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CLIMATE SERVICES: SCIENCE AND EDUCATION

Proceedings of the Second International
Research-to-Practice Conference



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16-18 April 2025

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FACULTY OF HYDROMETEOROLOGY AND ENVIRONMENTAL SCIENCE



CLIMATE SERVICES: SCIENCE AND EDUCATION

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Alina Semerhei-Chumachenko, PhD (Geography).

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The Proceedings of the Second International Research-to-Practice Conference on 'Climate Services: Science and Education' are presented in the collected volume. The presented materials highlight the current challenges and achievements in the development and implementation of climate services in climate-sensitive sectors of the economy. Special attention is given to the growing role of education in building capacity for climate-informed decision-making through interdisciplinary learning and professional training. The reports also cover issues of climate risks and adaptation strategies implemented at regional and local levels. Published studies reflect the author's vision of the problems of climate change and climate service. Materials are submitted in the author's editorial office.

The publication is intended for applicants, pedagogical, scientific and scientific-pedagogical employees of educational and scientific institutions.

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МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ОДЕСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ ІМЕНІ І. І. МЕЧНИКОВА
ФАКУЛЬТЕТ ГІДРОМЕТЕОРОЛОГІЇ І ЕКОЛОГІЇ



КЛІМАТИЧНЕ ОБСЛУГОВУВАННЯ: НАУКА І ОСВІТА

Матеріали Другої міжнародної
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Інна Хоменко, кандидат географічних наук;
Аліна Семергей-Чумаченко, кандидат географічних наук.

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У виданні подано матеріали Другої міжнародної науково-практичної конференції «Кліматичні послуги: наука і освіта». У поданих матеріалах висвітлюються актуальні виклики та досягнення у розвитку й впровадженні кліматичних сервісів у кліматозалежних секторах економіки. Особлива увага приділяється зростаючій ролі освіти у формуванні спроможностей для ухвалення рішень, обґрунтованих кліматичними даними, через міждисциплінарне навчання та підготовку фахівців. Доповіді також охоплюють питання кліматичних ризиків та адаптаційних стратегій, що реалізуються на регіональному та місцевому рівнях. Опубліковані дослідження відображають авторське бачення проблем зміни клімату та кліматичного сервісу. Матеріали подаються в авторській редакції.

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TABLE OF CONTENTS

Plenary Session

Jon Xavier Olano Pozo , Enric Aguilar Anfrons, Anna Boqué Ciurana, Caterina Cimolai Overview of Co-Creation Of Climate Services at The Centre for Climate Change and Research Institute on Sustainability, Climate Change, and Energy Transition of Universitat Rovira I Virigil.....	12
Wilfran Moufouma-Okia Global and National Framework for Climate Services.....	14
Patrick Parrish Applying Activity Theory to Education and Training for Climate Services.....	15
Alexander Baklanov Integrated Urban Services: towards Climate-Smart, Resilient, and Sustainable Cities and Settlements.....	17
Section I. Issues of climate services in key climate-dependent areas	
Noukpo M. Agbazo , Lonsenigbe Camara, Lancei Koivogui Intrinsic Multi-Scale Characteristics of Rainfall Variability in Nzérékoré, Southeastern Guinea, West Africa	19
Diadin Dmytro , Yakovlev Valeriy, Drozd Olena, Vergeles Yuriy Formation of the Hydrological Cycle in Urban Areas and Vulnerability of Water Supply Systems under the Influence of Climate Change	20
Dide Francis The Past Key Research International Programs for the Study of Environment and Climate over West Africa.....	22
Dyman Nataliya Trends in Raspberry Breeding due to Climate Change	23
Grabovskyi Mykola , Basyuk Pavlo, Zhelezniak Valeriy, Mandrysh Oleksandr, Labunskyi Ihor Assessment of the Application of Plant Growth Regulators in Maize Cultivation for Grain under Different Climatic Scenarios.....	25
Hrinchenko Yurii Designing Citizen-Science Project For Assessing War Damage To Environment In Ukraine.....	27
Karpuk Lesia , Ezerkovska Liudmyla, Pavlichenko Andrii, Karaulna Vitalina, Filipova Larysa, Titarenko Oksana, Ezerkovskyi Artur, Zaika Nataliia Organic Production as a Strategy for Climate Change Adaptation.....	29
Khrystiuk Borys , Gorbachova Liudmyla Simulation of Rain Floods of the Stryi River Using Artificial Neural Network.....	31

