

## Jasmine Y. Foo

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EDUCATION **Brown University**, Providence, Rhode Island USA  
Ph.D., Applied Mathematics, May 2008  
Sc.M., Applied Mathematics, May 2005  
Sc.B., Mathematics/Physics with Honors, May 2002

### ACADEMIC EXPERIENCE

**University of Minnesota-Twin Cities**  
*Associate Head, School of Mathematics* 1/21-present  
*Professor, School of Mathematics* 9/19-present  
*Associate Professor, School of Mathematics* 9/15-8/19  
*Assistant Professor, School of Mathematics* 9/11-8/15

**Institute for Mathematics and its Applications**  
*Deputy Director* 9/19-present

**Harvard University and Dana Farber Cancer Institute**  
*Postdoctoral researcher, Biostatistics and Computational Biology* 6/8-8/11  
(moved from Memorial Sloan Kettering Cancer Center in 2010.)

### SELECTED HON- ORS/AWARDS

- United States Fulbright Scholar Grant (2018-2019)
- National Science Foundation CAREER Award, Division of Mathematical Sciences (2014-2019)
- McKnight Land Grant Professorship (2013-2015)
- National Cancer Institute PSOC Young Investigator Award (2010, 2010)
- Sigma Xi Award for Excellence in Graduate Research (2008)
- United States Department of Energy Computational Science Graduate Fellowship (2004-2008)
- NSF VIGRE Graduate Fellowship (2004-2008, declined)

### ACADEMIC VISITS

- University of Oslo, Faculty of Medicine, Biostatistics / BigInsight Data Science Institute, 2018-2019.
- Mathematical Biosciences Institute, Ohio State University, Fall 2014.
- Institute for Mathematics and its Applications, UMN, 2012-2013.
- Lawrence Berkeley National Laboratories, Summer 2005.

## PUBLICATIONS

1. Gunnarsson, E., Leder, K., Foo, J. Exact site frequency spectra of neutrally evolving tumors, transition between power laws and signatures of cell viability. in revision, *Theoretical Population Biology*, 2021.
2. Foo, J., Gunnarsson, E., Leder, K., Storey, K. Spread of premalignant clones and cancer initiation in multilayered tissue. in revision, *Annals of Applied Probability*, 2021.
3. Foo, J., Leder, K., and Schweinsberg, J. Mutation timing in a spatial model of evolution. *Stochastic Processes and their Applications*, Vol. 130 (10), pages 6388-6413, 2020.
4. Kim, S., Choung, S., Sun, R., Ung, N., Hashemi, N., Lau, R., Spiller, E., Gasho, J., Foo, J., Mumenthaler, S. Comparison of cell and organoid-level analysis of patient-derived 3D organoids to evaluate tumor cell growth dynamics and drug response. *SLAS Discovery*, Vol. 25 (7), pages 744-754, 2020.
5. Einar Gunnarsson, Subhajyoti De, Kevin Leder, and Jasmine Foo. Understanding the role of phenotypic switching in cancer drug resistance. *Journal of Theoretical Biology*, Vol. 490 (7), 2020.
6. Emma E. Goldberg and Jasmine Foo. Memory in trait macroevolution. *American Naturalist*, Vol. 195(2), 2020.
7. Katie Storey, Kevin Leder, Andrea Hawkins-Daarud, Kristin Swanson, Atique Ahmed, Russell Rockne, and Jasmine Foo. Glioblastoma recurrence and the role of MGMT methylation. *JCO Clinical Cancer Informatics*. 3: pp 1-12. 2019.
8. Kamran Kaveh, Yutaka Takahashi, Michael A Farrar, Guy Storme, Marcucci Guido, Jamie Piepenburg, Jackson Penning, Jasmine Foo, Kevin Z Leder, and Susanta K Hui. Combination therapeutics of nilotinib and radiation in Acute Lymphoblastic Leukemia as an effective method against drug-resistance. *PLoS Computational Biology*, 13(7):e1005482, 2017.
9. Kathleen Storey, Marc D Ryser, Kevin Leder, and Jasmine Foo. Spatial measures of genetic heterogeneity during carcinogenesis. *Bulletin of Mathematical Biology*, 79(2):237-276, 2017.
10. Danika Lindsay, Colleen M Garvey, Shannon M Mumenthaler, and Jasmine Foo. The response of cancer cell populations to therapies. *Ecology and Evolution of Cancer*, pages 137-152. Elsevier, 2017.
11. Danika Lindsay and Jasmine Foo. Impact of tumor oxygenation on drug resistance evolution under hypoxia-activated prodrug therapy. In *Proceedings of the 5th International Conference on Biomedical Engineering*, 2017.
12. Qie He, Junfeng Zhu, David Dingli, Jasmine Foo, and Kevin Zox Leder. Optimized treatment schedules for chronic myeloid leukemia. *PLoS Computational Biology*, 12(10):e1005129, 2016.

