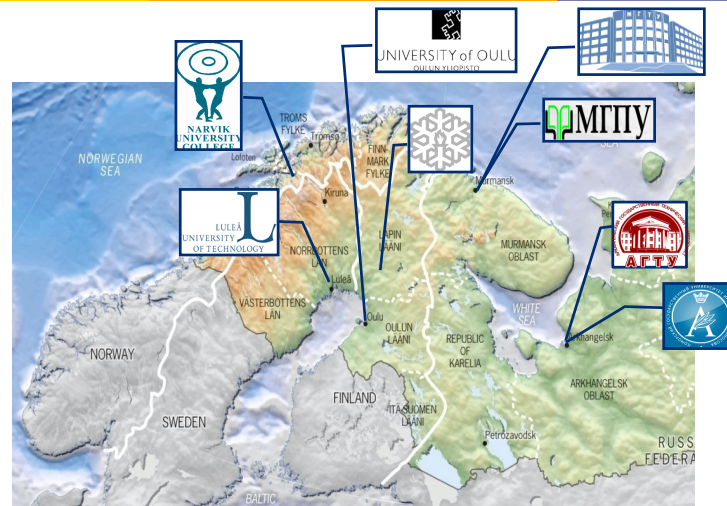


Barents Master's Programme in Environmental Engineering

Report for the vice-rectors meeting, 3.11.2009 Petrozavodsk



Barents Environmental Engineering (BEE)

- **Main responsibility:** University of Oulu, Faculty of Technology, Department of Process and Environmental Engineering (PYO)
 - Developed together with PYO and the Thule Institute (BCBU coordination)
- **Full partners**
 - University of Oulu, Finland
 - Archangelsk State Technical University, Russia
 - Murmansk State Technical University, Russia
 - Narvik University College, Norway
 - Not part of the BCBU agreement, but very active
- **Associate partners**
 - University of Lapland, Finland
 - Murmansk State Pedagogical University, Russia
 - Luleå University of Technology, Sweden
 - Status unclear, but ready to provide courses
- **Possible new partners**
 - Pomor State University, Archangelsk, Russia
 - Danish Technical University, Denmark
 - Arctic Technology Centre (ARTEK)



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Orientations in BEE

- University of Oulu (2009):
 - **Clean production**
 - **Water and environment**
- Narvik University College (2010)
 - **Sustainable energy**
- Archangelsk State Technical University (2010)
 - **Industrial ecology and rational use of natural resources**
 - **Environmental technology and management**
- Murmansk State Technical University (2009)
 - **Integrated use of water resources**
 - **Multi-purpose use of water resources; water and wastewater treatment technologies for industry and municipalities**
- Associate members, provide courses (earliest spring 2010)
 - Luleå Technical University
 - University of Lapland
 - Murmansk State Pedagogical University
 - Pomor State University, Archangelsk, Russia

Orientations launched Sept. 7th. 2009

Funding situation in 2009

- SYMO project (“Finnish-Russian joint degrees in BEE and CSW”)
 - SYMO 2 currently in progress, until 2010
 - Financier: Ministry of Foreign Affairs, Finland
 - Can be used only by Finnish staff, but the interest of Russian universities is key
 - Mainly for running the BCBU project, but also for course material development
- Ministry of Education (Finland)
 - Used for the of benefit Circumpolar Health, BEE and ICT programmes
 - Funding expiring in 2009
- University of Oulu’s funding
 - Allocated to the Faculties of Technology and Medicine
 - Funding used mainly for local coordination
- NordPlus funding of NUC
 - Only for the sustainable energy orientation
 - UOulu is partner, but funding only for Norway
- Potential funding
 - TEMPUS application, 2nd try, to be decided in November 2009
 - What else? It is clear now that we will need continued funding for joint courses

Selection criteria

- The BEE working group has formed a Joint Selection Committee
 - One each representatives of each participating the university's faculty administrative office, and an academic member

- Selection criteria
 - Educational background
 - Bachelor degree
 - Excellent or good grades in mathematical sciences
 - Sufficient "engineering" studies – thermodynamics, transfer phenomena, etc.
 - Good command of English language
 - Motivation letter
 - Relevance of the Barents
 - Recommendation letter

- Application period: Jan-Feb. 2009 through Funima (Finland University Admissions)
 - Screens for the validity of documents