Kyrnasivska Nataliia	
Assessment of the Bioclimatic Potential of the Dnipropetrovsk Region in the Conditions Climate Change.....	33
Kovalenko Yurii , Drozd Olena, Khandogina Olga	
Low-Carbon Solutions for Key Sectors of the Ukrainian Economy: Climate Change Mitigation Strategies.....	35
Kozhevnikov Sergii , Berezhnytska Yuliia	
PVC Profiles Recycling Technologies as Part of the European Sustainability Concept.....	37
Kryvomaz Tetiana , Tsyba Artem, Hamotskyi Roman	
Climate Aspects of ESG Standards in the Construction Sector of Ukraine..	40
Kryvoshein Oleksandr , Kryvobok Oleksii	
A Web-Based System for Enhancing Agrometeorological Decision-Making in the Face of Climate Change.....	42
Kuklyshyn Oksana	
Climate Change in Transcarpathia: Impact, Challenges, and Adaptation....	44
Loboda Nataliia , Rozvod Mykyta	
Changes in Climate and River Water Content in the Upper Dniester Basin at the Beginning of the 21st Century.....	46
Loboda Nataliia , Otchenash Nataliia, Rozvod Mykyta	
Risks of Water Resources Depletion in Southern Ukraine and their Consequences According to Climate Scenarios.....	48
Oreshchenko Andrii	
Elaborating the Atlas ‘Climate and Water Resources of Ukraine’.....	50
Loboda Nataliia , Kuza Antonina	
Assessment of the Chemical Pollution Risks of Rivers in the Northwestern Black Sea Region.....	52
Nedostrelova Larysa	
Analysis of Total Solar Radiation Flows on the Territory of Ukraine.....	54
Osypov Valeriy , Nikitenko Nataliia, Matviienko Yevhenii, Ahafonov Yurii, Mossur Herman, Bonchkovskyi Andrii, Nikoriak Victor, Osadcha Nataliia	
Web Service “Climate & Water”: How to Develop Climate Service for Water Managers.....	56
Ovcharuk Valeriya	
Analysis of Water Discharge in the Mouths Of Large Ukrainian Rivers Flowing into the Black Sea under Climate Change.....	58
Perebynos Alona	
Decadal Trends in Municipal Waste Generation in Ukraine.....	60
Polevoy Anatoly , Barsukova Olena	
Greenhouse Gas Emissions from the Winter Wheat Agroecosystem in Climate Change Conditions.....	62

