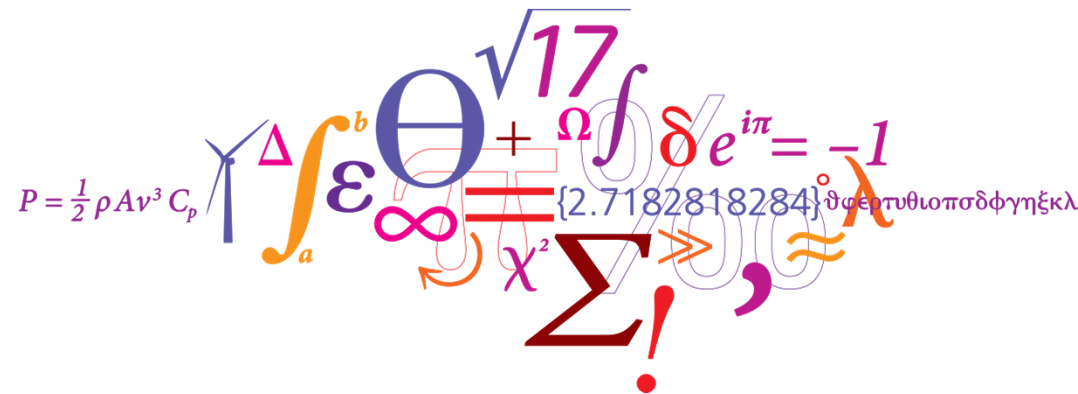


Wind Energy Training Overview

Wind Energy Education at DTU, Denmark

DTU Wind Energy

Tom Cronin and Niels-Erik Clausen



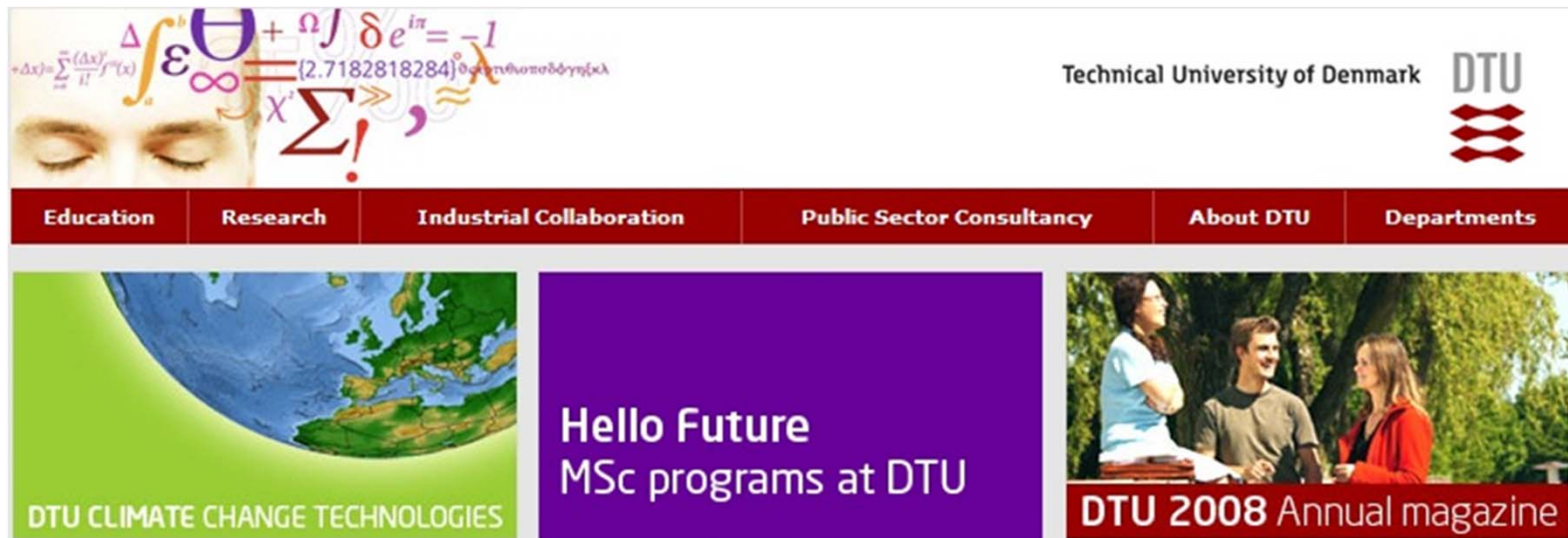
Technical University of Denmark (DTU)

People

- Around 5,000 employees
- 2,500 scientific staff
- Including 1,050 PhD students
- 10,600 students

Study programmes

- 15 bachelor (BSc)
- 28 masters (MSc)
- 10 bachelor (BEng)



The screenshot shows the DTU website homepage. At the top left, there is a banner with mathematical symbols and a person's face. The top right features the DTU logo and the text 'Technical University of Denmark'. Below this is a navigation bar with six red buttons: 'Education', 'Research', 'Industrial Collaboration', 'Public Sector Consultancy', 'About DTU', and 'Departments'. The main content area is divided into three sections: a green section for 'DTU CLIMATE CHANGE TECHNOLOGIES' with a globe image, a purple section for 'Hello Future MSc programs at DTU', and a red section for 'DTU 2008 Annual magazine' with a photo of three people.

