

COURSE CERTIFICATE

№ 02REENERGY-0222-2

Date of issue 22/12/2022

This is to certify that

Panashe Zinduku

Successfully completed the course

RENEWABLE ENERGY: RESOURCES AND TECHNOLOGIES

2 credits

The description of the course and the achieved learning results are given in the appendix to this certificate.

E-CERTIFICATE

<https://open.spbstu.ru/certificate/02REENERGY-0222-2.pdf>



Vice-rector for academic affairs
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STUDENT ID 2280501

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<http://www.spbstu.ru/>

THE NAME OF THE COURSE RENEWABLE ENERGY: RESOURCES AND TECHNOLOGIES
<https://openedu.ru/course/spbstu/REENERGY/>

LEAD-TIME

From September 12, 2022 to December 22, 2022

Assessment, number of hours and credits per course

Credits	Hours		Assessment		
	General	Academic	100-point	5-point	Letter
2	54	72	66	3	C

GRADING POLICY

Evaluation scale ranges (100-point scale)	Score (5-point scale)	Letter
90-100	5	A
70-89	4	B
50-69	3	C
0-49	2	F

COURSE PROGRAM

Module 1. Current state and development trends of renewable energy sources in the world

- Lesson 1. Current state and development trends of the fuel and energy complex
- Lesson 2. Analysis of world consumption of traditional and renewable energy sources
- Lesson 3. Sources of renewable energy. Climate change and their impact on renewable energy resources

Module 2. Renewable energy resource assessment

- Lesson 4. Water resources, distribution and use. Hydropower potential of rivers. Hydraulic energy use schemes

- Lesson 5. Wind flow and its formation. Wind flow characteristics and determination of the main parameters of a wind power plant
- Lesson 6. Solar radiation and its characteristics for energy use

Module 3. Renewable energy conversion technologies

- Lesson 7. Types of hydropower plants. The main parameters of the hydroelectric power station and their definition. Energy conversion and hydroelectric equipment
- Lesson 8. Types and features of wind power plants. Wind power station. Systemic wind energy and its functioning in the power system
- Lesson 9. Converting solar energy into heat and electricity
- Lesson 10. Modes of operation of facilities based on renewable energy sources in the network
- Lesson 11. Principles of design of facilities based on renewable energy sources

Module 4. Use of RES complexes for autonomous power supply

- Lesson 12. Preconditions for the integrated use of renewable energy sources and the creation of energy complexes
- Lesson 13. Principles of operation of energy complexes based on renewable energy sources
- Lesson 14. Operating modes of energy complexes based on renewable energy sources in autonomous generation
- Lesson 15. Energy-economic substantiation of energy complexes based on traditional and renewable energy sources

Module 5. Economics and ecology of renewable energy sources

- Lesson 16. Indicators and performance criteria for energy projects in the power and energy markets
- Lesson 17. Efficiency of RES projects, taking into account risks and spatial and temporal variability of resources
- Lesson 18. Renewable energy and the concept of sustainable development
- Lesson 19. Assessment of the environmental impact factors of RES facilities

WHAT YOU'LL LEARN:

- Students will be able to form a system of knowledge about the current state and promising technologies of renewable energy sources.
- Students will be able to choose operating modes for supplying power to individual farms and large consumers in power systems.

FIELDS OF STUDY:

- 05.00.00 Geosciences
- 13.00.00 Electric and thermal power engineering

SCORING FORMULA:

№	Assessment Type	Points scored	Maximum score	Quotient
1	Module Test	96	100	0,10
2	Practical Task	71	100	0,30
3	Final Test	58	100	0,60
4	Final Score	66	100	1

Appendix to the certificate №
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