Reshetchenko Svitlana , Tkachenko Tetiana, Orekhova Daria. Yield of Cereal Crops in Ukraine and Problems of Market Development....	64
Savenets Mykhailo , Nadtochii Lyudmila, Kozlenko Tetiana, Komisar Kateryna, Umanets Antonina, Zhemera Natalia Challenges in Accurate Air Quality Research, Management, and Assessment in Ukraine Amid War and Climate Change.....	66
Shanyhin Anton , Babienko Volodymyr, Talalayev Kostyantyn Impact of Seasonal Fluctuations in Vitamin D Levels on the Health of the Population of Southern Regions of Ukraine as a Factor of Climate Risks....	68
Snizhko Sergiy , Shevchenko Olga Financial and Economic Measures to Improve Climate Services in Flood Management in Ukraine.....	70
Starzhynskiy Pavlo , Prokopenko Ihor Regional Features of Structural and Functional Changes of Aquatic Ecosystems.....	72
Stepanenko Sergiy Overview of the Urban Solutions to Climate Change.....	74
Tarchiani Vieri , Grey Sebastian Bridging the Communication Gap in Agrometeorological Services: Enhancing the Uptake and Effectiveness for Users in Developing Countries.....	76
Tytariova Olena Using Triticale in Animal Feeding as a Means of Adapting Livestock Farming to Global Climate Changes.....	78
Vakula Bohdan , Dyman Tetiana, Stavetska Ruslana Influence of Air Temperature on Physiological Indicators of Goats.....	80
Vergeles Yuriy , Rybalka Inna Have Winters Warmed up in Eastern Ukraine?.....	82
Vronska Nataliya , Liuta Oksana, Popovych Olena, Sliusar Vira The Impact of Climate Factors on the Energy Sector.....	84
Yarov Yaroslav , Grashchenkova Tetiana, Pilipyuk Viktor Assessment of the Current State of Some Tributors of the Southern Bug River by Hydrochemical Indicators.....	86
Zhygailo Olena , Zhygailo Taras, Zhyhailo Demian Assessment of Climate Risk of Sunflower Seed Yield Loss in Ukraine for 2021–2050.....	88
Section II. Education in Climate Services	
Glushkov Alexander , Khetselius Olga, Lobachev Mykhailo, Shablii Oleh, Svinarenko Andrey Climate Services and Modelling: Simulations of the Earth Atmospheric Circulation and Entropy and Angle Momentum Balance.....	91

Contents

Glushkov Alexander , Khetselius Olga, Lobachev Mykhailo, Shablii Oleh, Husieva Kateryna Climate Services in City Management: Green City Technology, Air Pollution & Ventilation Data Analysis, Artificial Intellect, Management Solutions.....	93
Khomenko Inna , Nedostrelova Larysa, Katerusha Halyna, Borovska Halyna Climate Products (Climatic and Socio-Economic Indicators for Climate Services).....	95
Khomenko Inna , Prokofiev Oleh, Andrusenko Volodymyr, Moka Anastasiia, Chorna Tetiana, Bratova Zlata Citizen-Science Student Project Under Gromada Erasmus+: Monitoring Air Quality in Urban Areas	97
Kravchenko Maryna , Tkachenko Tetiana, Voloshkina Olena, Vasylenko Lesya Awareness of Green Building as a Component of Climate Change Adaptation.....	99
Mahura Alexander , Ovcharuk Valeriya, Khomenko Inna, Lappalainen Hanna, Tyuryakov Svaytoslav Climate-Oriented Trainings on Climate Services, Climate Change Adaptation and Mitigation.....	101
Ovcharuk Valeriya , Martyniuk Maksym, Pisariev Yurii, Stetsyuk Andriy, Tashku Alina, Sryberko Anastasiia Citizen-Science Student Project under Gromada Erasmus+: Assessing the Hydrological and Satellite Data on Black Sea Coastal Waters after Kakhovka Dam Destruction.....	103
Prokofiev Oleh , Nedostrelova Larysa, Volvach Oksana International Agreements and National Legislation in the Field of Climate Change.....	105
Semerhei-Chumachenko Alina , Halych Yelyzaveta, Prokofiev Oleh Training Course for Masters ‘Data and Information for Climate Services’... Semerhei-Chumachenko Alina , Halych Yelyzaveta, Prokofiev Oleh Training Course for PhD Students ‘Management of Climate Databases’....	107 109
Serbov Mykola , Danilova Nataliia Prospects for the Development of Higher Education in Geodesy and Land Management in Ukraine in the Interests of Climate Service and Post-War Restoration of Ukraine.....	111
Sopina Ana , Zaninović Tamara Planning (Climate) Sensitive Cities – Connecting Spatial Planning with Environmental Sciences in Higher Education.....	113
Vashchuk Yulia , Oleshko Olena The Relevance of Teaching the Discipline ‘Climate-Forming Ability of Plants in Urban Landscapes’ for Applicants for Speciality 206 ‘Garden and Park Management’	115