13. Marc D Ryser, Walter T Lee, Neal E Ready, Kevin Z Leder, and Jasmine Foo. Quantifying the dynamics of field cancerization in tobacco-related head and neck cancer: a multiscale modeling approach. *Cancer Research*, 76(24):7078-7088, 2016.
14. Danika Lindsay, Colleen M Garvey, Shannon M Mumenthaler, and Jasmine Foo. Leveraging hypoxia-activated prodrugs to prevent drug resistance in solid tumors. *PLoS Computational Biology*, 12(8):e1005077, 2016.
15. Colleen M Garvey, Erin Spiller, Danika Lindsay, Chun-Te Chiang, Nathan C Choi, David B Agus, Parag Mallick, Jasmine Foo, and Shannon M Mumenthaler. A high-content image-based method for quantitatively studying context-dependent cell population dynamics. *Nature Scientific Reports*, 6:29752, 2016.
16. Richard Durrett, Jasmine Foo, and Kevin Leder. Spatial moran models II: Cancer initiation in spatially structured tissue. *Journal of Mathematical Biology*, 72(5):1369-1400, 2016.
17. Jasmine Foo, Lin L Liu, Kevin Leder, Markus Riester, Yoh Iwasa, Christoph Lengauer, and Franziska Michor. An evolutionary approach for identifying driver mutations in colorectal cancer. *PLoS Computational Biology*, 11(9):e1004350, 2015.
18. Shannon M Mumenthaler, Jasmine Foo, Nathan C Choi, Nicholas Heise, Kevin Leder, David B Agus, William Pao, Franziska Michor, and Parag Mallick. The impact of microenvironmental heterogeneity on the evolution of drug resistance in cancer cells. *Cancer Informatics*, 14:CIN-S19338, 2015. ?
19. Jasmine Foo, Cymra Haskell, Natalia L Komarova, Rebecca A Segal, and Karen E Wood. Modeling sympatric speciation in quasiperiodic environments. *Applications of Dynamical Systems in Biology and Medicine*, pages 149-174. Springer, 2015.
20. Jasmine Foo, Kevin Leder, and Junfeng Zhu. Escape times for branching processes with random mutational fitness effects. *Stochastic Processes and Their Applications*, 124(11):3661-3697, 2014.
21. Jasmine Foo, Kevin Leder, and Marc D Ryser. Multifocality and recurrence risk: a quantitative model of field cancerization. *Journal of Theoretical Biology*, 355:170-184, 2014.
22. Jasmine Foo and Franziska Michor. Evolution of acquired resistance to anti-cancer therapy. *Journal of Theoretical Biology*, 355:10-20, 2014.
23. Leila Aghili, Jasmine Foo, James DeGregori, and Subhajyoti De. Patterns of somatically acquired amplifications and deletions in apparently normal tissues of ovarian cancer patients. *Cell Reports*, 7(4):1310-1319, 2014.
24. Jasmine Foo and Kevin Leder. Dynamics of cancer recurrence. *Annals of Applied Probability*, 23(4):1437-1468, 2013.

