

Wind Energy Planning and Applied Geoinformatics

Course overview

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Lecturer

- Prof. Dr. Bernd Möller
 - EEM, EUF
 - Course responsible
 - Geographical distribution of resources
 - Regional wind planning
 - Local aspects of wind farm planning
 - Resource economics
 - Applied GIS

Content

Learning outcomes

- Acquisition of knowledge about levels of onshore and offshore wind energy planning
- Gaining knowledge on location-specific aspects of wind energy suitability, infrastructural planning, approval planning and site management.
- The students gain practical skills of using geographical information systems for wind energy planning and project management.
- The students learn about how location relates to political, social, technical and legal aspects of wind energy planning and management.
- Students can assess suitability of regions and locations for wind energy projects.

Subjects covered

- Wind energy planning procedures and policy review
- Introduction to the use of GIS software for engineers and planners
- Geographical assessment of wind energy potentials
- Acquisition and application of geospatial data and information
- Identification of suitable areas and preliminary location analysis
- Spatial modelling of environmental aspects of wind energy
- Regional mapping of preferential sites
- National suitability mapping
- Marine spatial planning for offshore wind energy

Wind energy planning

- Planning: land use, restrictions etc.
- Legislation: feed-in, policies etc.
- Infrastructure: grid, roads
- Ownership and socio-economy
- International developments
- Onshore project development

Applied geo-informatics in wind power management (GIS)

- GIS fundamentals
- Geo-data and its sources
- GIS software (Q-GIS)
- Vector GIS
 - Search attributes and locations
 - Overlay analyses
- Raster GIS
 - Surface analyses (visibility etc)
 - Distance analyses (noise etc)
 - Multicriteria models (suitability etc)

Examination

- Course portfolio
 - Worked exercises: description, processes, screenshots
 - Synthesis of lab exercises
 - Evaluation criteria: completeness, correctness and competence in equal shares
 - Max. 15 pages
 - Submit January 31st, 2025 by email

Evaluation criteria

- Completeness
 - All exercises are included, all aspects of the exercises have been addressed
- Correctness
 - Absence of errors and faults in the text, the methods applied, and the results
 - Use of correct terminology
- Competence
 - Comprehension of the topic and the subjects
 - Ability to understand and reflect upon the results

Structure

- Sept. 23rd to Dec 16th
 - Wind Energy Planning and GIS (13 seminars)
 - Approx. 90 min lectures, 90 min exercises
 - Structured or semi-structured as lab
- Jan. 6th and 13th
 - Open workshops
 - Opportunities to present results and discuss portfolios
- Deadlines
 - Submission of portfolio Jan. 31st

Stud.IP

- Announcements
- Lecture notes
- Exercise data
- Literature
- Exchange and communication

<https://elearning.hs-flensburg.de/studip>

Software and data

- Primary GIS software used: QGIS 3.34
- Download: <https://www.qgis.org/download/>
- Please use Long Term Version, not the latest one! (Windows, Mac, Linux etc.)
- Please install English version
- Data sources will be announced during the course. Emphasis is on open, globally available data except where local data exists.

Literature (Planning and GIS)

- Books:
 - Boyle: Renewable Energy. Oxford 2004 or newer
 - Mathew: Wind Energy. Springer 2006.
 - Jarass, Obermair and Voigt: Windenergy (in German). Springer, 2009.
 - Ackermann (Ed.): Wind Power in Power Systems. Wiley, 2005, 2011
 - De Smith, Longley, Goodchild. Geospatial Analysis - A comprehensive guide. Online version on www.spatialanalysisonline.com
 - GIS for Renewable Energy. GIS Best Practices series, ESRI 2010.
 - Sunak, Höfer, Siddique, Madlener, De Doncker: A GIS-based Decision Support System for the Optimal Siting of Wind Farm Projects. E.ON Energy Research Center Series, Volume 7, Issue 2
- Reports:
 - Wind energy report Germany 2014. Fraunhofer Institute IWES, 2015
 - EWEA, European Wind Energy Association: various reports.
 - KPMG: Offshore Wind in Europe. 2010 Market Report.
- Web resources:
 - QGIS Manual, training etc: <https://www.qgis.org/resources/hub/>
- List is to be complemented during the course of the semester. Supplementary literature available on StudIP

Contact

- Course responsible
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