Vasiutynska Kateryna , Zabarna Eleonora, Shablii Oleh, Husieva Kateryna Mechanisms for Climate Services Integration into the Structure of a ‘Green University’	118
Section III. Climate Risks and Adaptation to Climate Change on Regional and Local Levels	
Babienko Volodymyr , Mokienko Andrii, Shanigin Anton Climate Changes as a Call for Water Supply of Southern Ukraine.....	121
Balabukh Vira , Dovhal Hanna, Yahodynets Stepan Climate Bulletin of Ukraine.....	123
Budnik Svitlana Contemporary Trends in Soil Temperature Changes, their Consequences and Adaptation of the Territory.....	125
Fedoniuk Vitalina , Pavliuk Marharyta, Fedoniuk Mykola Possibilities of Using Bioclimatic Indexes to Assess Weather Comfort.....	127
Dokus Anhelina Coal Credits as an Instrument of Sustainable Development.....	129
Goptsiy Maryna , Ovcharuk Valeriya, Pozdnyakov Yurii Spatiotemporal Variability of Monthly Runoff at Rivers of the Tisza Sub- Basin under Climate Change.....	132
Kichuk Natalia , Kushchenko Liliia Climate Services for Sustainable Water Quality Management in the Black Sea Basin.....	134
Grebin Vasyi , Balabukh Vira, Goptsiy Maryna, Bejenaru Gherman Regional Peculiarities of the Dniester River Runoff Changes under Climate Change Conditions.....	136
Khomenko Inna , Nadiia Prykhodko Generating and Controlling Heat Waves in Ukraine.....	138
Kuryshyna Viktoriia Temperature Regime of the South of Ukraine in the Conditions of Climate Change.....	140
Kuryshyna Viktoriia Humidity Regime of the South of Ukraine under Conditions of Climate Change.....	142
Nazhmudinova Olena Climate Challenges under Martial Law in Ukraine.....	144
Ovcharuk Valeriya , Kovalenko Mykhailo Flood Risks in the Ukrainian Carpathians: The Role of Insurance and Climate Services.....	146
Prokofiev Oleh , Goncharova Liudmyla, Chernyshov Vadim The Prevailing Wind Direction at the Odesa-Observatory Station and Its Dynamics in the Context of Modern Climate Change.....	148

Contents

Prokofiev Oleh, Goncharova Liudmyla, Chernyshov Vadim Statistical Characteristics of Surface Wind Speed at Odesa Observatory Station and their Dynamics in the Context of Modern Climate Change.....	150
Prykhodko Veronika Municipal Solid Waste Management in the Context of Sustainable Climate Policy.....	152
Rusyn Iryna Climate Risk Projections and Adaptation Strategies in Ukraine.....	154
Semenova Inna Consequences of Climate Change in Ukraine: Drought and Wildfires.....	156
Shakirzanova Zhannetta, Sivaiev Denys The Impact of Climate Change on the Hydrological Regime of Rivers in The Ukrainian Polissia.....	158
Shepel Victoriya, Semerhei-Chumachenko Alina The Impact of Global Warming on Hurricane Activity in the North Atlantic Ocean.....	160
Timofeyev Vladyslav, Savchuk Svitlana Climate Change and Forecasts in Ukraine and Methodological Aspects of Educational Process.....	162
Zabolotna Olena, Kryvoshein Oleksandr, Kryvobok Oleksii Lightning Detection System as a Tool for Short-Term Forecasting of Natural Disasters.....	164
Zadorozhna Ruslana Reviewing Climate Scenarios as Analytical Projects in the Context of IPCC Assessment Reports.....	166
Zaiets Serhii, Volvach Oksana, Yuzyuk Serhii, Kiriya Yuri Changes in Agrometeorological Conditions of the Autumn Period in the South of Ukraine.....	168
Author index	170