Overview – Educational Activities

As a University Department, DTU Wind Energy offers many types of education with a relation to wind energy:

- Individual courses at B.Sc. level
- Masters-level M.Sc. programs
- PhD education and supervision
- Continuing education of professionals
- E-learning courses
- Future digital e-learning masters in wind energy (over 2 years)

Bachelor programme courses

- Introduction to wind energy
- Manufacturing of advanced fibre composites
- Wind turbine racer (course and competition)



MSc Programmes in Wind Energy at DTU

- **MSc in Wind Energy**
A DTU education, DTU Wind Energy in collaboration with DTU Electro
- **European Wind Energy Master (Erasmus Mundus)**
In collaboration with TUDelft, UniOldenburg, NTNU
- **Innovative Sustainable Energy Master (Nordic programme)**
In collaboration with KTH, Chalmers, Aalto and NTNU
- **MSc in Sustainable Energy**
A DTU education in collaboration with DTU Management Engineering with 5 specialisations – one is wind energy

MSc courses at DTU Wind Energy

Course Description	ECTS points
46100 Introduction to micro meteorology for Wind Energy	5
46200 Planning and development of wind farms	5
46211 Offshore wind energy	10
46230 Power system balancing with large scale wind power	5
46300 Wind Turbine Technology and Aerodynamics	10
46310 Projects in Wind Turbine Aeroelasticity	10
46320 Loads, Aerodynamics and Control of Wind Turbines	10
46400 Wind Turbine Measurement Technique	10
46411 Design of large composite structures	5
46415 Structural analysis and design optimisation of wind turbine blades	5
46420 Composite Materials and Fibres	5
46430 Experimental Materials Characterization	5
46440 Manufacturing of Advanced Fibre Composites	5
46500 Probabilistic methods in wind energy	5
46800 Research Immersion – wind energy	5

MSc in Wind Energy

2-year MSc programme

- 30-60 students per year
- Danish and foreign students
- All courses are given in English

1st Semester

- Wind turbine technology
- Aerodynamics & aeroelasticity
- Measurement techniques

MSc Thesis

- Often in collaboration with industry

2nd & 3rd Semesters

- Aerodynamics and fluid mechanics
- Structural mechanics
- Construction and materials
- Power electronics & grid connection
- Control and regulation
- Prognostics and optimization
- Wind resources & loads on wind turbines
- Projects in aeroelasticity
- Planning & development of wind farms



