Wind Energy Education @ ForWind – Local and European Collaborations

NAWEA Symposium 2015, Virginia Tech, Blacksburg, VA
June 10, 2015
Agenda

1. Revisited: Continuing Education
2. European Wind Energy Master (EWEM)
CONTINUING EDUCATION FOR PROFESSIONALS IN WIND ENERGY
Recruitment Strategies of the Wind Energy Industry

• Hire graduates with degree in traditional science or engineering:
  • Mechanical / Civil / Electrical / Aerospace Engineering /…
  • Physics / Meteorology / …
  • … and train them on the job in wind specific applications.

• „Pioneer Mentality“ in Germany: „If we taught us everything all by ourselves then the new generations can do that as well.“

• Challenge: Experienced staff has to be recruited by headhunters.

• Problem: The resulting personnel carousel is not a sustainable HR management.

• Solution: Continuing higher education for professionals.
A 10 Years of Collaboration of Academia and the Wind Energy Industry -- Onshore and Offshore
The Concept: Bring together Experts from all Areas of Realisation of Wind Farms

- **Multi-disciplinary target group:**
  - scientists, engineers, project developers,
  - economists, managers, law, finance, insurance,…

- Offer systematic know-how about wind energy projects.

- Fill individual knowledge gaps.

- Develop interdisciplinary competences.

- Provide professional development for decision makers.

- Build network of experts.
Interdisciplinarity and System Knowledge

Understand and Master the Complexity of Modern Wind Farm Projects

- Science, Technology
- Law, Policy, Economy
- Planning, Development
- Financing, Insurance
- Manufacturing, Components
- Logistics, Construction
- Technical and Commercial Operation
- Maritime Technologies
Participants of the Offshore Program by Areas of Supply Chain

**Planning & Consenting**
- Public Affairs
- Investment Fund, Bank
- Engineering, Consulting
- O&M Manager

**WT Manufacturing**
- Project Development
- Development, Design
- Procurement
- Service Technician

**Offshore Substructure**
- Naval Officer Installation Vessel
- Quality Management
- Technical Design
- Law, Contracting

**Installation & Commissioning**
- Construction Site Management
- Ship Building
- Harbour Development
- Cable Manufacturing
- Substation Engineering

**Electrical System & Grid**
- Electrical Power Systems
- TSO

**Technical and Commercial Operation**
- Energy Supplier
- Sales
- Public Affairs
- Consulting
- Investment Fund, Bank

**Project Development**
- Technical Design
- Site Management

**Engineering, Consulting**
- Substation Engineering
- Electrical Power Systems
Structure and Organisation

- **Part-time study program for professionals**
  - duration: 11 months
  - university certificate on Master level (30 ECTS)
  - fee: 9200/9800 EUR

- **Mix of methods / „blended learning“:**
  - exclusive reading material (3-4 weeks reading period)
  - on-site seminars once a month
  - project work (wind farm development)
  - Field trips, workshops, …
  - online learning platform

- **Alumni network** with more than 220 alumni and 80 lecturers
Project work is learning by doing

Task: Wind Farm Development
• Interdisciplinary teams form virtual company
• Project meetings during on-site lectures
• Support through online-platform
• Project presentation is main part of final exam

Learning by going:
• Experience in project and team management
• Intensive training of communication and negotiation skills
Part 2

EUROPEAN WIND ENERGY MASTER (EWEM)
European Wind Energy Master (EWEM)

• 4 world-leading Wind Energy universities join forces
• 2 year program, 4 tracks, double degree
• Building on long-standing cooperation and local master programs
• Erasmus Mundus Scholarships for students
• Mobility funding for staff and students
• Associated partners: major industry, business & associations involved in guest lectures, summer schools, internships or MSc thesis
• Aim: 50-60 graduates per year (today around 40)
• Wind Energy: 90 ECTS + thesis (=100%)
Program Structure

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<tr>
<th></th>
<th>First year (60 ects)</th>
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<th>Second year (60 ects)</th>
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<tr>
<td></td>
<td>Semester 1</td>
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<td>Semester 2</td>
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<tr>
<td>Wind Physics</td>
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<td>Rotor Design</td>
<td>DU: general introduction to wind energy</td>
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<td>TU Delft</td>
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<td>Electric Power Systems</td>
<td>TU Delft</td>
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<td>Summer school</td>
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<td>Offshore Engineering</td>
<td>TU Delft</td>
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<td>NTNU</td>
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- DU = Delft University of Technology, DTU = Technical University Denmark, NTNU = Norwegian University of Science and Technology, UniOl = Carl von Ossietzky University of Oldenburg
- 1 ects = 28 hours of study according to the European Credit Transfer System
## Awarded Degrees

<table>
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<tr>
<th>Track</th>
<th>Degree 1</th>
<th>Degree 2</th>
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<tbody>
<tr>
<td>Wind Physics</td>
<td>MSc Wind Energy Engineering from DTU</td>
<td>MSc Engineering Physics from UniOl</td>
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<tr>
<td>Rotor Design</td>
<td>MSc Wind Energy Engineering from DTU</td>
<td>MSc Aerospace Engineering from TU Delft</td>
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<tr>
<td>Electric Power Systems</td>
<td>MSc Electrical Engineering from TU Delft</td>
<td>MSc Technology-Wind Energy from NTNU</td>
</tr>
<tr>
<td>Offshore Engineering</td>
<td>MSc Offshore Engineering and Dredging from TU Delft</td>
<td>MSc Technology-Wind Energy from NTNU</td>
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</table>
Required BSc Background