DECADAL TRENDS IN MUNICIPAL WASTE GENERATION IN UKRAINE

Alona Perebynos, PhD

Kyiv National University of Construction and Architecture, Ukraine

The issue of establishing a sustainable municipal waste (MW) management system in Ukraine remains relevant and is actively debated among representatives of the executive branch, local governments, and the public. After the adoption of the Framework Law of Ukraine “On Waste Management” dated 20.06.2022, a number of important legislative acts are expected to be adopted that will contribute to the implementation of best practices for preventing and reducing waste generation, as well as a separate collection of MW at the source. The National Waste Management Plan until 2033 dated 27.12.2024 defines the general strategy for effective waste management and obliges regional councils to develop and adopt regional waste management plans within a year, according to which local plans will be developed.

Ensuring effective planning and management of the MW system is achieved with the availability of reliable and up-to-date data. The State Statistics Service of Ukraine collects and presents quantitative data on the generation and treatment of waste of hazard classes I-IV by material categories, among which the category "municipal and similar waste" is represented. Data is available for 2011-2023, but this study will consider data for 2013-2023 (Table 1).

Table 1. Quantitative and qualitative data on MW generation in Ukraine according to the State Statistics Service of Ukraine, 2013-2023

Indicators	Years										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
MW generation, thousand tons	10804	7126	6789	6946	6183	6211	6618	6726	6482	5242	4858
Population, million	45.43	42.93	42.76	42.58	42.39	42.15	41.9	41.59	41.17	34.51	34.03
MW generation, kg/person	237.8	166.0	158.8	163.1	145.9	147.3	157.9	161.7	157.5	151.9	142.8

Note: * - International Monetary Fund estimates

The initial analysis of MW generation showed an increasing trend during 2011-2013, while 2014, the year of the beginning of the russian-Ukrainian war, is characterized by a sharp decrease to 7,126 thousand tons. Military operations on the territory of a state usually lead to economic instability and changes in the number of the population and their residence, which directly affects the MW generation. This hypothesis also supported the reduction in waste generation to

5,242 thousand tons in 2022 (Fig. 1), when a full-scale invasion of the territory of Ukraine took place, compared to an average of 6,565 thousand tons during 2015-2021. According to the Ministry of Foreign Affairs of Ukraine, approximately 20% of the current population was abroad at the beginning of 2023, which affected the reduction of MW in 2022 by 19%.

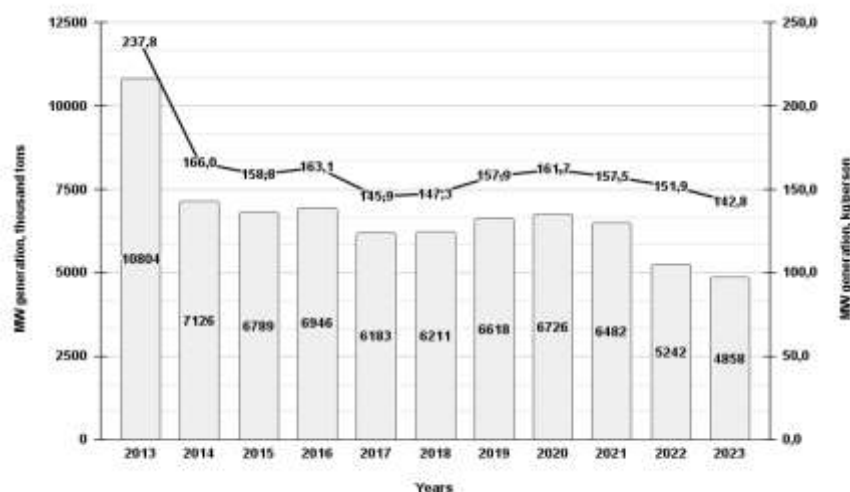


Fig. 1. MW generation trends in Ukraine for 2013-2023, thousand tons and kg/person

The indicator of MW generation per person showed no significant changes (Fig. 1). The average waste generation for 2014-2021 was 157.3 kg/person. Comparing this value with the indicators for 2022 and 2023 151.9 kg/person and 142.8 kg/person, respectively, allows us to conclude a trend towards a decrease in MW generation per person. However, it should be noted that the population of Ukraine for 2022 and 2023 is estimated, so the calculations are not valid. Overall, the average MW generation for 2014-2023 is 155.3 kg/person and does not differ much from the value calculated based on accurate population data.

