



NORWEGIAN CENTRE FOR
INTERNATIONAL COOPERATION
IN EDUCATION

SUMMER SCHOOL PROGRAM

”Norwegian-Georgian-Moldavian-Ukrainian Summer School on Quantitative Risk Management” (Sponsored by SIU, Grant CPEA-LT-2016/10003)

1-15 October, 2018.
Batumi, Georgia

Main Partners:

Norwegian University of Science and Technology (NTNU), Department of Industrial Economics and Technology Management, Trondheim, Norway.

Project Coordinator: Professor Alexei Gaivoronski

Taras Shevchenko National University of Kyiv (TSNUK), Faculty of Computer Science and Cybernetics, Kyiv, Ukraine.

Project Coordinator: Professor Volodymyr Zaslavskiy

Network Partners:

V.M. Glushkov Institute of Cybernetics of the National Academy of Science of Ukraine (NASU),

Batumi Shota Rustaveli State University (BSU, Batumi, Georgia),

Ivane Javakhishvili Tbilisi State University (TSU, Tbilisi, Georgia),

Moldova State University (MSU, Moldova),

Academy of Transport, Informatics, and Communications (ATIC, Moldova),

Miratech Corporation Ukraine (MCU, Kyiv, Ukraine),

International Institute for Applied System Analyses (IIASA, Austria),

Systems Analysis Committee of NASU, Kyiv, Ukraine.

Dear colleagues, it is a great pleasure to welcome you at the Summer School “Quantitative Risk Management” organized as a part of the project “Advanced Collaborative Program for Research Based Education on Risk Management in Industry and Services under Global Economic, Technological and Environmental Changes” funded by the Norwegian Center for International Cooperation in Education (SIU).

The main objective of the project is to strengthen the Norwegian-Ukrainian-Eurasian educational and research cooperation in the field of Quantitative Risk Management and related topics, for e.g. optimal decision support under risk and uncertainty. The project seeks to develop a sustainable network of universities in Ukraine, Moldova, Georgia and Norway capable of designing and running joint programs and courses at both Master and PhD-levels. The cooperation will be based on principles of Bologna declaration and on combining strengths of each university in a particular field and creating synergies through the network cooperation.

Participants will gain a deeper understanding of new challenges in the field of quantitative risk management and critical infrastructure protection. This school may be of particular interest to practitioners and policy-makers who prepare the guidelines for reforms in these areas. Beyond that, this school will serve as a networking platform to enhance education of young specialists in partner countries.

Project coordinator: Professor *Alexei Gaivoronski*

International Program Committee:

Chair: Professor Alexei Gaivoronski, Department of Industrial Economics and Technology Management (NTNU);

Co-Chair: Professor Volodymyr Zaslavskyi, Faculty of Computer Science and Cybernetics (TSNUK);

Co-Chair: Professor Ibraim Didmanidze, Faculty of Technologies, Center of Languages and Information Technologies, BSU;

Corresponding Member of NASU, Professor Pavlo Knopov (GIC);

Corresponding Member of GNAS, Professor Elizbar Nadaraya (TSU);

Professor Serghey Cataranciuc (MSU).

Organizational Committee: Gaivoronski, Alexei; Didmanidze, Ibraim; Zaslavsky, Volodymyr; Knopov, Pavlo; Yamkova, Olga.

Local Organizing Committee: Prof. Zurab Megrelishvili, Prof. Albert Shatashvili, Assoc. Prof. Neli Akhvlediani, Assist Prof. Irma Bagrationi, Zebur Beridze, Didar Didmanidze, Merab Megrelishvili (BSU, Georgia), Prof. Omar Purtukhia (TSU, Georgia), Zurab Zakaradze (LEPL Batumi 6 Public Physics-Mathematical School).

Working Languages: English, Ukrainian, Georgian and Russian.

