Educational and thematic plan of the additional general educational program

"Soils and Civilization Development"

No	Section and topic names	Total hours	Including		
			Lec-tures	Practic. lessons	Indep. work
1	**Introduction. Soils and religion.**	4	3		1
1.1	Soil functions in the 21st century: fertility, biosphere and sanitary. Modern environmental challenges (climatic, epidemic, pollution) and the role of soil in solving them. The scientific contribution of Professor L.O. Karpachevsky in the development of the interdisciplinary direction "Soils and Society".	1	1		
1.2	Religious approach to the soil and agriculture origin, the development of civilizations, sciences and crafts. Soil as an object of religious and scientific thinking and action. Religion and the creation of new soils. The soil is man's last refuge. Burial as a religious ceremony, and soil as an attribute of religious action. Modern soil science and religion.	3	2		1
2	**Soils, soil cover and civilization development.**	4	3		1
2.1	Natural resources are the most powerful factor in the socio-economic development of society. Soils and wars. Soil fertility is the driving force in the civilization development. The first centers of natural agriculture. The relationship between soil condition and type of civilization.	3	2		1
2.2	The role of chernozems in the civilization development and why they were not plowed up first. Russian regions with active farming from the XII to XX centuries. The work of the Resettlement Administration in the land development in the Russian Asian outskirts, and the role of soil scientists in the assessment of soils for migrants.	1	1		
3	**Soils and geopolitics.**	4	3		1
3.1	The first agricultural civilizations in the foothills. Geographic centers of plants origin according to N.I. Vavilov. Periods in the history of civilization in its relation to nature and soil.	1	1		
3.2	Features of the soil cover in the XIX-XX centuries. The main soil functions in the modern world. Soil contamination. The ability of soils to self-purify. The soil is like a time bomb. A new soil paradigm about soil sanitary functions and medical soil science.	3	2		1
4	**Soil and society social structure.** State of soils and types of civilization. Soil and social status of people: income level, lifestyle, professional activity, education level, cultural and leisure activities, crime, morbidity, fertility, mortality, etc. Soils and social risks in cities. Criminality and the urban environment.	4	3		1
5	**Soil and human health.**	4	3		1
5.1	Public health and the role of natural factors in its formation. Sanitary and ecological features of soils. Biological, lithogenic and climatic public health risk factors.	1	1		
5.2	Soil biodiversity, soil infections. Self-cleaning potential of landscapes and soils. The ability of soils to self-purify. Catalytic activity in soils: enzymatic and abiotic. The role of	3	2		1

	soil in the prion infection inactivation. Soil properties and morbidity of the population (acute respiratory infections, general infectious diseases, acute infections, tuberculosis, chickenpox, salmonellosis, scabies, etc.). Sanitary functions of the soil. Medical soil science.				
6	**City and biosphere. Soils of megacities.**	4	3		1
6.1	Urban ecosystems. Urban and natural soils. Pollution of urban soils. Megalopolis soils as an indicator of the urban environment and a source of pollution. Urban biological diversity and sanitary functions of urban soils.	3	2		1
6.2	Environmental and social risks in urban ecosystems. Agricultural farms in cities - reality or myth?	1	1		
7	**The role of rock matrix properties in the life origin and soil formation.**	4	3		1
7.1	Sedimentary rocks, soils and the first life traces on Earth. Theories of life origin. Organized elements, hypercycles, RNA world. Abiogenic theory of the life origin (catalysts, gas hydrates, hypercycles).	1	1		
7.2	The role of the rock mineral matrix in the life origin. Abiogenic synthesis of ribonucleides. Catalytic functions of rocks in the life and soil formation. Rock as the boundary of soil-forming processes. Soil Mineral matrices and rock mineral matrix. Soil zero-moment.	3	2		1
8	**The soil in painting.**	4	3		1
8.1	The cognitive function of art. Phytocenoses, landscapes, soils and other natural elements in painting. Soil color and pathway network in art and in real forest and meadow ecosystems.	1	1		
8.2	Reflection in painting of soil processes: red-colored soils; "Normal" and "abnormal" soils according to V.V. Dokuchaev; soils on stony rocks and brickwork, in forest biogeocenoses; dumps, dead wood, molehills in the formation of soil variegation, anisotropy of forest soils.	3	2		1
9	**Soil science in the future. Interaction of soil science with fundamental sciences.**	4	3		1
9.1	Modern environmental challenges (climatic, epidemic, pollution), and the role of soil in stabilizing food problems. Urban farming – “For and Against”. Development of city farming in Russia and in the world. Creation of artificial soils and structures. Ecosystem services. Soils in space research.	2	1		1
9.2	Achievements of fundamental sciences in solving soil problems. Theories of physical and chemical mechanics of porous substances in understanding mechanisms of aggregation in soils. Aluminosilicates, oxides and hydroxides of metals as catalysts of soil processes. Matrix soil organization as a natural model of the universal mechanism for the substance organization. Molecular soil science. Soil nanoreactors and nanoconstructions. Compartmentation in the soil.	2	2		
	Total	36	27		9
Final certification		exam			