Alaittin Kirtisoglu

Chicago | *Istanbul* | *akirtisoglu.me/*

Education

PhD in Applied Mathematics, Illinois Institute of Technology *May 2026*

- Research areas: Optimization, network design, spatial analysis
- Excelled in optimization algorithms, large-scale data analysis, graph and machine learning algorithms

MSc in Mathematics, Hacettepe University *June 2021*

- GPA: 3.93 (top 1%). Research area: Graph theory

BSc in Mathematics, Mustafa Kemal University *June 2018*

- GPA: 3.45/4.00 (top 1%)

Experience

Research Internship, Fermilab May–August, 2022

- Developed a hierarchical clustering to classify energy deposits in a physics experiment
- Designed a neural network to describe neutrino interactions in the detector

Teaching Assistant, Part Time - Illinois Institute of Technology 2021 –Present

Teaching Assistant, Full Time - TED University, Ankara Turkey 2019 –2021

Selected projects

Practical Routing Strategies for the Chicago Transportation Network Present

- Developing a Python library to calculate the best routes and precise travel times
- Designing cost-effective optimization strategies to solve the star-shaped central network issue

Deep Reinforcement Learning for Hierarchical Facility Location Present

- Designing new search algorithms via Graver bases from applied algebra
- Implementing a deep reinforcement learning algorithm to fasten the search in a large space

Designing an Equitable Primary Care Network: Chicago Case Study - *Won a fellowship!* Sep 2024

- Constructed Chicago healthcare and transportation networks using GTFS and Census datasets
- Implemented local search algorithms such as simulating annealing, tabu search, and old bachelor
- Designed a Markov chain algorithm to locate new facilities equalizing public transportation accessibility

Virtual Admission Committees with LLMs and Multi-Agent Systems June 2024

- Designed a RAG process to teach agents the special knowledge needed for their profiles
- Designed a discussion prompt for the agents. Evaluated logical reasoning in the discussion

Publications

[1] Kaul, H. And **Kirtisoglu, A.** *Designing an equitable primary care network: Chicago case study*, *Submitted.*

[2] **Kirtisoglu, A.** And Özkahya, L. *Coloring of graphs avoiding bicolored paths of a fixed length*, *Graphs and Combinatorics*, vol. 40, no. 1, p. 11, 2024.

Skills

- **Tools:** Python, R, CPLEX, LateX, GIS, ArcGIS
- **Libraries:** Geopandas, OSMnx, Folium, NetworkX, LangChain, LlamaIndex, TensorFlow, PyTorch, ScikitLearn, Gerrychain, Matplotlib
- **Theory:** Integer programming, optimization, AI agents, reinforcement learning, deep learning, regression, statistical analysis, machine learning, algorithm design, graph algorithms