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Day of Arrival

Sunday, September 30, 2018, Batumi Shota Rustaveli State University

7.00-23.00	Accommodation of the summer school participants in the hotel: Family hotel in Batumi, district Gonio Kvariati, innkeeper Bahtadze Shalva. Contact Mobile Telephone Numbers: +995 599 276600 (Didmanidze, Ibraim) The map is given at: http://QRM-School.knu.ua
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Week one

	Monday 1	Tuesday 2	Wednesday 3	Thursday 4	Friday 5
Moderator	Didmanidze I.	Gaivoronski A	Purtukhia O.	Zaslavskiy V.	Shatashvili A.
10:00-10:45	Registration	Gaivoronski A. A. (2)	Cataranciu S.	Shashiashvili M.	Didmanidze I. (1)
10:45-11:30	Registration	Ermolieva T., Knopov P. (on IIASA, 1)	Hincu B. (1)	Knopov P. (1)	Gorbachuk V.(1)
11:30-12:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
12:00-12:45	Opening session	Zaslavsky V.	Zaslavsky V., Yamkova O.	Zaslavskiy V., Pasichna	Shatashvili A. (3)
12:45-13:30	Gaivoronski A.A. (1)	Shashiashvili M., Purtukhia O.	Hincu B. (2, practice)	Shatashvili A. (2)	Megrelishvili Z. (2)
13:30-15:00	Lunch	Lunch	Lunch	Lunch	Lunch
15:00-16:00	Presentations of Universities. Moderator: Didmanidze I.	Shatashvili A. (1)	Ermoliev Y., Knopov P. (on IIASA-NASU)	Megrelishvili Z. (1)	Fomina T. (1)
16:00-16:30	Excursion over BSU. Photo session. Organizational issues.	Excursion over Batumi.	Excursion to Gonio Fortress.	Black Sea	Black Sea
19:00-	Welcome party		Dinner		

Week two

	Monday 8	Tuesday 9	Wednesday 10	Thursday 11	Friday 12
Moderator	Knopov P.	Gorbachuk V.	Megrelishvili Z.	Didmanidze I.	Didmanidze I.
10:00-10:45	Lebedev Y. (1)	Lebedev Y. (2)	Bagrationi I. (1)	Megrelishvili K. (2)	Megrelishvili M. & Beridze Z.
10:45-11:40	Gorbachuk V. (2)	Gorbachuk V. (3)	Bagrationi I. (2)	Megrelishvili K. (3)	Black Sea
11:40-12:00	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
12:00-12:45	Sharapov M. (1)	Sharapov M. (2)	Megrelishvili K. (1)	Didmanidze I. (2)	Black Sea
12:45-13:30	Fomina T. (2)	Fomina T. (3)	Chachanidze G.	Discussion	Black Sea
13:30-15:00	Lunch	Lunch	Lunch	Lunch	Lunch
15:00-15:45	Black Sea	Black Sea	Black Sea	Black Sea	Black Sea
15:45-16:30	Black Sea	Black Sea	Black Sea	Black Sea	Black Sea
16:30-17:00	Black Sea	Black Sea	Black Sea	Black Sea	Black Sea

List of Lectures:

1. BAGRATIONI Irma, Assistant Prof. (BSU). "Risk Management in Social and Political Organizations [In Accordance with Ethical Principles]" (1).
2. BAGRATIONI Irma, Assistant Prof. (BSU). "Risk Managers of Art Marketing [The Famous Artistic and Literary Heroes]" (2).
3. CATARANCIUC Serghey, Professor (MSU). "Solving of Optimization Problems on Discrete Structures".
4. CHACHANIDZE Guram (BSU). "Modern Technologies of Management of Education".
5. DIDMANIDZE Ibraim, Professor (BSU). "Ecology and Risk" (1).
6. DIDMANIDZE Ibraim, Professor (BSU). "Informatics and Quantitative Risk Management" (2).
7. ERMOLIEVA Tatiana, PhD (IIASA), Prof. KNOPOV Pavlo, Professor (GIC), Prof. NORKIN Volodymyr, Prof. ZASLAVSKYI Volodymyr. "Coping with Risk and Uncertainty in IIASA Protects".
8. ERMOLIEV Yury, Professor (IIASA), ERMOLIEVA Tatiana, PhD (IIASA), KNOPOV Pavlo, Professor (GIC). "On Collaboration NASU-IIASA".
9. FOMINA Tamara (BSU). "Optimal Estimates in Problems of extrapolating random Processes in a Hilbert Space" (1).
10. FOMINA Tamara (BSU). "Optimal Estimates in Filtration Problems for Random processes in a Hilbert Space" (2).
11. FOMINA Tamara (BSU). "Optimal Estimates in Problems of Extrapolation, filtration, and interpolation of functionals of random processes with values from a Hilbert Space" (3).
12. GAIVORONSKI Alexei, Professor (NTNU). "Telecommunication Networks: Internet Economics and Risk Management" (1).
13. GAIVORONSKI Alexei, Professor (NTNU). "Telecommunication Networks: Internet Economics and Risk Management" (2).
14. GORBACHUK Vasil, Professor (GIC). "Risk Indicators for Fragile Networks" (1).
15. GORBACHUK Vasil, Professor (GIC). "Agency Problems, bubbles, and economic Network Crises" (2).
16. GORBACHUK Vasil, Professor (GIC). "Optimal Risk Sharing, Decentralization, Contagion, and Robustness" (3).
17. HINCUB Boris, Associate Professor (MSU). "Nash equilibrium in Noncooperative games" (1).
18. HINCUB Boris, Associate Professor (MSU). "Global functions for receiving and sending messages in MPI programming" (2, practical training).
19. KNOPOV Pavlo, Corresponding Member of NASU, Professor (GIC). "Some problems of stochastic optimization, risk theory and control theory for stochastic systems" (1).
20. LEBEDEV Yevgen, Professor (TSNUK). "Lecture1 Optimal choice of failure probabilities in generalized Erlang systems" (1).
21. LEBEDEV Yevgen, Professor (TSNUK). "Algorithms for calculating blocking probabilities in retrial queueing systems" (2).
22. MEGRELISHVILI Konstantin (BSU). "The main functions of Management" (1).

