Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA
(RUDN University)

Institute of Environmental Engineering

COURSE SYLLABUS

GREEN ECONOMY AND TOOLS FOR ENTERPRISES SUSTAINABLE DEVELOPMENT

Recommended by the Didactic Council for the Education Field of:

05.04.06 "Ecology and Nature Management"

The course instruction is implemented within the professional education programme of higher education:

Integrated Solid Waste Management

2026

1. COURSE GOAL(s)

The discipline "Green Economy and Tools for Enterprises' Sustainable Development" is part of the Master's program "Integrated Municipal Solid Waste Management" in the field of study 05.04.06 "Ecology and Environmental Management" and is studied in the 2nd semester of the 1st year. The discipline is delivered by the Department of Environmental Safety and Product Quality Management. The discipline consists of 5 sections and 9 topics and is aimed at studying the theoretical and applied foundations in the field of environmentally safe organization of economic activities in the context of the transition to a green economy.

The aim of the discipline is to study the theoretical and applied foundations of the "green" or circular economy and sustainable development of municipal solid waste (MSW) processing enterprises; to acquire technological skills in the production of energy resources from MSW; and to develop the ability to make managerial decisions in the field of the "low-carbon" economy.

• 2. REQUIREMENTS FOR LEARNING OUTCOMES

The process of studying the discipline is aimed at the formation of the following competencies:

Competence code	Competence descriptor	Competence formation indicators
PC-6	Capable of diagnosing issues related to nature conservation, formulating practical recommendations for environmental protection, and ensuring sustainable development.	**PC-6.1** Capable of executing the requisite calculations for the planning, modeling, and forecasting of territorial object development;.
		PC-6.2 Capable of performing analysis and evaluation of available resources and conditions required for the conduct of research;.
		PC-6.3 Capable of conducting spatial, territorial, demographic, sociological, and economic investigations, together with topographical-geodetic, engineering-geological, and cartographic surveys..

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

Course ***«Green Economy and Tools for Enterprises Sustainable Development»*** belongs to the part formed by the participants of educational relations of Block 1 "Disciplines (Modules)" of the higher education program.

Within the framework of the higher education program, students also study other disciplines and/or internships (practical training) that contribute to achieving the planned learning outcomes of the discipline "Basics of Circular Economics".

Table 3.1

The list of the higher education programme components that contribute to the achievement of the expected learning outcomes

Competence code	Competence descriptor	Previous courses/modules, internships*	Subsequent courses/modules, internships*
PC-6	Capable of diagnosing issues related to nature conservation, formulating practical recommendations for environmental protection, and ensuring sustainable development.	No	Research Work; Environmental noms for sustainability; Pre-Graduation Practice;

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course is **4** credit units.

Table 4.1. Types of academic activities during the period of the HE program(me) mastering

Types of academic activities		**Total hours**	**Semester(s)**			
			1	**2**	**3**	**4**
Contact academic hours		*18*		*18*		
Lectures		9		9		
Lab works						
Seminars (workshops/tutorials)		9		9		
Self-study		*99*		*99*		
Evaluation and assessment (exam; pass/fail grading)		*27*		*27*		
The total course workload	hours	**144**		**144**		
	credits	**4**		**4**		

