Overview of Wind Energy Education Program -2017

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Wind Energy Education Program

Opportunity:

- Wind energy along with other renewable electric technologies is a rapidly growing, multi-billion dollar, global industry.

- The International Energy Agency, IEA, recently increased its five year projection for renewable electric capacity increase to a 43% global growth in; about 1 TW of new electric capacity – which is equal to the entire electric generation capacity of the US.

- TTU / NWI Wind Energy Education Program is one of only a few in the nation to support a US workforce of over 100,000.
Renewables hit by ‘lack of talent’

Too few professionals are moving into the industry, 
.....“this is crunch time for the renewables sector”.

- RE NEWS – March 24, 2017

News article outlining the 2017 - airswift & energyjobline
Global Energy Talent Index report - which surveyed over 16,000
professionals worldwide within the oil, gas, renewables, power,
nuclear and petrochemicals sectors.
NREL interview of U.S. wind energy companies

• In occupations such as engineering, of people interviewed 80% have either some or great difficulty finding applicants that meet their job requirements.

• The more specific the occupation is to wind energy the more difficult it is to find qualified applicants.

• If the occupation requires a higher-level degree, the more difficult it is to find qualified applicants.

• 25% of wind energy firms contacted searched outside the U.S.; Europeans have more hands-on experience and wind-specific degrees.

• Employers hiring candidates with graduate degrees are looking for wind-specific coursework that also offers experiential learning.
NWI Educational Program Elements

• Undergraduate Programs
  – Bachelor of Science in Wind Energy
    • In process for the degree to be offered on-line.
  – Minor in Wind Energy

• Graduate Programs
  – Graduate Certificate Programs
    • Advanced Technical Wind Energy (for engineers and scientists)
    • Advanced Managerial Wind Energy (for managers, business and legal professionals)

• Global Perspective
  – Global Component Requirement for the BSWE

• Reporting
  – The Chair reports to the Associate Vice Provost for Undergraduate Education
BSWE Majors
Program approved by the TTU Board of Regents, August 2011
Wind Energy Course Enrollments

- **Graduate**
- **UG**

<table>
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<th>Year</th>
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<th>UG</th>
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<td>Fall 2017</td>
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</table>
• Currently enrolled undergraduate majors.....188
• Wind Energy minors..... ~ 56
• Graduated ...113 students;
  – > 80% have jobs in the energy sector; 10% Grad. School
• Graduate Certificate Enrollments..... >100
• Graduate Certificate Competed:.....>57
• Sample of companies providing internships (often leading to jobs)
  – BP Wind
  – Nextera
  – Group NIRE
  – Tri Global
  – Siemens Wind
  – GE Wind
  – Wanzek
  – Blatner Energy
Group NIRE Partnership:

– Partnering with Group NIRE in the area of micro-grids and electric power grid resiliency e.g. “Islands of Power” model after disaster situations – NSF Pre-Proposals for Harvey and Irma recovery.

– SCADA and Black-out facility training

– DHS supported education program

– Internship opportunities
DNV GL Partnership:

– DNV GL is a leading international corporation for the energy value chain including renewables and energy efficiency and one of the top three certification bodies in the world

– Contract with DNV GL – Professionals from DNV-GL are providing tailored, state of the industry case studies and support materials for the Graduate Wind Energy Certificate program courses.
Nextera Partnership:

– Partnering with TTU and Sandia to provide interns for the SWiFT project (PI Swift, Co-PI Young and Westergaard)

– Evolving Partnership with NextEra; the largest utility owner of renewable power systems in the US.

– Send a team of recruiters several times a year to interview our students and support the job fair

– Providing SCADA data to support both the education and research programs
• BSWE On-Line Degree approved

• Received DOE Award for the Collegiate Wind Competition

• 12 Universities Invited for 2018

• TTU is the only Texas School

2016 DOE Competition team presenting business plan
• New Graduate Renewable Power Systems Class approved.
• New course on Syncro-phasors, Grid and Wind Project Monitoring (SCADA) systems, and Micro-Grids.
• New course on Electric Grid Resiliency, funded by DHS and in collaboration with group NIRE.
• New Pentalum LIDAR wind measuring equipment used for Sandia-SWiFT Wake Studies
• Curriculum development and licensing initiative to include a recently signed 2+2 agreement for wind energy transfer students with Western Texas College.

• Working with South Plains College and Texas State Technical College on an summer - accelerated certification program.

• Summer Camps for K-12 Students
  • Two STEM summer camps with a focus on wind power and renewable electric technologies – Run on the Wind (Middle School Students) and GenTECH (High School Students). Enrollment is about 20 students in each camp.
NWI Wind Energy Teaching Faculty

- 6 full time and 3 part time faculty
- Program Director; Andrew Swift, ScD, PE
- Graduate Program; Chris Pattison, PhD
- Faculty credentials: 5 PhD; 1 JD; 3 MS
- Teaching loads are 4 to 6 class sections per semester
• Faculty accomplishments include:
  – Research:
    • GLEAMM Micro-grid project
    • Wake Dynamics, Management and Control investigations to include the HAWKS – PIV imaging wind tunnel project and Lidar research at the SNL-SWiFT Facility
    • Wind Shear and LLJ studies using 200 m tower and Lidar data
    • Faculty, Graduate and Undergraduate students meet regularly, led by Dr. Westergaard and Suhas Pol, to discuss and present research findings.
Faculty accomplishments also include:

- Research:
  - GLEAMM Micro-grid project
  - Wake Dynamics, Management and Control investigations to include the HAWKS – PIV imaging wind tunnel project and Lidar research at the SNL-SWiFT Facility
  - Wind Shear and LLJ studies using 200 m tower and Lidar data
  - Faculty, Graduate and Undergraduate students meet regularly, led by Dr. Westergaard and Suhas Pol, to discuss and present research findings.
• Faculty accomplishments continued:
  – Conference presentations and publications,
    • e.g. the European 2016 wind to torque conference.
  – Several Textbooks published
    • *Wind Energy Essentials* by Walker and Swift
    • *The Essentials of Mathematical Analysis and Modeling* by A. Ruiz-Columbie
  – Wind Project Consulting
  – TTU Leadership Institute graduate
NWI Wind Energy Staff:

- Assistant Director of Student Services; Kacey Marshall
- Lead Academic Advisor; Maggie Gilchrest
  - Both advisors are members of NACADA; National Academic Advising Association
  - Ms. Marshall received the 2016 TTU-Matador distinguished staff award for her work
  - Ms. Gilchrest completed the President’s Leadership Institute Program.

- IT Specialist (half-time)
Wind Energy Educational Program – FY2017 Financials

– NWI Educational Programs (BSWE, Grad. Cert., WE Course Enrollments) generated a gross revenue in FY 2017 of......$2,207,036

– Expenses (salaries, M and O) ....$1,067,115
• **Summary of Successes**
  – Student placement in the renewable power sector
  – Educational Programs that generate gross revenue well in excess of expenses
  – Expect continued growth in the undergraduate programs as the new on-line degree is fully implemented.
  – Growth in outreach and engagement as we implement service learning classes, and additional “hands on” opportunities for the students.
• Barriers
  – Faculty growth, recruitment and retention
    • No career track opportunities due to a lack of faculty lines and/or joint appointments.
Vision:

*We will continue to set standards of excellence in the education of professionals and future leaders for the renewable power sector.*

Mission:

*Wind Energy is the premier multidisciplinary education program - developing transformational experts who apply knowledge, skills, and conviction to lead in the advancement of sustainable renewable power solutions with positive regional, national and global impact.*
Questions and Comments