- 23.MEGRELISHVILI Konstantin (BSU). "Methods and principles of Risk Management" (2).
- 24.MEGRELISHVILI Konstantin (BSU). "Risk Assessment in Business" (3).
- 25.MEGRELISHVILI Zurab, Professor (BSU). "Water and Geopolitics" (1).
- 26.MEGRELISHVILI Zurab, Professor (BSU). "Risks of Decision-Making in Environmental Protection" (2).
- 27.MEGRELISHVILI Merab & BERIDZE Zebur, Senior Lecturers (BSU). "The Black Sea and Risk-Factors of Ecological Catastrophe".
28. PRESENTATIONS of Universities (**NTNU, TSNUK, GIC, TSU, BSU, MSU, ATIC**)
- 29.SHARAPOV Myhailo, Associate Prof. (TSNUK). "Calculation of reliability Indexes for systems with unreliable devices" (1).
- 30.SHARAPOV Myhailo, Associate Prof. (TSNUK). "Calculation of reliability Indexes for systems with unreliable devices" (2).
- 31.SHASHIASHVILI Malkhaz, Professor (TSU), PURTUKHIA Omar, Professor (TSU). "Risk Factors and Loss Distributions".
- 32.SHASHIASHVILI Malkhaz, Professor (TSU). "Value-at-Risk (VaR) and Expected Shortfall".
- 33.SHATASHVILI Albert, Professor (BSU). "Probabilistic spaces, random functions, and a random process" (1).
- 34.SHATASHVILI Albert, Professor (BSU). "On the equivalence of two Gaussian measures" (2).
- 35.SHATASHVILI Albert, Professor (BSU). "On the equivalence of probability measures" (3).
- 36.ZASLAVSKYI Volodymyr, Professor (TSNUK). "Optimal resource allocation for critical infrastructure protection" (1).
- 37.ZASLAVSKYI Volodymyr, Professor, YAMKOVA Olga (TSNUK). On the thematic lecture to be announced. (2)
- 38.ZASLAVSKYI Volodymyr, Professor, PASICHNA, PhD student (TSNUK). On the thematic lecture to be announced. (3)

Key Lecturers

Ibraim Didmanidze, Professor, DSc.:

Ibraim Didmanidze Professor, Doctor of Physical and Mathematical Sciences, Head of the direction of Information Technologies of the Center of Languages and Information Technologies at the GE-Shota Rustaveli State University (Batumi, Georgia). He is Member of the Engineering Academy of Georgia. he author of more than 170 scientific and methodical works, including two monographs, one Georgian patent, and a textbook book. His scientific works are in the field of Graph Theory and the development of mathematical models for technology processes. Leading specialist in ISTC project G- 725.