The generation and treatment of municipal waste remain a significant unsolved problem in the management of many Ukrainian cities, directly affecting the quality of life of residents and environmental safety. Analyzing statistical data on municipal waste generation over the past 10 years, the study emphasizes the importance of relying on quantitative and qualitative data when planning waste management to take into account cause-and-effect relationships.

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AUTHOR INDEX

- Ahafonov, Yu., 56-57
 Andrusenko V., 97-98
 Anfrons, E.A., 12-13
 Babienko, V.V., 68-69, 121-122
 Baklanov, A., 17
 Balabukh, V., 123-124, 136-137
 Barsukova, O., 62-63
 Basyuk, P.L., 25-26
 Bejenaru, G., 136-137
 Berezhnyska, Yu., 37-39
 Bonchkovskiy, A., 56-57
 Borovska, H., 95-96
 Bratova, Z., 97-98
 Budnik, S.V., 125-126
 Chernyshov, V., 148-149, 150-151
 Chorna, T., 97-98
 Cimolai, C., 12-13
 Ciurana, A.B., 12-13
 Danilova, N., 111-112
 Diadin, D.V., 20-21
 Dide Francis, 22
 Dokus, A., 129-131
 Dovhal, H.P., 123-124
 Drozd, O.M., 20-21, 35-36
 Dyman, N., 23-24
 Dyman, T.M., 80-81
 Ezerkovska, L., 29-30
 Ezerkovskiy, A., 29-30
 Fedoniuk, V.V., 127-128
 Fedoniuk, M.A., 127-128
 Filipova, L., 29-30
 Glushkov, A.V., 91-92, 93-94
 Goncharova, L., 148-149, 150-151
 Goptsiy, M., 132-133, 136-137
 Gorbachova, L., 31-32
 Grabovskiy, M.B., 25-26
 Graschenkova T.V., 86-87
 Grebin, V., 136-137
 Grey, S., 76-77
 Halych, Ye., 107-108, 109-110
 Hamotskiy, R.O., 39-40
 Hrinchenko, Yu., 27-28
 Husieva, K.D., 93-94, 118-119
 Karaulna, V., 29-30
 Karpuk, L., 29-30
 Katerusha, H., 95-96
 Khandogina, O.V., 35-36
 Khetselius, O.Yu., 91-92, 93-94
 Khomenko, I., 95-96, 97-98, 101-102, 138-139
 Khrystiuk, B., 31-32
 Kichuk, N., 134-135
 Kiriya, Yu.P., 168-169
 Komisar, K., 66-67
 Kovalenko, Yu., 35-36
 Kovalenko, M., 146-147
 Kozhevnikov, S., 37-39
 Kozlenko, T., 66-67
 Kravchenko, M., 99-100
 Kravchenko, M., 99-100
 Kryvobok, O.A., 42-43, 164-165
 Kryvomaz, T.I., 39-40
 Kryvoshein, O.O., 42-43, 164-165
 Kuklyshyn, O., 44-45
 Kuryshyna, V., 140-140, 142-143,
 Kushchenko, L., 134-135
 Kuza, A.M., 52-53
 Kyrnasivska, N., 33-34
 Labunskiy, I.V., 25-26
 Lancei Koivogui, 19
 Lappalainen, H.K., 101-102
 Liuta, O., 84-85
 Lobachev, M.V., 91-92, 93-94
 Loboda, N., 46-47, 48-49, 52-53
 Lonsenigbe Camara, 19
 Mahura, A., 101-102
 Mandrysh, O. Yu., 25-26
 Martyniuk, M., 103-104
 Matvienko, Ye., 56-57
 Moka, A., 97-98
 Mokienko, A.V., 121-122
 Mossur, H., 56-57
