Maksat Kuanyshbay

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EDUCATION

01/2021—12/2022	**M.S. in Scientific Computing**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
	• Cumulative GPA: 3.7 / 4.0
08/2016—06/2020	**B.S. in Mathematics**, Nazarbayev University – *Astana, Kazakhstan*
	• Cumulative GPA: 3.8 / 4.0
	• Magna Cum Laude
05/2019—07/2019	**Summer Studies in STEM**, University at Buffalo – *NY, USA*

HONORS AND AWARDS

International

11/2018	**2nd Prize**, The 1st Al-Khorezmi International Mathematical Olympiad – *Urgench, Uzbekistan*
05/2018—06/2018	**4th Prize**, 2nd International Summer School on "Mathematical Methods in Science and Technology" – *Almaty, Kazakhstan*
04/2018	**3rd Prize**, 5th North Countries Universities Mathematical Competition – *Astana, Kazakhstan*
08/2017	**3rd Prize**, 24th International Mathematics Competition for University Students – *Blagoevgrad, Bulgaria*

National

11/2020	**International Bolashak Scholarship**, awarded to cover all the expenses related to graduate studies at NYU in amount of $ 140,000
04/2019	**2nd Prize**, Republican Olympiad in Mathematics – *Astana, Kazakhstan*
04/2018	**3rd Prize**, Republican Olympiad in Mathematics – *Almaty, Kazakhstan*
04/2017	**3rd Place**, Republican Student Olympiad in Mathematical and Computer Modeling – *Astana, Kazakhstan*

2016—2018	**Dean's List**
	• For attaining a semester GPA of at least 3.75 out of 4.0
	• 5 times for Fall 2016, Spring 2017, Fall 2017, Fall 2018, Fall 2019

2014—2015	**Participant of IMO Training Camps**
	• Was among top 12 high school students who were gathered in winter and spring camps for special training and further selection for International Mathematical Olympiad

RESEARCH EXPERIENCE

07/2023—Present	**Research Assistant**, Nazarbayev University – *Astana, Kazakhstan* Name of Project: **Multiattribute Utility Functions under Proper Partial Utility Independence Condition: Methods and Applications** Principal Investigator: **Yerkin Abdildin**
	• Reproduced the research results from "Analysis of Decision Alternatives of the Deep Borehole Filter Restoration Problem" written by Y. Abdildin, A. Abbas (2016)
	• Constructed multiattribute utility functions for the cases when attributes are fully independent, partially dependent and fully dependent
05/2023—Present	**Research Assistant**, Courant Institute of Mathematical Sciences, New York University – *remote* Name of Project: **Surgical Simulation for Manipulating the Omentum** Principal Investigator: **Gizem Kayar**

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- Studying "Working with Volumetric Meshes in a Game Engine: a Unity Prototype" written by L. Pitzalis, G. Cherchi, R. Scateni, and L. D. Spano (2020).
- Studying numerical integration methods, including Euler's method, Euler-Cromer method, and Verlet's method for the implementation of mass-spring system that is used to create the physical representation of deformable object

09/2022—12/2022 | **Graduate Project**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
Name of Project: **An Augmented Large Language Model for Patent Acceptance Prediction**
Course Title: **CSCI-GA 2565 Machine Learning**
Course Grade: **A-**
Course Instructor: **Rajesh Ranganath**
- Designed and implemented an augmented hierarchical language model for the Harvard USPTO Patent Dataset in a 3-person team using Python
- Implemented Sentence Transformer with SciBERT word embeddings to transform the input sequence

09/2022—12/2022 | **Graduate Project**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
Name of Project: **Emoji Diffusion**
Course Title: **CSCI-GA 2271 Computer Vision**
Course Grade: **A**
Course Instructor: **Rob Fergus**
- Experimented with a simplified version of denoising diffusion probabilistic model (DDPM) on an emoji dataset in a 3-person team using Python
- Experimented with varying noise scheduler (linear and cosine), loss function (L1 and L2), and model architecture

01/2022—05/2022 | **Capstone Project**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
Name of Project: **Accelerating Ray Tracing**
Course Title: **MATH-GA 2012 Advanced Topics in Numerical Analysis: High-Performance Computing**
Course Grade: **A**
Course Instructor: **Benjamin Peherstorfer**
- Designed and implemented ray tracing algorithms with parallelization in OpenMP and CUDA in a 3-person team using C++ on Linux
- Implemented OpenMP parallelization of ray casting loops for different scheduling and number of threads that provided a near 3x speedup over the original algorithm

11/2019—05/2020 | **Research Assistant**, Nazarbayev University – *Astana, Kazakhstan*
Name of Project: **Micro-Electro-Mechanical Systems Problem**
Principal Investigator: **Anastasios Bountis**
- Implemented in Python professor Bountis' pull-in solution of the main differential equation according to Singularity analysis
- Found the solution using the Python implementation of the 4th order Runge-Kutta method and compared the results

09/2018—07/2019 | **Research Assistant**, Nazarbayev University – *Astana, Kazakhstan*
Name of Project: **Imaging in Seismic Exploration**
Principal Investigator: **Yogi Erlangga**
- Reproduced the research results from "The Method of Difference Potentials for the Helmholtz Equation Using Compact High Order Schemes" written by M. Medvinsky, S. Tsynkov, E. Turkel (2012)
- Learned to derive polar forms of the 1st and 2nd approximations of the highly absorbing local boundary conditions using conformal mapping
- Used five-node stencil for the numerical approximation of both solution and data

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- Applied the method of difference potentials in 2D space for circular domain

RESEARCH INTERESTS

My research interests primarily lie with the mathematical foundations of machine learning. I am also interested in the application of numerical methods in differential equation solvers for Computational Fluid Dynamics, 3D Reconstruction in Computer Graphics and Virtual Reality, and Optical Flow of Fluids in Computer Vision.