Yuri Ermoliev Professor, DSc.:

Professor, DSc. Ermoliev is a Member of the Ukrainian Academy of Sciences since 1988. Professor Y.Ermoliev has been the Head of the Department of Mathematical Methods of Operations Research at the Institute of Cybernetics of the Ukrainian Academy of Sciences, Kiev, since 1969. He was first employed with the International Institute for Applied Systems Analysis (IIASA, Laxenburg, Austria) in the System and Decision Sciences Program from 1979 to 1984, undertaking research in non-differentiable and stochastic optimization problems. In 1991 he was a visiting professor with the University of California at Davis. Currently, Professor Y.Ermoliev is the IIASA Institute Scholar contributing his research to the Advanced Systems Analysis Program at IIASA. Professor Ermoliev is a State Prize Winner in Science of Ukraine (1978) and the State Prize Winner in Science of the USSR (1981). He was awarded the Order of

St. George the Victorious and medals of the National Academy of Sciences as a distinction for his extraordinary achievements in science. His long-term outstanding contribution has been recognized by the Mathematical Programming Society by the award of the "Pioneer in Stochastic Programming". Professor Ermoliev's scientific interests strongly follow the well-established tradition of the famous school of Ukrainian mathematicians in advancing the mathematics towards new challenging practical problems that could not be solved by existing methods. Working after the University at the Computing Center of the National Academy of Sciences, which later become the Glushkov Institute of Cybernetics, Ermoliev encounter in a vast variety of applications requiring multidisciplinary approaches, new mathematics, models and methods. He was fascinated by fundamental challenges which must be confronted in advancing mathematician towards realistic applications to socio-economic and environmental problems. Professor Ermoliev's research focuses on modeling of decision-making processes in the presence of risks and uncertainties, stochastic and dynamic systems optimization, optimization on networks, and nonlinear dynamics. His major publications include Stochastic Programming Methods (1976), Stochastic Models in Economics (1979), and Techniques for Stochastic Optimization (1988). Other publications concern the study of path-dependent adaptation processes, pollution control problems, catastrophic management problems, energy and agriculture modeling, reliability theory, and optimization of discontinuous systems, in particular, discrete event systems optimization, which paths may be significantly affected by the occurrence of rare events.

Tatiana Ermolieva, PhD:

Tatiana Ermolieva is a Research Scholar with Ecosystems Services & Management Program (ESM) at the International Institute for Applied Systems Analysis (IIASA, Laxenburg, Austria). She holds the Kjell Gunnarson's Risk Management Prize (Swedish Insurance Society) and a IIASA Peccei Award for her work on optimal decisions for coping with dependent catastrophic risks. Tatiana Ermolieva has a master's degree in applied mathematics with specialization in statistics, optimization, and economics from Kyiv State University, Ukraine, and a PhD on spatio-temporal estimation and optimization of heterogeneous values and flows in complex dynamic and stochastic systems. Her main research interests are analysis and modeling of complex socioeconomic, agricultural, environmental, and financial systems with explicit treatment of uncertainties, risks, extreme events, and spatial and temporal heterogeneities of regions and agents. She develops quantitative models and methods, including software and practical applications, for designing strategies ensuring robust system performance in the presence of uncertainties and risks, in particular of extreme catastrophic nature. Tatiana Ermolieva's activities with ESM concern GIS-based modeling and optimization of regional developments, methodologies for robust downscaling of land use (including agricultural) values from incomplete, uncertain, aggregate information; non-parametric approaches to data estimation and recovering. Recent practical studies cover topics of global food security and adaptation under climatic uncertainties and risks; fusion of downscaling within the framework of ESM's GLOBIOM model; treatment of systemic risks with a stochastic version of GLOBIOM; design of robust insurance programs (including cat bonds, contingent credits, mutual funds) against climatic disasters, e.g., floods; analysis of robust economic instruments (emission trading markets) under uncertainties; and discounting under catastrophic risks. She applies her skills in several EU projects, in collaborative research with colleagues from various IIASA programs, joint research with IIASA NMOs and other institutions.

Alexei Gaivoronski, PhD, Professor, Norwegian University of Science and Technology (Norway):

Alexei Gaivoronski is Professor of Industrial Economics and Operations Research at the Department of Industrial Economics and Technology Management.

He is one of the leading international experts in methods of optimal decision support under uncertainty and in particular stochastic optimization, risk management. His interests cover both theoretical and applied issues and particular applications in telecom, ICT economics, finance and investment. He published more than 70 research papers on these issues. Besides academic experience, he has extensive industrial experience where he worked in telecom industry and consulted for Hydro, Xerox, Telenor. He was the principal investigator in FP7 SPICE integrated project from NTNU where he led the team on evaluation of business models for provision of advanced mobile data services. He led the operations research group in IOT and obtained different industrial and academic grants. He is a participant in the international collaboration network on optimization under uncertainty and risk management, member of program committees of international conferences in stochastic programming and industrial optimization.