25. Jasmine Foo, Kevin Leder, and Shannon M Mumenthaler. Cancer as a moving target: understanding the composition and rebound growth kinetics of recurrent tumors. *Evolutionary Applications*, 6(1):54-69, 2013.
26. David B Agus, Jenolyn F Alexander, Wadih Arap, Shashanka Ashili, Joseph E Aslan, Robert H Austin, Vadim Backman, Kelly J Bethel, Richard Bonneau, Wei-Chiang Chen, et al. A physical sciences network characterization of non-tumorigenic and metastatic cells. *Nature Scientific Reports*, 3:1449, 2013.
27. Jingmin Shu, Zhilian Xia, Lihua Li, Ellen T Liang, Nicholas Slipek, Dawen Shen, Jasmine Foo, Subbaya Subramanian, and Clifford J Steer. Dose-dependent differential mrna target selection and regulation by let-7a-7f and mir-17-92 cluster micrnas. *RNA Biology*, 9(10):1275-1287, 2012.
28. Jasmine Foo and Kevin Leder. Rare events in cancer recurrence timing. In *Simulation Conference (WSC), Proceedings of the 2012 Winter*, pages 1-10. IEEE, 2012.
29. Foo, J., Chmielecki, J., Pao, W., Michor, F. 'Effects of pharmacokinetic processes and varied dosing schedules on the dynamics of acquired resistance to erlotinib in EGFR-mutant lung cancer,' *Journal of Thoracic Oncology* (2012) Vol 7 (10).
30. Min Tang, Jasmine Foo, Mithat Gonen, Joelle Guilhot, Francois-Xavier Mahon, and Franziska Michor. Selection pressure exerted by imatinib therapy leads to disparate outcomes of imatinib discontinuation trials. *Haematologica*, 2012.
31. Shannon M Mumenthaler, Jasmine Foo, Kevin Leder, Nathan C Choi, David B Agus, William Pao, Parag Mallick, and Franziska Michor. Evolutionary modeling of combination treatment strategies to overcome resistance to tyrosine kinase inhibitors in non-small cell lung cancer. *Molecular Pharmaceutics*, 8(6):2069-2079, 2011.
32. Kevin Leder, Jasmine Foo, Brian Skaggs, Mercedes Gorre, Charles L Sawyers, and Franziska Michor. Fitness conferred by BCR-ABL kinase domain mutations determines the risk of pre-existing resistance in chronic myeloid leukemia. *PloS ONE*, 6(11):e27682, 2011.
33. Juliann Chmielecki, Jasmine Foo, Geoffrey R Oxnard, Katherine Hutchinson, Kadoaki Ohashi, Romel Somwar, Lu Wang, Katherine R Amato, Maria Arcila, Martin L Sos, et al. Optimization of dosing for EGFR-mutant non-small cell lung cancer with evolutionary cancer modeling. *Science Translational Medicine*, 3(90):90ra59-90ra59, 2011.
34. Rick Durrett, Jasmine Foo, Kevin Leder, John Mayberry, and Franziska Michor. Intratumor heterogeneity in evolutionary models of tumor progression. *Genetics*, 188(2):461-477, 2011.
35. Jasmine Foo, Kevin Leder, and Franziska Michor. Stochastic dynamics of cancer initiation. *Physical Biology*, 8(1):015002, 2011.