PUBLICATIONS

1. Skrzypacz, P, He, J-H, Ellis, G, Kuanyshbay, M. A simple approximation of periodic solutions to microelectromechanical system model of oscillating parallel plate capacitor. *Math Meth Appl Sci*. 2020; 1– 8. https://doi.org/10.1002/mma.6898

WORK EXPERIENCE AND UNIVERSITY SERVICE

01/2021—12/2022   **Recitation Leader**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
Course List: **Honors Linear Algebra, Math for Economics**
- Worked 10 hours per week as a recitation leader for the class of around 70 students at the Courant Institute of Mathematical Sciences
- Held weekly recitation sessions and office hours, proctored, graded, and gave feedback on students' quizzes and exams

01/2021—12/2022   **Grader**, Courant Institute of Mathematical Sciences, New York University – *New York, USA*
Course List: **Graduate Computer Graphics, Numerical Analysis, Linear, Nonlinear Optimization**
- Worked 10 hours per week as a grader for the class of around 40 students at the Courant Institute of Mathematical Sciences
- Held weekly office hours, graded, and gave feedback on students' assignments

08/2018—05/2019   **Board Member of the Student Government**, Nazarbayev University – *Astana, Kazakhstan*
- Actively participated in organizing events such as: Scholarship Fair, Informal Sessions with Professors, Winter Camp, Midterm Preparation Nights

08/2018—05/2019   **Students' Representative in the Self-Evaluation Group**, Nazarbayev University – *Astana, Kazakhstan*
- Participated on biweekly meetings and discussions about the University's external Follow up Evaluation process by the European University Association

06/2018—08/2018   **Intern in Financial Management Department**, KPMG – *Astana, Kazakhstan*
- Developed a sentiment analysis algorithm to study KPMG's perceived reputation in Kazakhstan
- Performed data pre-processing on unstructured data about private and governmental companies listed on Kazakhstan Stock Exchange (KASE)

09/2015—11/2015   **Mathematics for Olympiads Tutor**, Nurorda High School – *Astana, Kazakhstan*
- Prepared a group of high school students for regional and international competitions in mathematics specifically geometry, number theory, algebra and combinatorics

TECHNICAL COMPETENCIES   https://github.com/KMaxx

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Python	4 completed graduate courses at New York University:

Python
4 completed graduate courses at New York University:
- CSCI-GA 2271 Computer Vision (3 assignments, 1 group project)
- CSCI-GA 2565 Machine Learning (2assignments, 1 group project)
- MATH-GA 2010 Numerical Methods I (7 assignments)
- MATH-GA 2704 Applied Stochastic Analysis (6 assignments)

4 completed undergraduate courses at Nazarbayev University:
- ROBT 407 Statistical Methods and Machine Learning (2 group projects)
- PHYS 270 Computational Physics with Laboratory (11 laboratory sessions, 6 assignments)
- CSE 474 Intro Machine Learning (2 group projects)
- ROBT 205 Signals and Sensing with Lab (2 laboratory sessions)

MATLAB
2 completed graduate courses at New York University:
- CSCI-GA 2945 Advanced Topics in Numerical Analysis: Convex and Nonsmooth Optimization (10 assignments)
- MATH-GA 2020 Numerical Methods II (6 assignments)

1 completed undergraduate course at Nazarbayev University:
- ROBT 205 Signals and Sensing with Lab (11 laboratory sessions)

C++
2 completed graduate courses at New York University:
- MATH-GA 2012 Advanced Topics in Numerical Analysis: High-Performance Computing (4 assignments, 1 group project)
- MATH-GA 2270 Computer Graphics (6 assignments)

Mathematica
10 solved Wolfram Language Challenges in Programming & Computational Thinking, that helped to get acceptance for Wolfram Summer School.

Java
1 completed undergraduate course at Nazarbayev University:
- CSCI 152 Performance and Data Structures (11 laboratory sessions, 2 assignments)

12-week app development bootcamp

C
1 completed undergraduate course at Nazarbayev University:
- CSCI 151 Programming for Scientists and Engineers (11 laboratory sessions, 2 assignments)

MATHEMATICAL COURSEWORK

Advanced Partial Differential Equations, Fluid Dynamics, Nonlinear Differential Equations, Probability, Mathematical Statistics, Regression Analysis, Real Analysis, Applied Finite Element Methods

LANGUAGES

English (Fluent), Kazakh (Native), Russian (Fluent), Turkish (Conversational)

REFERENCES

Prof. Robert V. Kohn
Email: kohn@cims.nyu.edu

Prof. Leslie Greengard
Email: greengar@cims.nyu.edu

Prof. Sylvia Serfaty
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Prof. Yogi Erlangga
Email: yogi.erlangga@zu.ac.ae

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