

SOME ASPECTS CONCERNING THE ORGANIZATION OF TRAINING PROCESS FOR THE SPECIALTY "ENGINEERING OF RENEWABLE ENERGY CONVERSION SYSTEMS"

V. Dulgheru, Dr.Sc.PhD
Technical University of Moldova

INTRODUCTION

*"There are two global problems of humanity, energy and education.
Energy is the basis of material existence, and education - to the social.
They must be addressed. The rest is speculation, business"*

(Tetsuo Yoshida, President "Parchitec Inc. Energy & Solution Developer").

Solving global problems of mankind - the energy crisis, linked to the natural resource depletion of fossil fuels and serious compromise of the environment (primarily by the energy complex), falls on the shoulders of engineers, first of all.

The recent nuclear disaster at Fukushima nuclear power plant in Japan has demonstrated once again the urgent need to shift to renewable energy sources, which are non-pollutant, inexhaustible and have become economically advantageous.

One solution to these problems is the orientation of the education system to solve these problems. In this context, the specialty "Engineering of Renewable Energy Conversion Systems" was launched at the *Department of Mechanisms Theory and Machine Parts*, Technical University of Moldova, as the second cycle studies (Master's Degree) according to the Bologna Process. The following has served as logistic support for opening this important specialty:

- Experience of the Department staff in developing wind, hydro and solar energy conversion systems (about 20 years);

- Setting up the Centre for Renewable Energy Conversion Systems Development by the Senate decision of 2006;

- Emergence of increasingly obvious need for alternative energy sources, particularly for dispersed consumers, like households of farmers that have emerged in the Republic of Moldova.

Our colleagues at the University Transylvania Brasov, in particular Prof. Ion Visa, Rector of the university, have assisted us and contributed very much to launch this new specialty and develop the curriculum.

The route offers a set of courses of advanced knowledge in the field of conception, design, prototyping and development of the systems based on renewable energies:

Fundamental Subjects:

- *Modeling and Simulation of Mechanical Systems;*

- *Methodology of Research and Technical Creativity;*

- *Project Management;*

- *Tensor analysis / matrix;*

- *Advanced materials in the construction of machines.*

Specialized courses:

- *Numerical Simulation of Fluid Flow;*

- *Hydraulic Energy Conversion Systems;*

- *Wind Energy Conversion Systems;*

- *Solar Energy Conversion Systems.*

These disciplines are very important for future specialists in the field of RES.

An important role for the assertion of this specialty is to provide academic support for the taught subjects and set up the study laboratories. To ensure the academic support of taught courses at the second cycle (Master's Degree) two handbooks [1,2] were published at the Department, on which basis four special courses were developed: *Hydraulic Energy Conversion Systems; Wind Energy Conversion Systems; Solar Energy Conversion Systems and Numerical Simulation of Fluid Flow.*

An important role for proper training of future specialists in renewable energy conversion systems belongs to specialized practical training. During this practical training the students get acquainted with the latest achievements in the field of renewable energy conversion systems (wind, solar and hydro), with advanced laboratory equipment for laboratory testing of such systems. In this context our colleagues at the University of Braşov helped us essentially. Thanks to Prof. Ion Visa our students had the opportunity to become acquainted with study and research laboratories endowed with very modern equipment, with the considerable achievements in the field of conversion systems, particularly solar and wind energy conversion systems. Another important element in terms of the above mentioned specialty perpetuation in time is promoting it. The disadvantage of our department is that we are not



UNIVERSITATEA TEHNICĂ A MOLDOVEI
Catedra „Teoria Mecanismelor și Organe de Mașini“



CECER

Ingineria Sistemelor de Conversie a Energiilor Regenerabile



Vizează dublă competență

Master specializat,

Ciclul 2



Condiții de admitere: studii superioare; acumularea a 30 de credite transferabile

Durata studiilor: 1,5 ani structurată pe 3 semestre

Petrecerea practicii de teză de masterat: Centrul de Dezvoltare Durabilă,
 Universitatea Transilvania din Brașov, România

Discipline generale

- Modelarea și Simularea Sistemelor Mecanice
- Metodologia Cercetării Științifice și Creativității Tehnice
- Managementul Proiectelor
- Analiza Tensorială/ Matriceală

Discipline de specialitate

- Simularea numerică a curgerii fluidelor
- Sisteme de conversie a energiei hidraulice
- Sisteme de Conversie a Energiei Eoliene
- Sisteme de Conversie a Energiei Solare

Acumularea a 30 de credite transferabile de compensare a studiilor la disciplinele:

- Matematică superioară - 5 credite
- Mecanica Teoretică - 4 credite
- Rezistența Materialelor - 4 credite
- Teoria Mecanismelor și Mașinilor - 5 credite
- Bazele Proiectării Mașinilor - 6 credite
- Desen Tehnic, Modelarea 2D,3D - 3 credite
- Creativitate tehnică - 3 credite

Support didactic la disciplinele predate:

- Sisteme de conversie a energiilor regenerabile: solară, hidraulică, eoliană. Ed. TehnicaInfo, Chișinău, 2007, 592 p.
- Calculul tensorial pentru ingineri. Ed. TehnicaInfo, Chișinău, 2006, 404 p.
- Manual de Creativitate. Ed. TehnicaInfo, Chișinău, 2000, 404 p.

Cadre didactice la disciplinele de specialitate:

1 academician, 2 dr.hab.prof.univ., 4 dr.conf.univ.

Instruirea masteranzilor se va efectua în:

“Centrul de elaborare a Sistemelor de Conversie a Energiilor Regenerabile”(CECER) dotat cu tehnică computerizată și aparatură de măsurări și prelucrare a datelor;
 Laboratorul de Tehnologii bazate pe Materiale Compozite din cadrul Centrului;
 Centrul de Modelare și Simulare a Sistemelor Mecanice dotat cu tehnică computerizată

Informții de contact:

Bul. Ștefan cel Mare 168, Chișinău, 2004 MD. Tel. 509939, e-mail: dulgheru@mail.utm.md

Figure 1. Information leaflet.



specialized department and we do not have students, from which we can select candidates for the specialty. For this purpose an information leaflet has been developed (see fig. 1), which is displayed in various higher education institutions in the Republic. This allowed us to have, as students, graduates from different higher education institutions.

References:

1. **Bostan I., Dulgheru V., Bostan V., Ciupercă R.** *Anthology of Inventions, vol. 3. Systems for Renewable Energies Conversion (in Romanian).* Ed.: BonsOffices SRL, 2009, 458pp.
2. **Bostan I., Dulgheru V., Sobor Ion, Bostan V., Sochirean A.** *Systems for Renewable Energies Conversion: eolian, solar and hydraulic,* Ed.: BonsOffices SRL, 2007, 592pp.