- The Joint Selection Committee met on April 29th, 2009
 - However, decision of admittance is made at the Faculty of Technology of the University of Oulu

BEE Selection 2009

- FUNIMA summary:

Total number of entrances in the form	76
Total number of saved applications	51
Total number of submitted applications	42

- Application papers from FUNIMA arrived divided into two categories: 4 greens and 37 reds
 - The greens are technically acceptable, but not necessarily academically acceptable
 - Reds are technically inadequate – some of the required documents are missing
- The Joint Selection Committee (JSC) meeting on April 29th, 2009
 - All "green" applicants have been deemed acceptable to the programme.
 - Also evaluated 21 "red" applicants
 - In 8 cases when the technical inadequacy was minor, the JSC recommended their selection
 - In 3 cases the JSC recommended condition acceptance, further to their graduation this spring term
- The JSC had submitted a suggestion to the Faculty of Technology of the University of Oulu
 - to accept 8 applicants
 - further 7 to receive conditional acceptance further to finalizing their Bachelor degrees
 - the Faculty of Technology will not be in the future be issuing conditional acceptance
 - only those with university level bachelor degrees will be admitted
- It has been an unexpected albeit pleasant surprise that the Programme has attracted a wide number of international applicants from all through the world.
 - Of those accepted: 6 European, 6 Asian, 2 African, 1 South-American
 - 5 female, 10 male, average age: 27

Starting the programme

- 5 of 8 accepted have accepted their places
 - None of the conditionally accepted have submitted B.Sc. degrees
- None of the participants are from partner universities
 - 3 European (Finland, Greece, Italy), 1 Asian (Pakistan) and 1 South-American (Peru)
 - Background: 3 B.Sc. (mining, construction and electrical engineering), 1 M.Sc.(el.eng.), 1 PhD (Physics)
- This has invoked the BEE working group to have a fresh look at the Programme
 - Applicants from working life with different background are looking for a degree in environment
- Needed to make some adjustments to the programme
 - Due to the low number of students in the Programme (3 in CP and 2 in WE orientations) some final adjustments were made to the Programme
 - A “hybrid” theory module was introduced where all 5 students follow the same courses in the first semester, thus reducing resource input at the Department of Process and Environmental Engineering
 - In addition, most of the optionality of both orientations has been limited also in the second and third semesters as well.
- The first round also provided a large number of lessons
 - The application process will have to be started earlier
 - In this first round, some of the students have been delayed due to visa problems and were forced to start the Programme belated

“Hybrid” curriculum during 2009/2010

Orientation module (30 ECTS)		Advanced module (30 ECTS)			
- Introduction to the Environmental and Socio-economical Issues of the Barents Region (2) - Sustainable Development (3) - Introduction to the Environmental Legislative Systems of the Barents Region (5) - Industrial Ecology (5) - Research Methodology (5) - Water & Wastewater Treatment (7,5) - Chemical Processes in Water & Wastewater Engineering (5) - Research Methodology (5)		Compulsory - Environmental Issues in Barents Region (5) - Advanced practical training (3) - Process Design (5) - Hydrology and Hydraulics (5)	Elective (min. 2) - Adv Separation Processes (4) - Industrial and Domestic Waste Management (5) - Experimental Design (5)		
		Possible courses from BEE partner universities - Ice and snow, LTU (7,5) - Introduction to sustainable energy, NUC (3)			
Supplementary module (30 ECTS – Recommended min. 1 course from each)					
Module 1 Process engineering	Module 2 Environmental impact	Module 3 Environmental management	Module 4 Water and environment	Module 5 Elective	Master's thesis (30 ECTS)
- Air Pollution Control (5) - Advanced Proc. Design (5)	- Environmental impact assessment (5) - Field study in Russia (2) - Global change (5)	- Risk Managem. (3) - Resource economics (5) - Int'l Procure. & Logistics (5)	- Hydraulics for environmental engng (5) - Chemical Processes in Water & Wastewater Engineering (5)	- Courses from BEE partner universities	

Only in clean production orientation Only in water and environment orientation

Situation with the BEE courses 2009/2010

Curricula mainly based on PYO's existing courses with some BEE content:

