

# DIGIT-Bio-TECH

2019-1-BG01-KA203-062371

M.Sc. PROGRAMME “GREEN BIOTECHNOLOGY AND ICT”

## SYLLABUS

### COURSE:

GREEN ICT & ENERGY: FROM SMART TO WISE STRATEGIES

### AUTHORS:

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Academic work		Type	Number of classes
In-class work	Lectures		30
	Seminars		20
<b>Total in-class work</b>			<b>50</b>
Out-of-class work	Presentations		25
	Projects		20
	Self-guided library/database work		30
<b>Total out-of-class work</b>			<b>75*</b>
<b>Total of academic work</b>			<b>125</b>
<b>ECTS credits in-class work</b>			<b>2.0</b>
<b>ECTS credits out-of-class work</b>			<b>3.0</b>
<b>Total ECTS credits</b>			<b>5.0</b>
№	Grading		% of the grade
1.	Workshops/discussions of reports and papers		20 %
2.	Case studies		20 %
3.	Homework assignments and tests		10 %
4.	Exams		50 %

\* One credit corresponds to 25 hours of work.

### **Outline of the course**

This LO presents educational content about the main characteristics of green energy and the valuable alternative opportunities it presents to conventional ones. Information is delivered on how to classify the main green energy types and sources. The approaches for green energy provisioning for ICT are discussed. The definitions of ‘green ICT’ and ‘going green in ICT’ are explained and discussed in a comparative manner. Special emphasis is given to the importance of being ‘green’. Green ICT benefits are discussed as well, as the approaches to ‘green ICT’. The ICT’s contribution to the reduction of energy consumption and gas emissions is revealed. The practical implementation of the Green IT and Green Information Systems are clarified through the relevant value models. Data about the main green technologies are given: Cloud computing, Computer power management, Datacenter design, IT virtualization, material recycling, e-waste, etc. Finally, the educational material explains the future ICT trends in the two main ICT segments - Telecom infrastructure and the Mobile devices/terminals in terms of shifting from improving existing systems to providing new solutions.

The LO overviews the important role ICT plays in environment protection and fighting climate change. The global green ICT trends, their sub-trends current dynamics, and directions are explained. The development of the approaches for local conservation, corporate social responsibility for pollution control, and the need for transformative change and sustainability is presented. The tendencies in green ICT policies at the global scale are also revealed. Information about the concepts of ‘greening of ICT’ and ‘greening with ICT’ is given as well. The role of the international stakeholders as key players in the greening with ICT area is discussed. Green informatics contribution to environmental sustainability is outlined with emphasis on reduction of energy consumption and carbon footprint along with production and use; diffusion of information, education, and training to raise environmental awareness; environmental projects and networks promotion through communication; and sustainable environmental governance. The educational content is focused as well on the ICT and the Economy-Defining Technologies, the green ICT and education, and the green ICT impact at the governmental level.

### **Educational goals**

Informatics can contribute to solving environmental issues by implementing IT solutions. This can be done by reducing energy consumption, rising environmental awareness, offering efficient communication on environmental issues, and facilitating environmental monitoring and surveillance systems, as a tool to protect and restore natural ecosystems’ potential. EU has been enacting as well legal framework and enforcing policy recommendations toward easing and overcoming the environmental constraints associated with ICT usage.

In this way, the educational goals of this LO are to present knowledge about:

- Explaining green energy – types and resources.
- Energy Consumption in ICT Sector.
- Revealing options for reduction of energy consumption and gas emission.
- Rising awareness about the future ICT trends: from green to wise.

Nowadays, ICT plays an important role in environmental protection and fighting climate change. EU has been enacting as well legal framework and enforcing policy recommendations toward easing and overcoming the environmental constraints associated with ICT usage.

In this way, the educational goals of this LO are also to present knowledge about:

- The global trends in green ICT development.
- The world directions in green ICT policies.
- The green informatics contribution to green energy.
- The advanced cooperation for green ICT solutions.

### **Expected outcomes**

#### **Knowledge and Skills:**

As a result of the training students will be able to:

- explain what green energy is
- distinguish between the variety of green energy types and sources
- know the major trends in energy consumption in ICT sector
- comprehend the fundamentals of green energy provisioning for ICT
- define the green ICT and going green in ICT
- understand the importance of being 'green'
- realize the benefits of going green
- explain the contribution of ICT to reduce energy consumption and gas emissions
- give examples of the different ways of greening ICT
- understand and discuss the future ICT trends
- understand the global green ICT trends, their current dynamics and directions
- know the main characteristics of the local conservation approach, the corporate social responsibility for pollution control, and the need for transformative change and sustainability
- outline the green ICT related policy trends at the EU and global level
- distinguish between greening of ICT and greening with ICT
- know the alternative approaches to greening with ICT
- explain green informatics contribution to the environment and environmental sustainability, with special emphasis on sustainable environmental governance
- recognize the 'ICT for sustainable growth' main policy areas
- make the relation between ICT and the economy-defining technologies
- discuss green ICT impact at the governmental level.

**Problem-solving skills:** Decision making, creative thinking, analytical, research and interpreting skills

**Digital competencies and skills:** strategic web and database searching; data analysis and presentation; data management and preservation; digital communication; networks and file management.

**Personal skills:** initiative and independence, time management, good oral and written communication skills, teamwork.

## *Syllabus*

<b>№</b>	<b>Topic</b>	<b>Number of classes</b>
<b>1.</b>	<b>Unit 1 BL - The Green energy</b>	<b>25 h</b>
1.1	What is green energy? Green energy products work. The types of green energy.	4 h
1.2	Energy Consumption in ICT Sector: Green Energy Provisioning for ICT. Green ICT and ways of Greening ICT.	4 h
1.3	Energy Consumption in ICT Sector: Reduction of energy consumption and gas emission.	4 h
1.4	The future ICT trends: from green to wise.	3 h
1.5	Seminars	10 h
<b>2.</b>	<b>Unit 2 AL - EU policy towards overcoming the environmental constraints</b>	<b>25 h</b>
2.1	The global trends in green ICT development: Local conservation. Pollution control and corporate social responsibility. Solutions, transformative change, and profit.	2 h
2.2	World directions in green ICT policies: Green ICT advancement: global level policy. The leaders in greening with ICT. Alternative approaches to greening with ICT.	3 h
2.3	The green informatics contribution to green energy: Reduction of energy consumption and carbon footprint along production and use. Diffusion of information, education, and training to rise environmental awareness. Projects promotion through environmental networks communication. Sustainable environmental governance.	5 h
2.4	Advanced cooperation for green ICT solutions: ICT impacts green and sustainability. ICT and the Economy-Defining Technologies (EDTs): KBE/KBBE. Green ICT and education. Green ICT impact at governmental level.	5 h
2.5	Seminars	10 h