



FLUID MECHANICS OF WIND ENERGY SYSTEMS

YOUR BENEFITS

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Online Certificate Programs

WIND ENERGY SYSTEMS

EXPAND YOUR KNOWLEDGE IN WIND ENERGY

OVERVIEW CERTIFICATE PROGRAMS



Profile

This certificate provide a knowledge of mathematics and fluid mechanics as well as computational methods used for the fluid mechanical analysis of wind energy converters for stationary and transient cases. A knowledge about the aerodynamics of rotor blades will be facilitated. The goal is to enable engineers to apply existing commercial software packages of computational fluid mechanics in a sophisticated manner as basis for reliable prognoses of the fluid flow around wind turbines, and to improve the quality of numerical methods and to develop realistic models of wind energy systems. These aspects are fundamental ingredients for the engineering optimization of state-of-the-art wind turbines and their innovative designs with a higher energy efficiency, lifetime, degree of capacity utilization and robustness with regard to extreme load cases.

Modules

- Mathematics
- Fluid Mechanics
- Theoretical Fluid Mechanics
- Computational Fluid Mechanics
- Rotor Aerodynamics

- ››› International certificate program with 100% of online teaching
- ››› Work and study simultaneously and balance your studying and family time
- ››› Unique and experienced education alliance with the University of Kassel, Fraunhofer IWES and industrial partners
- ››› Study at the cutting edge of applied research in wind energy
- ››› Study with a problem-oriented focus and introduce your own professional input into the curriculum
- ››› Start with one certificate and use these modules for crediting to the master program
- ››› Solve the current and future challenges of wind energy development and be part of the world-wide increase of renewable wind energy

YOUR CONTACT PERSONS

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Offered by

U N I K A S S E L
V E R S I T Ä T

In 2014 as much wind power was installed like never before in the history. The extension climbed up on 51 GW worldwide. This is one reason why manufactures, service providers and evaluators are requested high qualified employers with specific skills in wind energy. The University of Kassel and the Fraunhofer Institute for Wind Energy and Energy System (IWES) registered this development several years ago. Both partners established seven certificate programs which are part of the study program Online M.Sc. Wind Energy Systems. In these certificates very specific aspects of wind power will be treated. The acquired knowledge of each certificate should enable our students to extent their knowledge in very specific parts of the wind energy. These range from fundamentals of wind energy systems to integration of wind power in the electricity supply system. The knowledge transfer in each certificate takes place on a university level.

We would be pleased to welcome you in our certificate programs!

Prof. Dr.-Ing. habil. Detlef Kuhl
Wind Energy Systems Course Director
University of Kassel

U N I K A S S E L
V E R S I T Ä T

Prof. Dr.-Ing. Kurt Rohrig
Vice-Director Fraunhofer IWES

Fraunhofer
IWES

Each certificate includes different modules and have a total of 30 credits. All modules are embedded in the master's degree program Online M.Sc. Wind Energy Systems and are ASIIN accredited.

The Participants

Target groups are engineers and bachelor's degree holders who wish to extend their knowledge in the field of wind energy.

100% Online Teaching

The certificates are explicitly developed for those participants who would like to study beside their job. Therefore it is designed as a 100% online learning program.

Costs: € 6000 each certificate

Admission Requirements

Bachelor Degree, Diploma or equivalent degree in a technical or scientific course, like electrical, mechanical, civil engineering or comparable degrees with basics in mathematics, natural sciences and engineering
Application deadline for summer semester (Apr–Sep): 27th March
Application deadline for winter semester (Oct–Mar): 1st October

Registration: www.uni-kassel.de/wes



SCIENTIFICALLY ORIENTED FUNDAMENTALS OF WIND ENERGY SYSTEMS

ELECTRICAL ENGINEERING OF WIND ENERGY SYSTEMS

INTEGRATION OF WIND POWER IN THE ELECTRICITY SUPPLY SYSTEM

WIND ENERGY CONVERTER SYSTEMS

STRUCTURAL MECHANICS OF WIND ENERGY SYSTEMS

COMPUTATIONAL WIND ENERGY SYSTEMS

Profile

The certificate 'Scientifically Oriented Fundamentals of Wind Energy Systems' provides a strong fundamental knowledge to understand economically and ecologically efficient wind energy transformation and to design new wind turbines or components of wind turbines beyond the state-of-the-art of wind engineering. Beside the primary improvement of fundamental engineering knowledge, this certificate also serves as a basis for more technical or methodological oriented certificates or for studying the complete 'Online M.Sc. Wind Energy Systems' program.