- Starting seminar
 - The original idea of a joint “boot camp” of all BEE students, with representatives of all participating universities present could not happen
 - Programme has not started elsewhere, our students have not all arrived
- Introduction to the environmental and socio-economic issues of the Barents region
 - Was supposed to have been a joint course – did not happen
 - Same reason as above, was at the end a 3-day intensive event
- Introduction to the environmental legal systems of the Barents region
 - Has been executed from UOulu resources with contribution from NUC
 - No contribution from Russia, Russian legal system only shortly introduced
- Sustainable development
 - Plan to carry out from UOulu resources, but hope to get participants from Russia
- Environmental issues of the Barents region
 - Planned for May 2010

Plans for the Sustainable Energy orientation

- Goal is to build a joint degree with Narvik University College
 - During the first year, all students would be at UOulu
 - with Narvik contributing a 10 ECTS intro course
 - 3rd semester in Narvik
 - Diploma work project at home university
- Plenty of challenges
 - Agreement yet to be signed with NUC
 - Faculty of Technology is yet to accepted the orientation to be opened at UOulu
- UOulu will not open this orientation through international call
 - Only as an elective orientation to our own students finalizing their Bachelor studies
 - Reason: too many uncertainties
- Main concern: courses have been developed independently at the two universities
 - Will they be compatible, will there be unnecessary overlap?

Sustainable Energy curriculum (preliminary)

Orientation module - UOulu (30 ECTS)	Avanced module (30 ECTS)
<ul style="list-style-type: none"> - Introduction to the Environmental and Socio-economical Issues of the Barents Region - Sustainable Development - Introduction to the Environmental Legislative Systems of the Barents Region - Industrial Ecology - Research Methodology - Water & Wastewater Treatment - Chemical Processes in Water & Wastewater Engineering 	<ul style="list-style-type: none"> -Environmental Issues in Barents Region -Advanced practical training (compulsory in UOulu) -Experimental Design -Process design -Industrial and Domestic Waste Management Introduction to sustainable energy (NUC) -<i>Global energy policy</i> -<i>Resources for sustainable energy</i> -<i>Energy management in housing, industry and transport</i>
Supplementary module (30 ECTS) - NUC	Diploma work project (30 ECTS)
<ul style="list-style-type: none"> -Renewable energy -<i>Hydrogen, wind, solar, bioenergy, waste-to-energy</i> -Energy & environment -<i>Global environmental situation, future scenarios, cold climate challenges, CO₂ neutral transport</i> -Energy systems in buildings and industry -<i>Insulation, windows, heat recovery, energy efficiency,...</i> -Project work 	Diploma work project

- Courses in Italics are to be provided by NUC, ~50% of them are available

Summary of experiences in UOulu

- BEE start successful in UOulu, although not without problems
- Positive issues, but providing new challenges:
 - Students from all through the world interested in the programme
 - Raises the question: should BEE be only for Barents students?
 - More mature students with higher degrees from other fields interested in taking BEE as a second degree
 - Might not have an ideal background, but are very mature and motivated
 - Student group very heterogeneous
- Negative issues that need to be fixed
 - No students from BEE partner universities
 - Better advertisement, we all need to advertise BEE to our own students
 - Students from exotic countries had delays due to visa problems
 - Student selection needs to be done earlier
- Student selection process has been too demanding
 - Will need to specify entrance criteria better
 - Stronger requirement set by the Faculty of Technology
- The best of all are the 5 students, who formed a strong group supporting each other
 - Very committed, great expectation of them graduating in 2 years

Challenges for BEE in UOulu

- 2009/2010 a very intense time for UOulu
 - The Finnish university system is changing: more independence but financial responsibility
 - UOulu is to be an international level science university
 - This means strong commitment towards internationalization
 - However, in 2010 our budget is going to be lower
 - This is the last year for finalizing the old-fashioned 5 year Masters degrees
 - E.g in PYO; 200 (?) degrees need to be finalized by June 2010
 - In the same time increasing workload to bridge polytechnic level B.Sc. degrees to start M.Sc.
- The role of the Thule Institute has been crucial in maintaining the BCBU network
 - Thule's role in education in the new university is yet unclear
 - May need to shift from a coordination unit to a research institute
- The awakening of PYO staff to recognizing BEE as their own has been slow
 - Even though strong support from leadership and key professors
 - BEE has not been in the forefront when scarce resources need to be allocated
 - However, international programmes such as BEE are going to be crucial for survival
- Need more collaboration with Russian universities in BEE
 - Participation of Russian teachers in joint courses
 - Need possible exchange courses or field study places in Russia to our BEE students



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