

# Ruby Kim

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## Education

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- **Duke University** **Durham, NC**  
○ *Ph.D. in Mathematics* *Aug 2017–May 2022*  
*Thesis: Modeling the Interactions between the Circadian Clock, Dopamine, and Metabolism*  
Advisor: Dr. Michael C. Reed
- **Pomona College** **Claremont, CA**  
○ *B.A. in Mathematics (Applied Track)* *Sep 2013–May 2017*  
*Senior thesis: Stability Analysis of a Tumor-Immune Model*  
Advisor: Dr. Ami E. Radunskaya

## Employment

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- **University of Michigan** **Ann Arbor, MI**  
○ *Postdoctoral Assistant Professor, Department of Mathematics* *Aug 2022–present*

## Publications

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- Zhao L\*, **Kim R\***, Oremland LS, Chowkwale M, de Pillis LG, Brooks HZ. (2024). A Survey of Mathematical Modeling of Hormonal Contraception and the Menstrual Cycle. In: Ford Versypt, A.N., Segal, R.A., Sindi, S.S. (eds) *Mathematical Modeling for Women's Health. The IMA Volumes in Mathematics and its Applications*, vol 166. Springer, Cham. [https://doi.org/10.1007/978-3-031-58516-6\\_3](https://doi.org/10.1007/978-3-031-58516-6_3).  
\*These authors contributed equally to this work.
- **Kim R**, Nijhout HF, Reed MC. *Mathematical insights into the role of dopamine signaling in circadian entrainment*. *Mathematical Biosciences* (2023). 356: 108956. <https://doi.org/10.1016/j.mbs.2022.108956>
- **Kim R**, Witelski TP. (2022). Uncovering the dynamics of a circadian-dopamine model influenced by the light-dark cycle. *Mathematical Biosciences*. 344: 108764. <https://doi.org/10.1016/j.mbs.2021.108764>
- **Kim R**, Nijhout HF, Reed MC. (2021). One-carbon metabolism during the menstrual cycle and pregnancy. *PLoS Computational Biology*. 17(12): e1009708. <https://doi.org/10.1371/journal.pcbi.1009708>
- **Kim R**, Reed MC. (2021). A mathematical model of circadian rhythms and dopamine. *Theor Biol Med Model*. 18(8). <https://doi.org/10.1186/s12976-021-00139-w>
- **Kim R**, Woods T, Radunskaya A. (2018). *Mathematical Modeling of Tumor Immune Interactions*:

A Closer Look at the Role of a PD-L1 Inhibitor in Cancer Immunotherapy. *Spora: A Journal of Biomathematics*. 4:25–41. <http://doi.org/10.30707/SPORA4.1Radunskaya>

## Selected Presentations

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- **Kim, R.** (2024, July). *Modeling inter-individual differences in circadian timekeeping based on wrist-wearable data*. Society for Mathematical Biology and Korean Society for Mathematical Biology Joint Annual Meeting, Seoul, South Korea.
- **Kim, R.** (2024, July). *Applications of circadian clock models to problems in physiology*. Society for Mathematical Biology and Korean Society for Mathematical Biology Joint Annual Meeting, Seoul, South Korea.
- **Kim, R.** (2023, June). *The orchestra of circadian timekeeping: a mathematical modeling perspective*. Mathematical and Computational Biology Workshop, Institute for Computational and Experimental Research in Mathematics, Providence, RI. Poster.
- **Kim, R.** (2023, May). *Mathematical modeling of the molecular clock and the dopaminergic system*. Mathematical Biology Seminar, New Jersey Institute of Technology, Newark, NJ. Virtual.
- **Kim, R.** (2022, December). *Large-scale Cortical Modeling*. Cognitive Fatigue MURI Research Forum, University of Michigan, Ann Arbor, MI.
- **Kim, R.** (2022, September). *Using large-scale cortical simulation to test theories of sleep*. Sleep Europe 2022, European Sleep Research Society, Athens, Greece.
- **Kim, R.** (2022, January). *A mathematical investigation of the circadian clock and dopaminergic system*. Mathematical Biology Seminar, University of Utah, Salt Lake City, UT. Virtual.
- **Kim, R.** (2022, January). *A mathematical investigation of the circadian clock and dopaminergic system*. Mathematical Biology Seminar, University of Pennsylvania, Philadelphia, PA. Virtual.
- **Kim, R.** (2021, April). *Mathematical modeling of circadian rhythms and dopamine*. Mathematical Biology Seminar, Duke University, Durham, NC. Virtual.
- **Kim, R.** (2020, May). *A mathematical model of circadian rhythms and dopamine*. Workshop on Mathematical and Computational Methods in Biology. Mathematical Biosciences Institute (MBI), Columbus, OH. Virtual.