5. COURSE CONTENTS

Table 5.1. The content of the discipline (module) by type of educational work

Title of Course Modules	**Content**	**Types of academic activities**
Module 1. Fundamentals of a Green Economy.	Topic 1.1. The concept and essence of a "green" economy. The international context for the development of a "green" economy..	L, **S**
	Topic 1.2. The concept of a circular economy: its origins and evolution. Industrial ecology. The "cradle-to-cradle" concept. Circular economy. Blue economy. Biomimicry.	L, **S**
Module 2. Transition from a linear economy to a closed-loop economy	Topic 2.1. Limits to the development of a linear economy. Barriers and drivers of circular economy development. Environmental, resource, economic, and social benefits of a circular economy.	L, **S**
	Topic 2.2. Basic principles and mechanisms of a circular economy. Opportunities for material recycling. Types of cycles within a green economy. Methods for preserving product value. New circular business models.	L, **S**
	Topic 2.3. Fundamentals of green growth. Methodological approaches to assessing the green growth potential of territories and regions.	L, **S**
Module 3. Economic valuation of ecosystem services	Types of capital involved in the green economy. The concept of ecosystem services. Classification of ecosystem services. The use of remote sensing technologies in ecosystem service assessment. A review of approaches to the economic valuation of ecosystem services.	L, **S**
Module 4 Product life cycle assessment as a tool for the circular economy	Topic 4.1 Using Life Cycle Assessment (LCA) tools to create a circular economy. Production system. Unit processes. LCA: basic concepts and stages. Application of life cycle assessment to industrial symbioses..	L, **S**

Title of Course Modules	Content	Types of academic activities
Module 5 Sustainable development of enterprises	Topic 5.1 Definitions of Sustainable Development of Enterprises. Components of Sustainable Development of Enterprises: Economic Sustainability, Social Responsibility, Environmental Performance	L, **S**
	Topic 5.2 Corporate Social Responsibility and Environmental Performance. The Concept of Corporate Social Responsibility (CSR). Evolution of Views on the Role of Business in Society. Principles of CSR. Elements of CSR. CSR Models and Standards. Evaluation of Enterprise Social Performance. Non-Financial Reporting of Enterprises. Evaluation of Enterprise Environmental Performance. ISO 14031	L, **S**

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Classroom for Academic Activity Type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for mastering the course (if necessary)
Lecture	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless	Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype. Microsoft Windows 7 corporate. License No. 5190227, date of issue March 16, 2010 MS Office 2007 Prof , License # 6842818, date of issue 09/07/2009
Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, stable wireless	
For Self-Study	Classroom for self-study (can be used for seminars and consultations), equipped with a set of devices includes laptop, stable wireless.	

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main reading:

1. Tambovceva T., Titko J. Introduction to circular economy //Ekonomikas un kulturas augstskola. – 2020. материалы размещены в системе ТУИС РУДН

Additional reading:

1. Neugarten, R.A., Langhammer, P.F., Osipova, E., Bagstad, K.J., Bhagabati, N., Butchart, S.H.M., Dudley, N., Elliott, V., Gerber, L.R., Gutierrez Arrellano, C., Ivanić, K.-Z., Kettunen, M., Mandle, L., Merriman, J.C., Mulligan, M., Peh, K.S.-H., Raudsepp-Hearne, C., Semmens, D.J., Stolton, S., Willcock, S. (2018). Tools for measuring, modelling, and valuing ecosystem services: Guidance for Key Biodiversity

Areas, natural World Heritage Sites, and protected areas. Gland, Switzerland: IUCN. x + 70pp., материалы размещены в системе ТУИС РУДН

2. The report of Material Economics. The Circular Economy – a Powerful Force for Climate Mitigation, 2018, 176 pp.,

3. Ecosystem Management: adaptive, community-based conservation / by Gary K. Meffe ... [et al .] Island Press .- 2002.- 333 p ., материалы размещены в системе ТУИС РУДН

4. The Ellen MacArthur Foundation's report “Towards the circular economy. Economic and business rationale for an accelerated transition”, 2013 Vol. 1.- 91 pp.

материалы размещены в системе ТУИС РУДН

Internet-based sources

1. ELS of RUDN University and third-party ELS, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System - RUDN EBS http://lib.rudn.ru/MegaPro/Web
- ELS "University Library Online" http://www.biblioclub.ru
- EBS Yurayt http://www.biblio-online.ru
- ELS "Student Consultant" www.studentlibrary.ru
- EBS "Lan" http://e.lanbook.com/
- EBS "Trinity Bridge"

2. Databases and search engines:

- electronic fund of legal and normative-technical documentation http://docs.cntd.ru/
- Yandex search engine https:// www .yandex.ru/
- Google search engine https://www.google.ru/
- abstract database SCOPUS http:// www .elsevierscience.ru/ products / scopus /

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR EVALUATION OF STUDENTS’ COMPETENCES LEVEL UPON COURSE COMPLETION

The assessment toolkit and the grading system to evaluate the level of competences (competences in part) formation as results of mastering the discipline are specified in the Appendix to the syllabus.

