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## **Curricula for courses developed during realisation of URESA project.**

### **Introduction**

Technology is changing on a daily basis and the use of technology for educational purposes is quickly becoming a necessity for proper instruction. E-learning or Internet based instruction is gaining popularity because of the need for additional training to compete in the job market.

With the popularity of e-learning and computer-aided training, the need for curriculum designed specifically for the electronic environment increases.

Although the popularity of e-learning is increasing, many curriculum developers are using the same models to create e-learning instruction as they use to design and develop face-to-face teacher/learner instruction.

This document is dedicated to provide clear plan of teaching/learning activities predicted to be executed during realisation and exploitation of the URESA project. The curricula are developed to give educators a map or guideline for use in their field.

### **Specificity of e-learning**

E-learning is more popular today than it ever has been, partly because of the increase of the non-traditional type of student. The idea of regularly scheduled classes attended at the community college or local university is not a feasible or desirable alternative for the non-traditional students. Social aspects of the learner, self-motivational skills, and the learner's confidence with technology will all affect the level to which a student will prosper in the e-learning environment.

The non-traditional e-learning student does not have a daily classroom instructor to motivate and encourage him or her through difficult periods of a class. In a traditional classroom, a good instructor can sense when his or her students are becoming uninvolved or disinterested in the subject matter and can change gears by approaching the subject from a different angle. A different approach to the subject can sometimes renew the interest of a student or the class, however in Web-based learning, this indifferent attitude is hard to appraise and even harder to counter because of the lack of on-site instructors.

When one communicates electronically the medium must be compatible to users in order for the communication process to be complete. There have been four interactive relationships associated with e-learning in a distance-learning environment: interaction between learner and content, interaction between learner and instructor, interaction between learner and learner and interaction between learner and a technological medium or interface interaction. Since all of these interactions are based on the comfort levels of the learner with the medium, the learner-interface interaction is of vital importance in the distance learner environment. This interaction is less important or not present in traditional classroom instruction. Interaction between the learner and the interface is crucial in an e-learning environment.

## **Modules curricula**

During realisation of the project URESA there will be elaborated 7 training modules providing comprehensive information about renewable energy sources and their use in agriculture.

The document consists of curricula for following courses:

Module 0 – Introduction

Module 1 – Biomass

Module 2 – Solar Energy

Module 3 – Wind Energy

Module 4 – Geothermal Energy

Module 5 – Water Energy

Module 6 – Agro Biogas Plants

### **Module 0 – Introduction**

Energy – what is it?

- general definition
- kinds of energy
- sources of energy
- split of energy sources according to renewability
- split of energy sources according to position in the conversion chain
- split of energy sources according to extent of use

What are renewable energy sources?

- main features of renewable energy sources
- main kinds of renewable energy sources
- areas of use of renewable energy sources

Why are renewable energy sources important?

- general meaning of renewable energy sources for human and environment
- meaning of renewable energy sources for agriculture and its sustainability

Are renewable energy sources economically profitable?

- economy of renewable energy sources in agriculture

Practical application of renewable energy sources in agriculture: electricity, gas, heat, coolness.

**Intended learning outcomes.** The course participant achieves ability of: defining what the renewable energy is, indicating benefits of using RES in farms, describing environmental benefits, explaining

basic information on electricity and electricity-related techniques, classifying energy types, production and distribution methods, applying obtained information about energy, basics of energy production and use in field of own needs and demands, autonomously analysing and evaluating usefulness of energy types and RES to own needs.

## **Module 1 – Biomass**

What is biomass?

- definitions
- basic terms, measures, values
- types of biomass

Principles of biomass gain and use

- description how the biomass works,
- sources of biomass

Methods of production in agriculture

- possibilities of use in agriculture

The processes of energy production from biomass

- incineration
- pyrolysis
- gasification
- synthetic fuels
- fermentation
- anaerobic digestion

Generation the various types of energy from biomass in agriculture

- electricity
- heat

Advantages and disadvantages of biomass

- impact on environment
- economy of biomass use in agriculture
- farmer as energy producer

Waste management in context of biomass production

Case studies showing on practical example how to use biomass

- information about latest, state of the art technologies and their use and application in biomass production

**Intended learning outcomes.** The course participant achieves ability of: defining what biomass is, describing ways of operation, explaining implementation methods, listing benefits of the biomass

use, defining technical requirements for the use of biomass, classifying waste management, choosing appropriate methods of biomass production, applying tools and materials in the field of biomass production and utilization, using the waste management, scheduling the plan of implementation the proper use of biomass in their own farm, calculating profits and risks, autonomously analysing and rating risk level and threats regarding the biomass utilization, independently assessing profits brought by use of biomass and undertaking appropriate measures to obtain them.

## **Module 2 – Solar Energy**

What is solar energy?

- definitions
- basic terms, measures, values

Principles of solar energy gain and use

- description how the solar energy works

Generation the various types of energy from solar energy in agriculture

- electricity
- heat

Methods of production in agriculture

- possibilities of use in agriculture

Advantages and disadvantages of solar energy

- impact on environment
- economy of solar energy use in agriculture
- farmer as energy producer

Case studies showing on practical example how to use solar energy

- information about latest, state of the art technologies and their use and application in solar energy production

**Intended learning outcomes.** The course participant achieves ability of: defining what solar energy is, describing ways of operation, explaining implementation methods, listing benefits of solar energy use, defining technical requirements for the use of solar energy, choosing appropriate methods of solar energy production, applying tools and materials in the field of solar energy production and utilization, scheduling the plan of implementation the proper use of solar energy in their own farm, calculating profits and risks, autonomously analysing and rating risk level and threats regarding the solar energy utilization, independently assessing profits brought by use of solar energy and undertaking appropriate measures to obtain them.