Vasyl Gorbachuk, DSc, Professor, Glushkov Institute of Cybernetics, National Academy of Sciences of Ukraine (Ukraine):

Vasyl Gorbachuk DSc (Physics and Mathematics) in the field of Informatics and Cybernetics; Senior Research Associate, Department of Operations Research, V.M.Glushkov Cybernetics Institute (GIC), National Academy of Sciences of Ukraine; Professor, Chair of Finance, Department of Economic Sciences, National University of Kyiv Mohyla Academy (NaUKMA). Studied at Moscow Physical Technical Institute (Department of Management and Applied Mathematics) and Michigan State University (Department of Economics). Author of 7 books in Economics, Finance, Industrial Organization, Informatics, author of 400+ academic articles; editor of 2 books in Energy and Economics, editor of «Scientific Papers NaUKMA. Economics».

Pavlo Knopov, Professor, Corresponding Member of the National Academy of Sciences of Ukraine, Glushkov Institute of Cybernetics, National Academy of Sciences of Ukraine (Ukraine):

Affiliation and Official Address: Department of Mathematical Methods of Operation Research, V.M.Glushkov Institute of Cybernetics of National Academy of Science, Head of Department of “Mathematical Methods of Operation Research”, Professor of Taras Shevchenko National University of Kyiv. **Education:** Taras Shevchenko National University of Kyiv, Mathematical Faculty, Ukraine; Master of Science Degree in Mathematics, PhD, Doctor of Science in Mathematics. **Awards:** State Award of Ukraine in Science and Technology; V. M. Glushkov Award National Academy of Science of Ukraine (1997). Pavel Knopov supervised 15 PhD students. **Research interests:** 1. Problems of estimation of random processes and fields, 2. Control of random processes and fields, 3. Stochastic optimization problems. Publications: 200+ papers in refereed journals, 11 books.

Volodymyr Zaslavskiy, DSc (Technologies), Professor, Faculty of Computer Science and Cybernetics, Taras Shevchenko National University of Kyiv:

Volodymyr Zaslavskiy graduated from Taras Shevchenko National University of Kyiv, Cybernetics Faculty, and continued his professional career within Alma Mater. He participated in numerous R&D projects related with optimization of complex systems reliability (satellites, rockets launching and communications complexes, etc.), Member of IIASA Society, from 1997 to 2012 he was the President of AFCEA Chapter in Ukraine. In 2007 he received DSc (Technologies) degree by speciality “System Analysis

and Optimal Decisions Theory”. Prof V. Zaslavskiy promotes Type-Variety Principle to increase reliability of complex technical systems; He is the author of more than 180 scientific publications and 5 books. In 2011 he received Professorship. He has International Soros Science Education Program Award (1995), AFCEA Chairman’s Superior Performance Award (1999) and IBM Faculty Award (2004).

Participants of the Batumi Summer School

Name	Affiliation, Ranks and Position
Akhvlediani Neli	Batumi Shota Rustaveli State University , Faculty of Technologies, Center of Languages and Information Technologies (Batumi, Georgia), Associate Professor.
Bagrationi Irma	Batumi Shota Rustaveli State University , Faculty of Humanities, Department of Philosophy (Batumi, Georgia), Assistant Professor.
Beridze Zebur	Batumi Shota Rustaveli State University , Faculty of Technologies, Center of Languages and Information Technologies (Batumi, Georgia), Senior Lecturer & Researcher.
Cataranciuc Serghey	Moldova State University (Moldova) . Professor.
Cataranciuc Emil	Moldova State University (Moldova) . PhD student.
Chachanidze Guram	Batumi Shota Rustaveli State University , Faculty of Technologies, Center of Languages and Information Technologies (Georgia),
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Megrelishvili Merab	Batumi Shota Rustaveli State University , Faculty of Technologies, Center of Languages and Information Technologies (Batumi, Georgia), Senior Lecturer & Researcher.
Mociu Alexandra	Moldova State University , Student (Moldova).
Pasichna Maya	Taras Shevchenko National University of Kyiv , Faculty of Computer Science and Cybernetics, Department of Mathematical Informatics (Ukraine), PhD student.
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