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INTERNATIONAL SUMMER SCHOOL

SOURCE OF CREATIVITY: MATHEMATICS

Jul 1st – Jul 14th, 2023

Harbin Institute of Technology, Harbin, P.R. China

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GENERAL INFORMATION

Mathematics, especially theoretical mathematics, is an important foundation for scientific research. Both artificial intelligence and quantum communication need strong support from foundamental disciplines such as mathematics and physics. The reason for lack of major original scientific research results is that the 'neck' is stuck in the foundamental disciplines. In order to build up students' foundation in theory, to understand the cross-application of mathematics and other fields, and to cultivate more innovative talents, the School of Mathematics relies on the Sino-Russian Joint Research Centre for Applied Mathematics and the Sino-Russian Joint Campus in terms of both foundamental mathematics and cross-application, and invites experts in relevant fields from the Russian Academy of Sciences, St. Petersburg State University and St. Petersburg State Technical University to conduct course teaching, academic lectures and innovative practical activities. The international summer school will include subjects such as mechanics and mathematics, game theory and mathematical statistics. This international summer school is characterized by "equal emphasis on foundation and cross application", which will broaden students' academic vision and knowledge application ability, and cultivate excellent reserve talents for mathematics and cross application disciplines.

PROJECT ARRANGEMENT

- **COURSES AND LECTURES**

Speaker	Professional Title	Institution	Topic

Mazalov Vladimir	Professor	Russian Academy of Sciences	Social network analysis
ELENA PARILINA	Professor	St. Petersburg State University, Russia	Mathematical statistics
ANNA TUR	Associate professor	St. Petersburg State University, Russia	Queuing theory
Gubar Elena	Associate professor	St. Petersburg State University, Russia	Evolutionary game theory
Igor Ignatovich	Researcher	St. Petersburg State University, Russia	Mathematical methods of classical mechanics
Ivan Blekanov	Associate professor	St. Petersburg State University, Russia	Web3.0
Krylatov Alexander	Associate professor	St. Petersburg State University, Russia	Optimization method

● **RESEARCH PROJECT**

In this summer school, students will work in groups on the following topics.

(1)Social network analysis

The objective of this project is to gain a deep understanding of social network analysis methods through data set analysis of facebook.

(2)Mathematical statistics practical project

The linear regression method was used to predict the house prices in Harbin: the dependent variable (house prices) could be predicted by fitting the independent variables. The project is based on the study of specific problems and the calculation of linear regression.

(3)Practice of queuing theory

Consider a customer queuing model, analyze the queuing elements, formulate queuing rules and service rules, and use MATLAB to generate and implement a queuing system with GUI interface.

(4)Virus transmission model

Consider constructing a virus SEIR model and conducting simulation prediction based on the COVID-19 data in spring 2020.

(5)Practical research on mathematical methods of classical mechanics

The movement of the double pendulum is simulated numerically. The project requires students to use MATLAB or other mathematical software to solve its equations of motion and observe simple harmonic vibration and chaotic processes.

(6)Web3.0 research

Discuss the technical prospects of WEB3.0 freely by comparing WEB3.0 and WEB1.0 with WEB2.0.

(7)Optimization method practice

For a given class of items, students are grouped into unconstrained optimization methods to solve, and compare the differences between different algorithms.

PROGRAM DATES AND TIMES

Summer School: 1 July 2023 to 14 July 2023

CONTACT INFORMATION

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