# Guangyuan Liao, PhD

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## Education

**PhD** New Jersey Institute of Technology, Applied Mathematics 2020
GPA: 3.84/4.00; Advisor: Prof. Amitabha Bose
Dissertation: Mathematical models and tools to understand coupled circadian oscillations and limit cycling systems

**MSc** Sichuan University, Computational Mathematics 2014
Advisor: Prof. Bing Hu

**BSc** Sichuan University, Mathematics 2011

## Research interests

**Dynamical system**: limit cycling systems, invariant manifold computation, Poincare maps.

**Mathematical biology:** neural networks, circadian rhythms, modeling, model reduction.

**Data sciences:** parameter estimation, machine learning.

## Publications and conference presentations

**Guangyuan Liao**, Casey Diekman, Amitabha Bose. Entrainment dynamics of forced hierarchical circadian systems revealed by 2-dimensional maps. SIADS, 2020, in press, arXiv.

**Guangyuan Liao**, Casey Diekman, Amitabha Bose. Mathematical Models and Tools for understanding the Entrainment of Hierarchical Circadian System. SIAM Conference on Appl. Dyn. Syst., 2019. Poster.

**Guangyuan Liao**, Casey Diekman, Amitabha Bose. Entrainment dynamics of forced hierarchical circadian systems. Dynamics Days, 2020. Poster.

**Guangyuan Liao**, Amitabha Bose. Maps for coupled hierarchical kuramoto oscillators with discontinuous forcing. In preparation.

## Research Experiences

**Research assistant** 2016 - 2020
Advisor: Prof. Amitabha Bose

**PhD Dissertation**

- Developed a model with slow-fast dynamics and a coupled Kuramoto phase model for hierarchically coupled circadian systems.
- Improved the isochron computing algorithm of two-dimensional limit cycling systems.
- Constructed a mapping which greatly reduced the dimension of the original system.

**Project: Development of models and tools to understand circadian systems.**

- Developed mathematical models to study the entrainment of circadian oscillators.
- Constructed the entrainment map to predict the entrainment time and direction of entrainment.

## TEACHING EXPERIENCES

**New Jersey Institute of Technology,** Newark, NJ August 2015 - May 2020
**Teaching assistant**, Department of Mathematical Sciences

- Taught recitations for Calculus I & II courses, covering topics such as differentiation, integration, limits and elementary functions.
- Graded students work.
- Received good evaluation from the course coordinators.

**Lab instructor**, Department of Mathematical Sciences Fall 2019

- Taught lab sessions for *Mathematical Modeling (undergraduate), Teaching in Mathematics (post-graduate)*.
- Instructed undergraduate and postgraduate seminars on basic programming skills frequently used in solving scientific computing problems.
- Developed course assignments and final assessment, see course materials.

**Sichuan University,** Chengdu, China September 2012 - July 2014
**Teaching assistant**, Department of Mathematical Sciences

- Assisted the instructors of *Linear Algebra, Analysis*.
- Graded students work.

## COMPUTER SKILLS

**Programming**: MATLAB, LaTeX, Julia, Mathematica, Python, C++, HTML.

**Platforms**: Windows, Linux, MAC.