DEVELOPER:

Associate Professor of the ES&PQM Department		**Popkova A.A.**
Position	Signature	Name, Surname

HEAD OF DEPARTMENT:

Director of NM Department		**Kucher D.E.**
Position	Signature	Name, Surname

HEAD OF PROGRAMME:

Associate Professor of the NM Department		**Kapralova D.O.**
Position	Signature	Name, Surname

Department Environmental Safety and Product Quality Management
educational department to be specified

APPROVED
Department meeting protocol No_____,
Dated _____
day, month, year
Head of Educational Department
_____(Savenkova E.V.)
signature

ASSESSMENT TOOLKIT

for the course

Green Economy and Tools for Enterprises Sustainable Development / Зеленая экономика и инструменты устойчивого развития предприятий

05.04.06 "Ecology and nature management"
field of studies / speciality code and title

«Integrated Solid Waste Management
higher education programme profile/specialisation title

Master
graduate's qualification (degree)

Passport to Assessment Toolkit for Course Green Economy and Tools for Enterprises Sustainable Development

Field of Studies / Speciality 05.04.06 "Ecology and nature management"/ «Integrated Solid Waste Management»

Course: Green Economy and Tools for Enterprises Sustainable Development

Competences (competences in part) under assessment	**Course module under assessment**	**Course topic under assessment**	**Tools to assess higher education programme mast ring level**										**Points for topic**	**Points for module**
			Class work					**Self-studies**				**Exam/Pass-fail assessment**		
			Quiz	**Test**	**Work with lecture materials**	**Work at the seminars**	**Lab work**	**Homework**	**Research essay/ Library research paper**	**Calculation and graphic work**	**Group work project**			
PC-6	Module 1. Fundamentals of a Green Economy.	Topic 1.1. The concept and essence of a "green" economy. The international context for the development of a "green" economy..	1	1	1	1					3		7	14

		Topic 1.2. The concept of a circular economy: its origins and evolution. Industrial ecology. The "cradle-to-cradle" concept. Circular economy. Blue economy. Biomimicry.	1	1	1	1					3		7	
PC-6	Module 2. Transition from a linear economy to a closed-loop economy	Topic 2.1. Limits to the development of a linear economy. Barriers and drivers of circular economy development. Environmental, resource, economic, and social benefits of a circular economy.	1	1	1	1					2		6	19
		Topic 2.2. Basic principles and mechanisms of a circular economy. Opportunities for material recycling. Types of cycles within a green economy. Methods for preserving product value. New circular business models.	1	2	1	1					2		7	
		Topic 2.3. Fundamentals of green growth. Methodological approaches to assessing the green growth potential of territories and regions.	1	1	1	1					2		6	

	Module 3. Economic valuation of ecosystem services	Types of capital involved in the green economy. The concept of ecosystem services. Classification of ecosystem services. The use of remote sensing technologies in ecosystem service assessment. A review of approaches to the economic valuation of ecosystem services.	3	6	3	3					9		24	24
PC-6	Module 4 Product life cycle assessment as a tool for the circular economy	Topic 4.1 Using Life Cycle Assessment (LCA) tools to create a circular economy. Production system. Unit processes. LCA: basic concepts and stages. Application of life cycle assessment to industrial symbioses..	3	4	3	3					6		19	19
GC-6	Module 5 Sustainable development of enterprises	Topic 5.1 Definitions of Sustainable Development of Enterprises. Components of Sustainable Development of Enterprises: Economic Sustainability, Social Responsibility, Environmental Performance	1	1	1	1					2		6	10
		Topic 5.2 Corporate Social Responsibility and Environmental	1	1		1					1		4	