## Teaching

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| ○ <b>MATH 463: Introduction to Mathematical Biology</b>                         | <b>Ann Arbor, MI</b>     |
| ○ <i>Instructor of Record, University of Michigan Department of Mathematics</i> | <i>Fall 2024</i>         |
| ○ <b>MATH 462: Mathematical Modeling</b>  | <b>Ann Arbor, MI</b>     |
| ○ <i>Instructor of Record, University of Michigan Department of Mathematics</i> | <i>Winter 2023, 2024</i> |
| ○ <b>PHARMSCI 580: Mathematical Principles in Pharmaceutical Sciences</b>       | <b>Ann Arbor, MI</b>     |
| ○ <i>Instructor of Record, University of Michigan College of Pharmacy</i>       | <i>Fall 2023</i>         |
| ○ <b>MATH 156: Applied Honors Calculus II</b>                                   | <b>Ann Arbor, MI</b>     |
| ○ <i>Instructor of Record, University of Michigan Department of Mathematics</i> | <i>Fall 2022</i>         |

- **Introduction to Coding Theory** **Durham, NC**  
*Instructor, Duke Summer Workshop in Mathematics (SWiM)* *Summer 2022*
- **Certificate in College Teaching (CCT) Program** **Durham, NC**  
*Graduate Instructor, Duke Graduate School* *Mar 2018–May 2022*
- **Teaching Committee** **Durham, NC**  
*Graduate Representative, Duke Mathematics Department* *Aug 2021–May 2022*
- **MATH 106L: Laboratory Calculus and Functions II** **Durham, NC**  
*Instructor of Record, Duke Mathematics Department* *Spring 2020, Fall 2021*
- **MATH 106L: Laboratory Calculus and Functions II** **Durham, NC**  
*Lab Instructor, Duke Mathematics Department* *Spring 2021*
- **MATH 105L: Laboratory Calculus and Functions I** **Durham, NC**  
*Instructor of Record, Duke Mathematics Department* *Fall 2018, Fall 2019*
- **MATH 111L: Laboratory Calculus I** **Durham, NC**  
*Lab Teaching Assistant, Duke Mathematics Department* *Fall 2017*

## Service

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- **Association for Women in Mathematics (AWM)** **Ann Arbor, MI**  
*U-M Chapter Executive Board Member, U-M Department of Mathematics* *Jan 2023–present*
- **Lab of Geometry at Michigan (LoG(M))** **Ann Arbor, MI**  
*Undergraduate Research Mentor, U-M Department of Mathematics* *Jan–May 2023*
- **Association for Women in Mathematics (AWM)** **Durham, NC**  
*Student chapter founder and co-president, Duke Mathematics Department* *Jan 2019–May 2022*
- **Society for Industrial and Applied Mathematics (SIAM)** **Durham, NC**  
*Student chapter president, Duke Mathematics Department* *Aug 2019–May 2022*
- **Triangle Area Graduate Mathematics Conference (TAGMaC)** **Durham, NC**  
*Lead organizer, Duke-UNC-NCSU Mathematics Departments* *Fall 2018, Fall 2021*
- **Triangle Contest in Mathematical Modeling (TriCoMM)** **Durham, NC**  
*Co-organizer, Duke Mathematics Department* *Fall 2021*
- **Graduates Achieving Inclusion Now (GAIN)** **Virtual**  
*Moderator, Duke and Purdue Mathematics Departments* *Fall 2021*
- **Launch Point Conference** **Virtual**  
*Co-organizer, Duke-UNC-WFU Mathematics Departments* *Spring 2020*

## Workshops

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- **Computational Genomics Summer Institute (CGSI)** **Los Angeles, CA**  
*University of California, Los Angeles* *Jul 12-Aug 4, 2023*
- **Mathematical and Computational Biology Workshop** **Providence, RI**  
*Institute for Computational and Experimental Research in Mathematics (ICERM)* *Jun 12-16, 2023*  
Poster titled "The orchestra of circadian timekeeping: a mathematical modeling perspective."
- **Collaborative Workshop for Women in Mathematical Biology** **Minnetonka, MN**  
*Institute for Mathematics and its Applications (IMA) and Optum* *Jun 20-24, 2022*  
Project titled "Modeling the Stability and Effectiveness of Dosing Regimens of Oral Hormonal Contraceptives" mentored by Lisette de Pillis and Heather Zinn Brooks.
- **Data-Driven Mathematical & Statistical Modeling** **Virtual**  
*Statistical and Applied Mathematical Sciences Institute (SAMS-I)* *Jul 12-16, 2021*  
Parameter estimation, sensitivity analysis, and uncertainty quantification. Project mentored by John Nardini on Sparse Identification of Nonlinear Dynamics (SINDy).
- **Workshop on Mathematical and Computational Methods in Biology** **Virtual**  
*Mathematical Biosciences Institute (MBI)* *May 5-8, 2020*  
Gave a parallel talk on mathematical modeling of circadian rhythms and dopamine.
- **Tutorial Workshop on Parameter Estimation for Biological Models** **Raleigh, NC**  
*NC State Research Training Group in Mathematical Biology* *Jul 29-Aug 1, 2019*  
Basic techniques associated with identifiability theory, parameter estimation, and uncertainty quantification in biological models.

## Awards

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- **Allen Shields Outstanding Postdoctoral Assistant Professor Teaching Award**  
*University of Michigan Mathematics Department* *2024*
- **Nomination for Dean's Award for Excellence in Teaching**  
*Duke Graduate School* *2021*
- **L.P. Smith Award for Excellence in Teaching**  
*Duke Mathematics Department* *2020*
- **SIAM Student Chapter Certificate of Recognition**  
*Society for Industrial and Applied Mathematics (SIAM)* *2020*