for Design of Wind Turbines. Det Norske Veritas, Certification@risoe.dk) 2002.