		Performance. The Concept of Corporate Social Responsibility (CSR). Evolution of Views on the Role of Business in Society. Principles of CSR. Elements of CSR. CSR Models and Standards. Evaluation of Enterprise Social Performance. Non-Financial Reporting of Enterprises. Evaluation of Enterprise Environmental Performance. ISO 14031											
		TOTAL	**13**	**18**	**12**	**13**					**30**	**14**	**86**	**86**

Course Green Economy and Tools for Enterprises Sustainable Development

QUESTION CARD No 1

QUESTION 1 International aspects of the formation of a green economy QUESTION 2 Cultural ecosystem services

3 * ……..

Developer_____(Popkova Anna)
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Head of Educational Department_____(Savenkova Elena)
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Note * Practice case/task inclusion is subject to the teacher's discretion.

The set of exam question cards is complemented by the assessment criteria developed by the teacher and approved at the department meeting.

Assessment criteria:

(*in compliance with the legal regulations in force*)

EXAM QUESTIONS

1. Green economy. Definition. Main features.
2. Evolution of green economy ideas.
3. International aspects of the formation of a circular economy.
4. Resolution of the UN Conference on Sustainable Development "The Future We Want" on the ideasof a green economy. Green economy in the context of sustainable development.
5. Capital. Definition. Types of capital within the framework of the green economy concept.
6. Human capital. Natural capital. Physical capital.
7. Ecosystem services. Definition. Classification.
8. Providing ecosystem services.
9. Regulating ecosystem services.
10. Cultural ecosystem services.
11. Supporting ecosystem services.
12. Methods for the economic valuation of ecosystem services.
13. The potential of remote sensing technologies in ecosystem services assessment
14. The application of NDWI for ecosystem services assessment15. The concepts of green economy: it's origins and evolution.
16. Closed-loop Economy.
17. Diversification and decarbonization of the economy.
18. The concept of a low-carbon economy.
19. Comparative analysis of traditional and alternative energy chains.
20. Cyclical economy. Basic principles and instruments.
21. Framework indicators for sustainable development, developed by the UN Commission onSustainable Development.
22. Linear and circular business models.
23. Stages of product life cycle assessment.

24. Closed loop and open loop material recycling systems.
25. Approaches to the definition of enterprises sustainable development.
26. Components of corporate sustainable development of the enterprise.
27. Corporate social responsibility and methods of its assessment.
28. Indicators of environmental performance of the enterprise.
29. Industrial symbiosis.
30. The main stages of assessing the life cycle of products.

Tentative list of assessment tools

No	Assessment tool	Brief features	Assessment tool representation in the kit
		Class work	
1	Survey/Quiz	A tool of control, organised as a special conversation between a teacher and students on topics related to the course under study, and designed to clarify the amount of students' knowledge in a particular section, topic, problem, etc.	Questions on the course topics /modules
2	Test	A system of standardised tasks that allows the teacher to automate the procedure for measuring the student's level of knowledge and skills	Tests bank
3	Control work	A tool of control organised as a classroom lesson, at which students need to independently demonstrate the acquisition and mastering of the educational material of the course topic, section, or sections.	Questions on the course topics /modules
4	Round table, discussion, polemic, dispute, debate, (class work)	Evaluation tools that allow the teacher to engage students in the process of discussing controversial issues, problems and assess their ability to argue their own point of view.	List of themes for round tables, discussions, polemics, disputes, debates.
5	Business game and/or role play	Joint activities of a student group under the teacher's control to solve educational and professionally oriented tasks through the simulation of a real-world problem; this activity allows the teacher to assess the students' ability to analyse and solve typical professional challenges.	Topic (problem), concept, roles and expected results for each game
6.	Presentation (defence) of project/report/ Library research paper /briefs *	A tool for monitoring the students' ability to present the work results to the audience.	Themes for projects/reports/ Library research paper/ briefs