 Moufouma-Okia, Wilfran, 14
 Nadtochii, L., 66-67
 Nazhmudinova, O., 144-145
 Nedostrelova, L., 54-55, 95-96,
 105-106
 Nikitenko, N., 56-57
 Nikoriak, V., 56-57
 Noukpo M. Agbazo, 19
 Olano Pozo, J.X., 12-13
 Oleshko, O., 115-117
 Orekhova, D., 64-65
 Oreshchenko, A., 50-51
 Osadcha, N., 56-57
 Osypov, V., 56-57
 Otchenash, N., 48-49
 Ovcharuk, V., 58-59, 101-102, 103-
 104, 132-133, 146-147
 Parrish, P., 15-16
 Pavlichenko, A., 29-30
 Pavliuk, M.M., 127-128
 Perebynos, A., 60-61
 Pisariiev, Yu., 103-104
 Polevoy, A., 62-63
 Popovych, O., 84-85
 Pozdnyakov, Yu., 132-133
 Prokofiev, O., 97-98, 105-106, 107-
 108, 109-110, 148-149, 150-151
 Prokopenko, I., 72-73
 Prykhodko, N., 138-139
 Prykhodko, V., 152-153
 Pylyp'yuk, V.V., 86-87
 Reshetchenko, S., 64-65
 Rozvod, M., 46-47, 48-49
 Rusyn, I., 154-155
 Rybalka, I.O., 82-83
 Savchuk, S., 162-163
 Semenova, I., 156-157
 Savenets, M., 66-67
 Semerhei-Chumachenko, A., 107-108,
 109-110, 160-161
 Serbov, M., 111-112
 Shablii O.V., 91-92, 93-94, 118-119
 Shakirzanova, Zh., 158-159
 Shanigin, A.V., 68-69, 121-122
 Shepel, V., 160-161
 Shevchenko, O., 70-71
 Sivaiev, D., 158-159
 Sliusar, V., 84-85
 Snizhko, S., 70-71
 Sopina, A., 113-114
 Sryberko, A., 103-104
 Starzhynskiy, P., 72-73
 Stavetska R.V., 80-81
 Stepanenko, S., 74-75
 Stetsyuk, A., 103-104
 Svinarenko, A.A., 91-92
 Talalayev, K., 68-69
 Tarchiani, V., 76-77
 Tashku, A., 103-104
 Timofeyev, V., 162-163
 Titarenko, O., 29-30
 Tkachenko, T., 64-65, 99-100
 Tsyba, A.M., 39-40
 Tytariova, O.M., 78-79
 Tyuryakov, S., 101-102
 Umanets, A., 66-67
 Vakula, B.V., 80-81
 Vashchuk, Yu., 115-117
 Vasiutynska, K., 118-119
 Vasylenko, L., 99-100
 Vergeles, Yu.I., 20-21, 82-83
 Voloshkina, O., 99-100
 Volvach, O.V., 105-106, 168-169
 Vronska, N., 84-85
 Yahodynets, S.M., 123-124
 Yakovlev, V.V., 20-21
 Yarov, Ya.S., 86-87
 Yuziuk, S.M., 168-169
 Zabarna, E., 118-119
 Zabolotna, O.S., 164-165
 Zadorozhna, R., 166-167
 Zaika, N., 29-30
 Zaninović, T., 113-114
 Zaiets, S.O., 168-169
 Zhelezniak, V.V., 25-26
 Zhemera, N., 66-67
 Zhygailo, O., 88-89
 Zhygailo, T., 88-89
 Zhyhailo, D., 88-89

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НАУКА І ОСВІТА**

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Видавець і виготовлювач:

Одеський національний університет імені І. І. Мечникова
вул. Університетська, 12, м. Одеса, 65082, Україна
Свідоцтво суб'єкта видавничої справи ДК № 4215 від 22.11.2011 р.
Тел.: (048) 723 28 39, E-mail:druk@onu.edu.ua