Modules

- Design of Mechanical and Electrical Components
- Mathematics
- Application of Software Tools
- Solid Mechanics
- Fluid Mechanics
- Electrical Engineering

Selection of five modules from an offer of six modules

Profile

This certificate 'Electrical Engineering of Wind Energy Systems' deal with the main components of the electrical system. Issues like how to design, control and operate the electrical system in a wind energy converter will be treated. In this context questions are answered regarding the technical challenges and boundary conditions for the design and how does it interchange with the drive train and the whole wind energy converter system and the wind farm.

Modules

- Design of Mechanical and Electrical Components
- Electrical Engineering
- Control and Operational Management for Wind Turbines and Wind Farms
- Energy Storage
- Technical and Economic Aspects of Grid Integration

Profile

The fluctuation of wind power and the more decentralized production of wind power require complex solutions for the successful grid integration. The certificate 'Integration of Wind Power in the Electricity Supply System' gives you the opportunity to study the increasingly important issue of the integration of wind power into the power supply system. The certificate focuses on technical, administrative and legal barriers and challenges which are to be considered for a successful integration of wind power and other renewable energy and conventional technologies into the grid.

Modules

- Energy Meteorology
- Energy Storage
- Control and Operational Management for Wind Turbines and Wind Farms
- Technical and Economic Aspects of Grid Integration
- Energy Law
- Business Administration and Management of Wind Turbines and Wind Farms

Profile

The certificate 'Wind Energy Converter Systems' is focused on engineering, planning and managing aspects of wind turbine technology, wind turbines and wind farms. It provides the knowledge about classical and recently developed wind turbine components. Design and analysis methods for modern on- and offshore foundations, towers, rotor blades and nacelle systems will be taught. Modules about planning, management, administration of wind turbines and wind parks will complete the profile of project responsible wind engineers.

Modules

- Design of Mechanical and Electrical Components
- On- and Offshore Foundations
- Construction and Design of the Nacelle Systems
- Towers
- Rotor Blades
- Business Administration and Management of Wind Turbines and Wind Farms
- Planning and Construction of Wind Farms

Selection of 30 credits from an offer of 33 credits

Profile

Studying the certificate will provide knowledge of classical, current and future numerical methods for the solution of advanced mechanical models of wind turbine structures and structural components. Engineers will be familiar with the interpretation of stress states in different materials and the consequences for structural safety and lifetime of wind turbines. The goal of the certificate is to recognize which combinations of models and numerical methods can be efficiently and trustworthily applied for special kinds of structural analyses. Also engineers will be familiar with the limitations of the models and numerical methods and they will overcome these limitations by writing their own partial programs for special tasks in their professional career.

Modules

- Mathematics
- Solid Mechanics
- Linear Computational Structural Mechanics
- Non-Linear Computational Structural Mechanics
- Strength Durability and Reliability

Profile

This certificate provides a knowledge of computational methods used for the static and dynamic analysis of wind energy converters and the surrounding wind and water flows. The goal is to enable engineers to apply existing commercial software packages of structural and fluid mechanics in a sophisticated manner as basis for reliable prognoses of the mechanical behavior of wind turbines and to improve the quality of numerical methods and to develop more realistic models of wind energy systems. These aspects are fundamental ingredients for the engineering optimization of wind turbines and their future innovative designs with a higher energy efficiency, life time, degree of capacity utilization and robustness with regard to extreme load cases.

Modules

- Theoretical Fluid Mechanics
- Computational Fluid Dynamic
- Linear Computational Structural Mechanics

Selection of one module from an offer of two modules:

- Rotor Aerodynamic
- Strength Durability and Reliability