36. Jasmine Foo and George Em Karniadakis. Multi-element probabilistic collocation method in high dimensions. *Journal of Computational Physics*, 229(5):1536-1557, 2010.
37. Rick Durrett, Jasmine Foo, Kevin Leder, John Mayberry, and Franziska Michor. Evolutionary dynamics of tumor progression with random fitness values. *Theoretical Population Biology*, 78(1):54-66, 2010.
38. Jasmine Foo and Franziska Michor. Evolution of resistance to anti-cancer therapy during general dosing schedules. *Journal of Theoretical Biology*, 263(2):179-188, 2010.
39. Jasmine Foo and Franziska Michor. Evolution of resistance to targeted anti- cancer therapies during continuous and pulsed administration strategies. *PLoS Computational Biology*, 5(11):e1000557, 2009.
40. Jasmine Foo, Mark W Drummond, Bayard Clarkson, Tessa Holyoake, and Franziska Michor. Eradication of chronic myeloid leukemia stem cells: A novel mathematical model predicts no therapeutic benefit of adding G-CSF to imatinib. *PLoS Computational Biology*, 5(9):e1000503, 2009.
41. Jasmine Foo, Suzanne Sindi, and George Em Karniadakis. Multi-element probabilistic collocation for sensitivity analysis in cellular signalling networks. *IET Systems Biology*, 3(4):239-254, 2009.
42. Jasmine Foo, Xiaoliang Wan, and George Em Karniadakis. Multi- element probabilistic collocation method (ME-PCM): Error analysis and applications. *Journal of Computational Physics*, 227(22):9572-9595, 2008.
43. Prempraneerach, P, Foo, J, Triantafyllou, M., Chryssostomidis, C., Karniadakis, G, ‘Gradient-free Stochastic Sensitivity Analysis of the Shipboard Power System, International Simulation Multi-Conference, Edinburgh, Scotland (2008).
44. Jasmine Foo, Zohar Yosibash, and George Em Karniadakis. Stochastic simulation of riser-sections with uncertain measured pressure loads and/or uncertain material properties. *Computer Methods in Applied Mechanics and Engineering*, 196(41-44):4250-4271, 2007.
45. John B Bell, Jasmine Foo, and Alejandro L Garcia. Algorithm refinement for the stochastic Burgers equation. *Journal of Computational Physics*, 223(1):451-468, 2007.
46. D Lucor, J Foo, and GE Karniadakis. Vortex mode selection of a rigid cylinder subject to viv at low mass-damping. *Journal of Fluids and Structures*, 20(4):483-503, 2005.
47. D Lucor, J Foo, and GE Karniadakis. Correlation length and force phasing of a rigid cylinder subject to viv. In *IUTAM Symposium on Integrated Modeling of Fully Coupled Fluid Structure Interactions Using Analysis, Computations and Experiments*, pages 187-199. Springer, 2003.

## FUNDING

1. PI. NSF-Division of Mathematical Sciences. *“Evolutionary dynamics of non-genetic mechanisms of drug resistance in cancer”* (2021-2024)
2. MPI. Norwegian Research Council *“Norwegian-American Alliance for Research and Education in Data-Driven Mathematical Models of Cancer”* (2020-2023)
3. Co-PI. Norwegian Centennial Chair Grant. *“Computational approaches for personalized cancer therapy”* (2020-2022)
4. Co-PI. NSF-Division of Mathematical Sciences. Conference Grant *“Field of Dreams: Growing a Diverse Mathematical Community.”* (2020-2022)
5. PI. NSF-Division of Mathematical Sciences. Conference Grant. *“Workshop on Multiscale Modeling in Biology”*(2018-2019)
6. PI. US Fulbright Scholar Grant (2018-2019)
7. PI. NSF Division of Mathematical Sciences (DMS) *“CAREER: Stochastic models of cancer evolution.”* (2014-2020)
8. PI. McKnight Foundation *“Mathematics of cancer evolution.”* (2013-2015)
9. PI. NSF-Division of Mathematical Sciences  
*“Understanding stochasticity in cancer recurrence timing.”* (2012-2016).
10. Co-PI, NIH NCI Physical Sciences-Oncology Transnetwork *“Quantitative models of the effect of the tumor microenvironment on development of drug resistance.”* (2013-2014)
11. Co-PI, NIH National Cancer Institute PSOC Transnetwork (2011-2012)  
*“Development of quantitative models of penetrance of resistance.”*
12. NIH NCI PSOC Young Investigator Award (2010-2011)  
*“Towards an evolutionary framework for identifying driver mutations.”*
13. NIH NCI PSOC Young Investigator Award (2010-2011)  
*“Using genomic diversity of passenger mutations as prognostic markers for metastasis.”*
14. DOE Computational Science Graduate Fellowship (2004-2008).