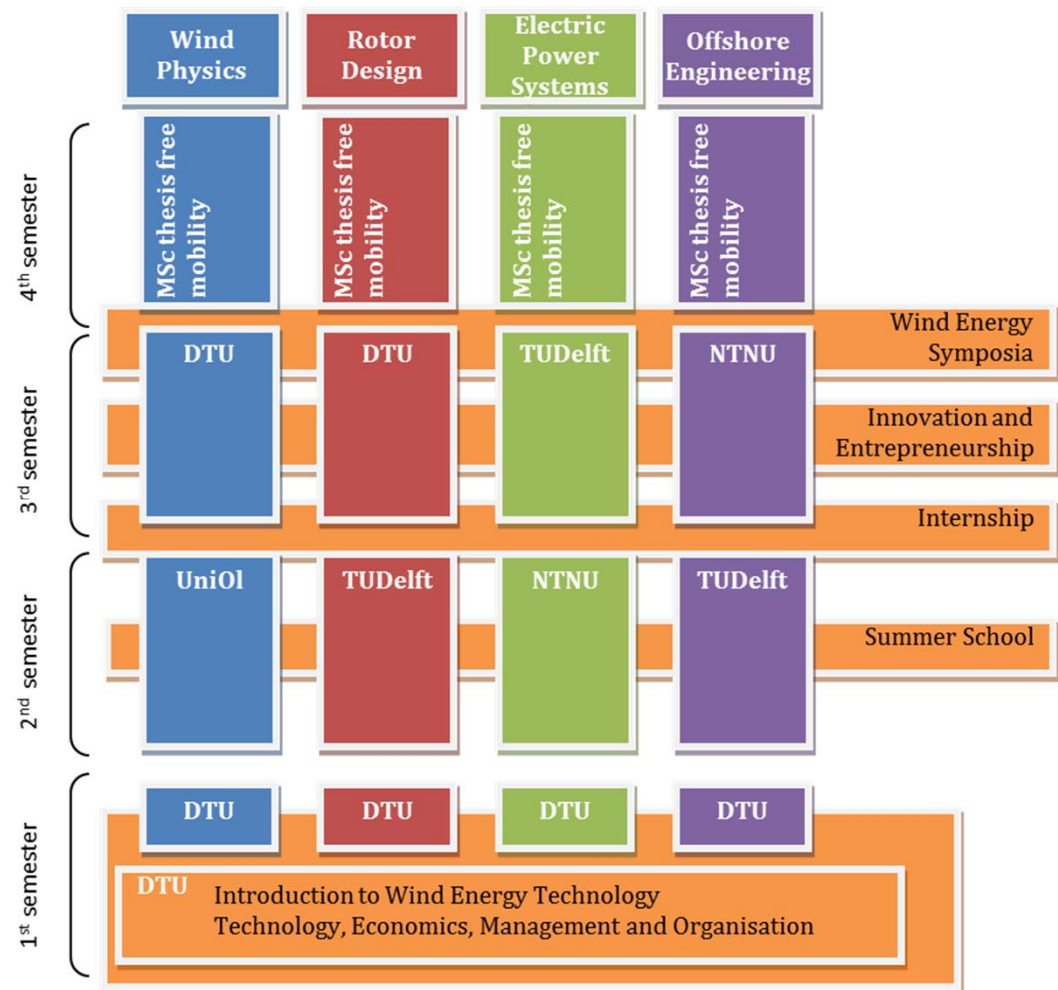
What do graduates of the DTU Wind Energy MSc do?

Some employment statistics from the last four years:

- 50 students graduate each year from DTU Wind Energy MSc
- Over 90% of students are from outside Denmark
- 60% find first employment in Denmark
- 40% in Danish private companies
- 35% in private companies outside Denmark
- 25% in academia

European Wind Energy Master

- Four tracks
- Double-degree programme
- Diplomas from two universities from:
 - TUDelft (Netherlands)
 - University of Oldenburg (Germany)
 - NTNU (Norway)
 - DTU (Denmark)
- Started 2012



MSc in Innovative Sustainable Energy Engineering

Joint Nordic Masters degree

- 2 years
- Conventional & renewable energy sources
- Energy utilisation
- Economical & environmental sustainability



Photo: Thinkstock.com

Participating universities

- Norwegian University of Science and Technology (NTNU)
- Aalto University in Finland
- Chalmers University of Technology (Sweden)
- KTH Royal Institute of Technology (Sweden)
- Technical University of Denmark (DTU)
- University of Iceland (UoI)



NORDIC FIVE TECH

MSc Sustainable Energy

Objective

The graduates will be able to combine detailed knowledge about an energy technology area with knowledge about the following:

- Design future energy systems with a high share of renewable energy sources
- Evaluation of energy technologies with regard to environment, economy, security of supply and system integration

Study lines

- Bio fuels
- Electrical energy systems
- Energy savings (in buildings)
- Hydrogen and fuel cells
- Thermal energy
- Wind Energy

Future Wind Energy E-learning Masters

Work load

- Total work load is one full year but runs over two years or longer
- Courses can be taken individually

Requirements for admission:

- B.Sc. degree or higher
- Minimum two years of relevant working experience

1st semester	2nd semester	3rd semester	4th semester
Wind Turbine Technology (5 ECTS)	Economics and Social Acceptance of Wind Turbines (5 ECTS)	Numerical Tools in Wind Energy (5 ECTS)	Final Project (15 ECTS)
Wind Resources (5 ECTS)	Aerodynamics and Aeroelasticity (5 ECTS)	Offshore Wind Energy (5 ECTS)	
Materials in Wind Energy (5 ECTS)	Integration and System Analysis of Wind Energy (5 ECTS)	Measurement Techniques in Wind Energy (5 ECTS)	

Wind Energy Training Overview

Wind Energy Education at DTU, Denmark

Some links

- [MSc Wind Energy](#) - seen by a student (DTU You Tube 2:56 min)
- [MSc Wind Energy](#) – curriculum and programme details
- [MSc Sustainable Energy](#) – course content and details
- [Innovative Sustainable Energy Engineering](#) – Joint Nordic Masters
- [DTU Homepage](#)