COMMUNITY BUILDING AND CROSS-BORDER COLLABORATION THROUGH ONLINE COURSES IN WIND ENERGY

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• WAsP is the wind power industry-standard tool for wind resource assessment

• More than 4,000 WAsP users in 110 countries

• WAsP courses have been offered to the wind energy industry since 1991

WAsP course venues
Motivation for developing online WAsP courses

• More WAsP users from the industry can be reached

• Increased demand for knowledge about renewable energy at the universities (e.g. joint educational programs and courses)

• No travelling time or expenses associated with online courses

• No need to go through complicated visa applications procedures

• More time for exercises, reflection, and discussion online

• Flexible work schedule for teachers and participants
## Course format and content

- Existing course material has been re-organised for online teaching
- Student’s work load is 40 hours in total (24 hours for the physical WAsP course)
- Nine course modules are run over 9 weeks (3 days for the physical WAsP course)

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<th>Module 7 – Wind farm calculations</th>
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<td>7.1 What is a wind farm?</td>
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<td>3.2 Map coordinate systems</td>
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<th>Module 7 – Wind farm calculations</th>
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<td>7.2 Power and thrust curves</td>
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<td>7.3 Wake losses in a wind farm</td>
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<td>7.4 Wind farm calculations</td>
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</table>
Learning platform: itslearning
E-lessons

Course modules follow a fixed structure with 3-4 E-lessons per module

The E-lessons consist of:

- **Introduction**
- **Learning objectives**
- **Tasks**
Tasks – some examples

Tasks in E-lesson 4.2

• View the presentation Roughness classification.

• Complete Exercise 4.2 where you will make roughness roses for two locations.

• Go to the discussion forum of your group (4.2A Discussion forum or 4.2B Discussion forum) and post your answer to the questions:

  1) How far away from a 100-m mast or wind turbine does the surface roughness have an impact on the anemometer or the wind turbine?

  2) So how big should your roughness map be?
The five-stage scaffolding model

Stage 1 – Access and motivation

Main activities:
• Teachers welcome each individual participant
• Problems with access are solved
Stage 2 – Online socialisation

Main activities:

• Participants and teachers get introduced
• Photos and profile descriptions are uploaded
Stage 3 – Information exchange

Main activities:

• Information is shared about simple topics related to the course
• Participants gain confidence in communicating online
Stage 4 – Knowledge construction

Main activities:
• The contents of E-lessons are discussed, questions are answered
• The teacher moderates the discussion and writes concluding remarks

Encouraging comments
Introducing new topics or questions
Stage 5 – Development

Main activities:

- Participants perform a complete WAsP case study
- Participants discuss their results in smaller groups
- Final results are uploaded to a table and the teacher adds some concluding remarks

Teacher’s concluding remarks

Hi all of you! It has really been fine watching you solving the exercise and assisting each other.

Most of you have obtained reasonable results for the single turbines and the wind farm – i.e. when just using the terrain description we provided to you. A number of you then noticed that within not so far distance from the two islands considered (Sprogøe and Langeland) there are additional islands, the terrain and coastlines of which in real life would have to be included. If you do that you will get somewhat different results, especially the off-shore wind turbine will get a noticeably lower production estimate because the wind climate will be less dominated by the sea-surface.

With these concluding remarks I wish you all good luck in your future with WAsP!
Follow-up on student progress

Itslearning comes with functionalities for monitoring student progress.

It is important to set up *measurable* criteria for passing the course.

List of participants

Click on a name leads to a detailed progress report for each participant.

<table>
<thead>
<tr>
<th>Name</th>
<th>Progress status</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAsP Climate Analyst</td>
<td>91%</td>
</tr>
<tr>
<td>Exercise 2.3</td>
<td>Read</td>
</tr>
<tr>
<td>Exercise 2.3 data</td>
<td>Read</td>
</tr>
<tr>
<td>Exercise 2.3 solution</td>
<td>Read</td>
</tr>
<tr>
<td>Exercise 2.3 solution step-by-step</td>
<td>Read</td>
</tr>
<tr>
<td>Exercise 2.3 solution step-by-step (mp4)</td>
<td>Not read</td>
</tr>
<tr>
<td>2.3A Discussion forum</td>
<td>Number of threads: 0 Number of comments: 3</td>
</tr>
<tr>
<td>2.3B Discussion forum</td>
<td>Number of threads: 0 Number of comments: 0</td>
</tr>
<tr>
<td>Module Evaluation</td>
<td>Completed</td>
</tr>
</tbody>
</table>
Test course run in the spring of 2013

- 24 participants from the wind energy industry and partner universities
- 20 participants completed the course (83%)
Participant feedback – overall

"I want to say that all e-moderators and participants have been very active. It was easy to learn!!"

Course participant from Spain
Participant feedback - level of difficulty

How do you rate the overall level of the course?

- Very difficult
- Difficult
- Just right
- Easy
- Very easy

What is your level of experience with WAsP?

- >6 years
- 5-6 years
- 3-4 years
- 1-2 years
- <1 year
- No experience

“I was a beginner in this field and I really learned a lot during the course. I think the structure was really nice and the discussions improved a lot the understanding”.

Course participant from Sweden
Participant feedback – course duration and timing

How do you rate the course duration of 10 weeks?

- Too short
- Just right
- Too long

What is your affiliation?

- Other
- Academic
- Industry

“Sometimes it was hard to find the time to follow.”

Course participant from Italy
Learning points from test course runs

- The five-stage pedagogical model works – participants are not afraid to share information and communicate online.

- Interactivity (group discussions, group work) keeps participants motivated.

- Follow-up on participant’s progress is the key to achieving a high completion rate in this course.

- Most participants and teachers enjoy the flexibility of working any time and spending as much time as they like – it gives more time to reflect and participant questions are more ‘thought through’.
More about WAsP courses

See www.wasp.dk for further info
The next WAsP e-learning course: September 16 – November 18, 2013

More about Virtual Campus Hub

Paper ID: 815
Session: International Projects. The Internationalization of Universities
Session time: Monday, 1 of July from 15:00 to 16:30
Presentation starting time: 16:00
Room: Güell
Presentation type: ORAL
Title: VIRTUAL CAMPUS HUB: A SINGLE SIGN-ON SYSTEM FOR CROSS-BORDER COLLABORATION
View abstract
Authors: M. Badger; Technical University of Denmark (DENMARK), F. Vercoulen; Eindhoven University of Technology (NETHERLANDS), L. Monaco; Royal Institute of Technology (SWEDEN), L. Farinetti; Politecnico di Torino (ITALY)

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