### **Module 3 – Wind Energy**

What is wind energy?

- definitions
- basic terms, measures, values

Principles of wind energy gain and use

- description how the wind energy works
- classification of wind turbines

Generation energy from wind in agriculture

- how to build a wind farm

Methods of production in agriculture

- possibilities of use in agriculture

Advantages and disadvantages of wind energy

- impact on environment
- economy of wind energy use in agriculture
- farmer as energy producer

Case studies showing on practical example how to use a wind energy

- information about latest, state of the art technologies and their use and application in wind energy production

**Intended learning outcomes.** The course participant achieves ability of: defining what wind energy is, describing ways of operation, explaining implementation methods, listing benefits of wind energy use, defining technical requirements for the use of wind energy, choosing appropriate methods of wind energy production, applying tools and materials in the field of wind energy production and utilization, scheduling the plan of implementation the proper use of wind energy in their own farm, calculating profits and risks, autonomously analysing and rating risk level and threats regarding the wind energy utilization, independently assessing profits brought by use of wind energy and undertaking appropriate measures to obtain them.

### **Module 4 – Geothermal Energy**

What is geothermal energy?

- definitions
- basic terms, measures, values

Principles of geothermal energy gain and use

- description how the geothermal energy works

Generation energy from geothermal sources in agriculture

- heating and heat pump
- electricity generation from geothermal energy

Methods of production in agriculture

- possibilities of use in agriculture

Advantages and disadvantages of geothermal energy

- impact on environment
- economy of geothermal energy use in agriculture
- farmer as energy producer

Case studies showing on practical example how to use a geothermal energy

- information about latest, state of the art technologies and their use and application in geothermal energy production

**Intended learning outcomes.** The course participant achieves ability of: defining what geothermal energy is, describing ways of operation, explaining implementation methods, listing benefits of geothermal energy use, defining technical requirements for the use of geothermal energy, choosing appropriate methods of geothermal energy production, applying tools and materials in the field of geothermal energy production and utilization, scheduling the plan of implementation the proper use of geothermal energy in their own farm, calculating profits and risks, autonomously analysing and rating risk level and threats regarding the geothermal energy utilization, independently assessing profits brought by use of geothermal energy and undertaking appropriate measures to obtain them.

## **Module 5 – Water Energy**

What is water energy?

- definitions
- basic terms, measures, values

Principles of water energy gain and use

- description how the water energy works
- classification of water turbines and power plants

Generation energy from water in agriculture

- electricity generation from water energy

Methods of production in agriculture

- possibilities of use in agriculture

Advantages and disadvantages of water energy

- impact on environment
- economy of water energy use in agriculture

- farmer as energy producer
- small water power plants and possibilities for their construction

Case studies showing on practical example how to use a geothermal energy

- information about latest, state of the art technologies and their use and application in geothermal energy production

**Intended learning outcomes.** The course participant achieves ability of: defining what hydro energy is, describing ways of operation, explaining implementation methods, listing benefits of hydro energy use, defining technical requirements for the use of hydro energy, choosing appropriate methods of hydro energy production, applying tools and materials in the field of hydro energy production and utilization, scheduling the plan of implementation the proper use of hydro energy in their own farm, calculating profits and risks, autonomously analysing and rate risk level and threats regarding the hydro energy utilization, independently assessing profits brought by use of hydro energy and undertaking appropriate measures to obtain them.

## **Module 6 – Agro Biogas Plants**

What is agro biogas energy?

- definitions
- basic terms, measures, values

Principles of agro biogas energy gain and use

- description how the agro biogas plant works
- elements of agro biogas plant
- where does the gas come from, anaerobic digestion, conditions and factors affecting the agricultural biogas production
- classification of substrates for agro biogas production

Generation energy from agro biogas in agriculture

- heat generation from agro biogas plant
- electricity generation from agro biogas plant
- coolness generation from agro biogas plant

Methods of production in agriculture

- possibilities of use in agriculture

Advantages and disadvantages of agro biogas plant and energy

- impact on environment
- economy of agro biogas plant and energy use in agriculture
- farmer as energy producer
- small agro biogas plant and possibilities for its construction

Waste management in context of agro biogas plant and energy production

Case studies showing on practical example how to use agro biogas plant and energy

- information about latest, state of the art technologies and their use and application in agro biogas plant and energy production

**Intended learning outcomes.** The course participant achieves ability of: defining what agro biogas plant and agro biogas energy is, describing ways of operation, explaining implementation methods, listing benefits of agro biogas energy use, defining technical requirements for the use of agro biogas plant, choosing appropriate methods of agro biogas plant energy production, applying tools and materials in the field of agro biogas plant energy production and utilization, scheduling the plan of implementation the proper use of agro biogas plant energy in their own farm, calculating profits and risks, autonomously analysing and rating risk level and threats regarding the agro biogas plant energy utilization, independently assessing profits brought by use of agro biogas plant energy and undertaking appropriate measures to obtain them.

Each of the courses listed above finishes with the exam containing 10 multiple choice questions to evaluate knowledge, skills and competencies obtained by the participant. To achieve the passing mark, the trainee must achieve at least 60% of proper answers.