## TEACHING

- Spring 2021, MATH 2241, Mathematical Modeling in Biology
- Spring 2021, MATH 8992, Directed Reading
- Fall 2020, MATH 5651, Prob/Stat Theory
- Spring 2020, MATH 5651, Prob/Stat Theory
- Spring 2020, MATH 2991, Independent Study
- Spring 2020 MATH 4997W, Senior project
- Instructor, Fall 2017, Topics in Math Biology: Stochastic simulation, UMN

- Instructor, Fall 2016, Prob/Stat Theory, UMN
- Instructor, Spring 2016, Prob/Stat Theory, UMN
- Instructor, Fall 2015, Topics in Math Biology: Stochastic processes in mathematical biology, UMN
- Instructor, Spring 2014, Honors Linear Algebra/Differential Equations, UMN
- Instructor, Fall 2013, Honors Multivariable Calculus, UMN
- Instructor, Spring 2013, Topics in Math Biology, UMN
- Instructor, Spring 2012, Prob/Stat Theory, UMN
- Instructor, Fall 2011, Prob/Stat Theory, UMN
- Co-instructor, Evolutionary Dynamics of Cancer, Cornell-Weill/Sloan-Kettering (Spring 2010).
- TA, Brown University (Multi-variable Calculus (Fall 2002), Ordinary Differential Equations I (Fall 2006), Ordinary/Partial Differential Equations II (Spring 2007)).
- Brown University Tutor for *Introductory Physics, Single- and Multi-variable Calculus, Abstract Algebra, Real Analysis* (1998-2002, 2007-2008).

SELECTED  
TALKS,  
2015-PRESENT

\*planned

- Universitat Heidelberg EMBO Workshop (May 2022)\*
- University of Illinois Urbana Champaign, Mathematical Biology seminar (Sept 2021)\*
- AMS Fall Central Sectional Meeting - Invited Address (August 2021)\*
- Centre International de Recontres Mathematiques (CIRM), (June-July 2021)\*
- EDGE Colloquium, June 2021\*
- Society for Mathematical Biology Annual Meeting (June 2021)\*
- SIAM Dynamical Systems Meeting, (May 2021)\*
- University of New Mexico, Applied Math Seminar (May 2021)\*
- UMN Biostatistics and Computational Biology Program, Colloquium (March 2021)
- Ohio State University, Conference on Stochastic Spatial Processes (March 2021)
- UCLA Biomathematics Colloquium (December 2020)
- University of Pennsylvania, Math Biology seminar (November 2020)
- IMA Workshop on Tumor Microenvironment (April 2020)
- SIAM Life Sciences Meeting, Garden Grove, CA (June 2020) canceled COVID19
- Creighton University, Mathematics Colloquium (Feb 2020)
- Ohio State University, Mathematical Biosciences Institute (November 2019)
- Midwest Probability Colloquium (October 2019)
- University of Oslo, Workshop on Personalized Medicine (May 2019)
- Imperial College London, Math Biology seminar (December 2018)
- University of Edinburgh, Math Biology Seminar (November 2018)
- University of Oslo, Biostatistics Department, PerCaThe Seminar (August 2018)
- International Centre for Mathematical Sciences, University of Edinburgh, UK (July 2018)
- IMA Workshop on Ecological and Biological Systems (June 2018)
- Rutgers University, Institute for Quantitative Biology, (April 2018)