Wind Physics:
- Mechanical Engineering
- Aerospace Engineering
- Mathematics
- Physics

Rotor Design:
- Mechanical Engineering
- Aerospace Engineering
- Physics

Similar backgrounds accepted if proven relevant.
Required BSc Background

Electric Power
Systems Electrical Engineering
Physics

Offshore Engineering
Civil Engineering
Structural Engineering
Mechanical Engineering
Physics

Similar backgrounds accepted if proven relevant.
Associate Partners
Associate Partners

Opportunities for your engagement within EWEM:

• If you are not associated yet, try to change that.
• Host students for internships or master thesis.
• Host visiting scholars for teaching purposes.
• Use scholarship to travel to one of the four European universities for teaching purposes.
• Give guest lectures at the Summer School.
• Promote PhD and Post-Doc positions.
Some key issues for successful cooperation in joint programmes -- lessons learned from EWEM:

- Create added value for students: attractive universities and high quality of the program.
- Resources are (as usually) critical: professors, lecturers, staff, rooms,…
- Key issue: local programmes have to be existing – and they need to fit together without lots of new courses to be created.
- Collaboration builds on trust that has been developing over the years.
- Need to overcome local administrative and legal barriers:
  - Different semester calendars / module structure / different credit systems
  - Business model to divide tuition (Oldenburg: no additional costs??)
- Industry not ready yet to fund scholarships.
- Exchange with associated partners needs to be intensified.
Part 3

ONLINE CERTIFICATE „ADVANCED WIND ENERGY“ – DEVELOPMENT IN PROGRESS
Online-Certificate Advanced Wind Energy

**Bridge Module**
- Wind Energy Utilisation 3 ECTS
- Fluid Dynamics I 3 ECTS
- Computational Fluid Dynamics (CFDI) 3 ECTS

**Track I: Energy Meteorology**
- Energy Meteorology and Numerical Methods for Wind Energy 1 3 ECTS
- Energy Meteorology and Numerical Methods for Wind Energy 2 3 ECTS

**Track II: Wind Energy Systems**
- Design of Wind Energy Systems 3 ECTS
- Aeroelastic Simulations of Wind Turbines 3 ECTS

**Extension Module**
- Measurements and Validation for Advanced Wind Energy (Lab & Field Project) 8 ECTS

Σ 23 ECTS
# Master online Renewable Energy (MoRE)

90 CP inkl. Brückensemester + 30 CP Master Thesis

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<tr>
<th>Grundlagen Modul</th>
<th>Kernmodule</th>
<th>Fachmodule (Wahlpflicht) 21 out of 60</th>
<th>Labormodule</th>
<th>Projektarbeit</th>
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<tr>
<td>30</td>
<td>21</td>
<td>21 out of 60</td>
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### Grundlagen Modul (30)

- Introductory Module (0)
  - Introduction to Online Learning
  - Introduction to Scientific research and writing

### Kernmodule (21)

- En. Systems & Thermo-dynamics of RE Systems (3)
- ThD od RE Systems
- Modellbildung (3)
- Modellbildung
- Energy Resources & Systems (6)
  - Energy Meteorology I
  - Resources, Distribution & Systems
- Energy, Society & Ecology (9)
  - Renewable Energy & Society
  - Sustainability of RE Technology
- Energy Economics

### Fachmodule (Wahlpflicht) 21 out of 60

<table>
<thead>
<tr>
<th>Fachmodule 7 out of all (21 CP)</th>
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<tr>
<td>Solar Energy Meteorology</td>
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<td>PV Systems I</td>
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<td>PV Systems II</td>
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<td>Semiconductor I</td>
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<td>Biomass Energy / Resource</td>
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<td>Biomass Conv. Technologies</td>
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<td>Micro Hydro</td>
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<td>Rural Energy I</td>
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<td>Rural Energy II</td>
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<tr>
<td>Sol. Thermal Systems I</td>
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<td>Sol. Thermal Systems II</td>
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<tr>
<td>Wind Energy Meteorology I</td>
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<tr>
<td>Secondary Batteries (Basics)</td>
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<tr>
<td>Grid Integration and Charge Control</td>
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### Labormodule (6)

- Labormodul I (3)
  - Labs: RE components and Energy Transfer Mech. (3)
  - Introd. to Lab Work
- Labormodul II
  - Labs: RE Systems (3)
  - Datalogger

### Projektarbeit (6)

- Project Work (10)
  - Case Study (4)
  - Management (2)
  - Financing (2)
- Software (2)

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*rot: Lehrveranstaltungen ForWind,*

*blau: Next Energy*

*grün: IÖB*

- mandatory, on-site
- OI
- elective, online
- elective, free choice
Conclusion

Collaboration wanted!
Thank You! Questions?

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