7	Pass/Fail assessment	A tool for checking the quality of students' performance of laboratory work, acquisition and mastering of the practice training and seminar educational material, successful completion of the advanced field internship and pre-graduate internship and fulfillment of all training assignments in the course of these internships in accordance with the approved programme.	Tasks examples
8	Exam	The evaluation of the student's work during the semester (year, the entire period of study, etc.); it is designed to identify the level, soundness and systematic nature of theoretical and practical knowledge gained by the student, formation of independent work skills, development of creative thinking, ability to synthesise the acquired knowledge and apply it to solve practice tasks	Examples of tasks/questions/exam question cards
9	Case	A problem-solving task in which the student is asked to comprehend the real work-related (occupational) situation necessary to solve the problem.	Assignments to solve the case
10	Multi-level tasks and assignments with varying difficulty	The tasks and assignments differ in terms of the following levels: a) reproductive level allows the teacher to evaluate and diagnose the students' knowledge of factual material (basic concepts, algorithms, facts) and the students' ability to correctly use special terms and concepts, recognize objects of study within a certain section of the discipline, b) reconstructive level allows the teacher toevaluate and diagnose the students' abilities to synthesise, analyse, generalise factual and theoretical material and formulate specific conclusions, establish cause-and-effect relationships, c) creative level allows to evaluate and diagnose students' skills to integrate knowledge of various fields, argue their own point of view.	Set of multi-level tasks and assignments with varying difficulty
Self- studies			
1	Calculation and graphic work	A tool for checking students' skills in applying the acquired knowledge according to a predetermined methodology in task solving or fulfilling assignments for a module or discipline as a whole.	Set of tasks for calculation and graphic work

2	Course work/project	A type of independent written work aimed at the creative development of general professional and specialised professional disciplines (modules) and the development of relevant professional competences	Course assignment themes
3	Project	The final "product" that results from planning and performance of educational and research tasks set; it allows the teacher to assess the students' ability to independently shape their knowledge in the course of solving practice tasks and problems, navigate in the information environment and the students' level of analytical, research skills, skills of practical and creative thinking; it can be implemented individually or by a group of students.	Themes for team-based or individual projects
4	Research essay (Library research paper)	The student's independent work in writing that summarises the results of the theoretical analysis of a certain scientific (educational and research) topic, where the author reveals the essence of the problem under study, considers different points of view, as well as argues his/her views on the material under consideration.	Themes for research essay (library research papers)
5	Reports, briefs	The product of the student's independent work, which is a public performance on the presentation of the results of solving a specific educational, practical, research or scientific topic.	Themes for reports, briefs
6	Essay and other creative assignments	A partially regulated assignment that has a nonstandard solution and allows the teacher to diagnose students' skills in integrating knowledge from various fields and arguing their own point of view; it can be prepared individually or by a group of students.	Themes for team-based or individual creative assignments
7	Standard calculations	A tool to test skills in applying the acquired knowledge, according to a predetermined methodology, solving tasks or fulfilling assignments for a module or discipline as a whole.	Set of tasks for standard calculations

8	Homework	The tasks and assignments differ in terms of the following levels: a) reproductive level allows the teacher toevaluate and diagnose the students' knowledge of factual material (basic concepts, algorithms, facts) and the students' ability to correctly use special terms and concepts, recognize objects of study within a certain section of the discipline, b) reconstructive level allows the teacher toevaluate and diagnose the students' abilities to synthesise, analyse, generalise factual and theoretical material and formulate specific conclusions, establish cause-and-effect relationships, c) creative level allows the teacher to evaluate and diagnose students' skills to integrate knowledge of various fields, argue their own point of view.	Set of multi-level tasks and assignments with varying difficulty

