

# **Yuanchao Xu**

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Room 4-405, Maskawa Building for Education and Research, Kyoto University  
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## **Working Experience**

**Kyoto University**  
Postdoc, Applied Mathematics  
September 2025 - August 2030

## **Education Experience**

**University of Alberta**  
Doctor of Philosophy (*Dissertation Award*), Applied Mathematics  
September 2021 - August 2025

**University of Manitoba**  
Master of Science, Mathematics  
September 2018 - August 2020

**University of Oregon**  
Bachelor of Science (*Cum Laude*), Mathematics  
January 2015 - December 2017

## **Research Interest**

My research interest lies in data-driven methods for stochastic dynamical system. In particular, I am interested in building up theoretical framework for learning stochastic Koopman operator and applying it into complex real-world problems, e.g., neurodynamics, reinforcement learning and generative diffusion modeling, etc.

## **Research**

1. Generative Modeling through Koopman Spectral Analysis: An Operator-Theoretic Perspective arXiv, 2025)
2. Reinforced Data-Driven Estimation for Spectral Properties of Koopman Semigroup in Stochastic Dynamical Systems (arXiv, 2025)
3. Spectral analysis of Koopman operator through pseudo-resolvent (in preparation, 2025)
4. A Data-Driven Framework for Koopman Semigroup Estimation in Stochastic Dynamical Systems (accepted by Chaos, 2025)
5. Koopman Eigenfunctions Links Multiscale State-Dependent Brain Dynamics (in preparation, 2025)
6. ResKoopNet: Learning Koopman Representations for Complex Dynamics with Spectral Residuals (ICML2025 (poster), Vancouver, Canada, 2025)
7. Koopman Spectral Analysis Uncovers the Temporal Structure of Spontaneous Neural Events (COSYNE (poster), Lisbon, Portugal, 2024)
8. Decentralized Multi-Agent Reinforcement Learning for Task Offloading Under Uncertainty (arXiv, 2021)

## **Talk**

1. *Data-Driven Koopman Framework for Modeling Complex Dynamical Systems*  
Fudan University, Shanghai, China, January 5th, 2026
2. *Data-Driven Koopman Framework for Modeling Complex Dynamical Systems*  
European Molecular Biology Laboratory, Rome, Italy, November 24th, 2025 (Online)
3. *Data-Driven Koopman Framework for Modeling Complex Dynamical Systems*  
Laboratoire Hubert Curien, Saint-Étienne, France, October 14th, 2025
4. *Stochastic dynamic mode decomposition: theory, algorithms, and reinforced extensions for Koopman spectral analysis*  
*Japan-Italy Workshop on Learning Dynamical Systems*  
IIT, Genova, Italy, October 9-10th, 2025

5. Perturbation method for learning stochastic Koopman operator  
*CREST*  
 RIKEN, Kobe, Japan, December 26-28th, 2024
6. Extracting Dynamics from Complex Systems: Deterministic and Stochastic Perspectives  
 East China University of Science and Technology, Shanghai, China, December 19th, 2024
7. Data-driven dynamical system with Koopman operator  
*Alberta Graduate Mathematics and Statistics Conference(AGMSC)*  
 University of Alberta, Edmonton, Canada July 3-5th, 2024

#### Visiting

1. Fudan University, China, January 5-9th, 2026
2. Laboratoire Hubert Curien, Saint-Étienne, France, October 14-15th, 2025
3. European Molecular Biology Laboratory, Rome, Italy, October 11-13th, 2025
4. Istituto Italiano di Tecnologia, Genoa, Italy, October 9-10th, 2025
5. Ehime University, Matsuyama, Japan, December 23-25th, 2024

#### Awards

- Faculty of Science Doctoral Dissertation Award, 2025
- Mary Louise Imrie Graduate Student Award, 2025
- Dr. Josephine M. Mitchell Recruitment Scholarship, 2021
- International Graduate Student Entrance Scholarship, 2020
- International Graduate Student Entrance Scholarship, 2018
- Clarence and Lucille Dunbar Scholarship, 2017

#### Teaching Experience

Math 102(lab) Applied Linear Algebra	Winter 2025
Math 209(lab) Calculus for Engineering 3	Fall 2024
Math 209(lab) Calculus for Engineering 3	Spring 2024
Math 102(lab) Applied Linear Algebra	Winter 2024
Math 201(lab) Differential Equations	Fall 2023
Math 101(lab) Calculus for Engineering 2	Spring 2023
Math 201(lab) Differential Equations	Winter 2023
Graduate Research Assistant	September 2020 - August 2021
Graduate Teaching Assistant	September 2018 - August 2020
Undergraduate Teaching Assistant	September 2016 - December 2017
Undergraduate Math Tutor	April 2016 - December 2017