Business game

for the course Green Economy and Tools for Enterprises Sustainable Development

1 Theme (problem): Towards circular economy: pros and cons

2 Game conception: the establishment of benefits and disadvantages in regards to circular economy tools implementation for different stockholders

3 Roles:
- government;
- society
- non-profit organizations; - entreasures;

4 Expected outcomes:
Business game helps students to obtain deep understanding of:
- the main approaches to transition of linear economy into the circular one;
- the basic principles and tools of circular economy;
- the application possibilities of circular economy model **Assessment criteria:** *(in compliance with the legal regulations in force)*

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Set of assignments for control work

for the course Green Economy and Tools for Enterprises Sustainable Development
course title

1. **Establish a correspondence between the type of enterprise and its characteristics**

LABOR INTENSIVE ENTERPRISES	High share of labor costs in total production costs
CAPITAL INTENSIVE ENTERPRISES	A significant part of production costs is depreciation
MATERIAL-INTENSIVE ENTERPRISES	A significant part of production costs is the cost of raw materials

2. **The main focus of the Millennium Development Goals is on:**
    a) ensuring social well-being
    b) solving environmental problems
    c) development of economic development programs
    d) modernization of technologies in the production sector of the economy

3. **Choose the correct formulation of the triple sustainability goal for business:** a) People, Planet, Profit
   b) Profit, People, Planet
   c) Planet, People, Profit
   d) Planning, Production, Profit

4. **Within the framework of what concept were the first ideas of the circular economy formulated?**

a) "Cradle to Cradle", William McDonough and Michael Brongart
b) "The Blue Economy", Günther Pauli
c) "Biomimicry", Jeanine M. Benyu
d) "The Economics of the Future Spaceship Earth", Connet Boulding

5. **Choose the subjects related to the external microenvironment of the enterprise:**

a) suppliers of material and technical resources
b) consumers of products (services) of the enterprise
c) competitors
d) enterprise administration

Assessment criteria:

(in compliance with the legal regulations in force)

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Department of Environmental Management and Product Quality Management Themes for team-based or individual creative assignments/projects for the course **Green Economy and Tools for Enterprises Sustainable Development**

For the successful implementation of the green economy concept, it is necessary to take into account the industries specifics. In the works of UNEP, the following priority green economy industries are highlighted: agriculture, fishing, forestry, industry, transport, waste management, energy. New technologies play a key role in the transformation of certain economy's industries. It should be noted that there is a wide range of related terms in relation to this area: "clean" technologies (clean-tech), "green" technologies, eco-innovations. The abovementioned technologies can reduce emissions, discharges and waste generation, as well as increase energy efficiency.

The purpose of the seminar is to analyze the main directions of the transition to a green economy in various industries.

Topics of reports

1. Analysis of the main directions of the transition to a green economy in agriculture.
2. Analysis of the main directions of the transition to a green economy in the forestindustry.
3. Analysis of the main directions of the transition to a green economy in transport.
4. Analysis of the main directions of the transition to a green economy in heavy industry (you can choose a specific industry, for example, ferrous and nonferrous metallurgy, mechanical engineering, etc.).
5. Analysis of the main directions of the transition to a green economy in the oil and gascomplex.
6. Analysis of the main directions of the transition to a green economy in fisheries.

Algorithm

1. Brief description of the selected industry and its contribution to the global economy. 2. Contribution of the selected industry to the economy of the Russian Federation * (share of GDP).

3. The main environmental problems in the selected industry of the Russian economy *(problems of emissions, discharges, waste).

4. Technologies to reduce emissions, discharges and waste generation in the selected industry.

5. Technologies to increase energy efficiency in the selected industry.

6. Successful cases of the implementation of the concept of a green economy in theselected industry.

* For international students - can choose the industry of their country economy.

The presented algorithm is applicable to all topics.

Task defense form – Power Point presentation of the report.

Assessment criteria:

(in compliance with the legal regulations in force)

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day, month, year