- University of Minnesota, School of Public Health, Epidemiology (April 2018)
- Arizona State University, Mathematics Department Colloquium (March 2018)
- Mayo Clinic, Phoenix AZ, Precision NeuroTherapeutics Lab (March 2018)
- University of Minnesota, Physics department, Biophysics seminar (Feb 2018)
- University of Illinois at Urbana-Champaign, Mathematics Colloquium (August 2017).
- University of Southern California, Aerospace and Mechanical Engineering Colloquium (Oct 2017).
- Duke University, SouthEastern Probability Conference (Durrett birthday conference), (May 2017).
- Gustavus Adolphus College, Mathematics and Computer Science Colloquium (May 2017)
- St. Olaf College, Mathematics Colloquium (April 2017)
- Undergraduate Women in Science and Engineering Club, UMN, (Oct 2016)
- City of Hope Cancer Center, CA (July 2016)
- University of Minnesota, Masonic Cancer Center seminar (April 2016)
- University of Minnesota, IMA Data Science Seminar (April 2016)
- University of Minnesota, Probability seminar (Feb 2016)
- Newton Institute, Cambridge University (Jan 2016)
- Harvard University, School of Engineering and Applied Sciences (Dec 2015)
- Dana Farber Cancer Institute, Biostatistics and Computational Biology (Dec 2015)
- Northwestern University, Engineering Sciences and Applied Math Department Colloquium (Nov 2015)
- University of St Thomas, Center for Applied Mathematics, public lecture (Nov 2015)
- Univ. of Minnesota, Biostatistics Colloquium, May 2015
- Univ. of Minnesota, Physics Department, Biophysics seminar, April 2015
- University of Wisconsin-Madison, Mathematics Department, Colloquium (April 2015).
- Northwestern University, Feinberg School of Medicine, (May 2014)
- University of Wisconsin - La Crosse, Midwest Mathematical Biology Conference, (May 2014) (plenary lecture)
- UC Irvine, Mathematics department, Probability seminar, (April 2014)
- University of California Berkeley, Simons Institute for Computing, (April 2014)
- American Society for Clinical Pharmacology and Therapeutics, Atlanta, GA, (March 2014)
- University of California - San Diego, Mathematics department, Probability seminar, (Jan 2014).
- National University of Singapore, Dept of Applied Probability and Statistics Colloquium, (Jan 2014).
- Singapore University of Technology and Design, (Jan 2014)
- University of Minnesota, Ecology and Evolutionary Biology, Colloquium, Dec 2013.
- Harvard University, Program for Evolutionary Dynamics seminar, (Oct 2013).
- Brown University, Division Applied Mathematics (Oct 2013).
- University of Minnesota, School of Pharmacy, Colloquium, (Oct 2013).



- University of Minnesota, Bioinformatics and Computational Biology Journal Club, (Oct 2013).
- Applied Probability Society (INFORMS), Costa Rica, (July 2013).
- Society for Mathematical Biology Annual Meeting, Tempe, (June 2013).
- AMS Sectional Meeting, Iowa State University, (April 2013).
- AWM Symposium for Research, Santa Clara CA, (March 2013).
- University of Illinois Urbana-Champaign Probability seminar, (Feb 2013).
- Duke University Probability seminar, (Feb 2013).
- University of Wisconsin-Milwaukee Applied Math colloquium, (Dec 2012).
- University of Wisconsin-Milwaukee Probability seminar, (Dec 2012).
- SIAM Life Sciences Minisymposium on Cancer Therapeutics, (Aug 2012).
- 3M Innovation Labs, (August 2012).
- Harvard University/Dana Farber Cancer Institute, Dept of Biostatistics, (July 2012).
- Koc University, PWC Meeting of Young Researchers in Probability and Statistics, (July 2012) (plenary).
- Bernoulli meeting (World Congress in Probability and Statistics), Istanbul, (July 2012).
- University of Minnesota, Math Colloquium (April 2012).
- Fields Institute, Toronto. (March 2012).
- WIM (Women in Mathematics group at UMN) (Apr 2012)
- State University, Mathematical Biosciences Institute (March 2012).
- Society for Mathematical Biology Annual Conference, Krakow, Poland, (July 2011).
- University of California-San Francisco, Center for Evolution in Cancer, (June 2011).
- Duke University, Mathematics Department, Probability Seminar, (Jan 2011).

#### EDITORIAL WORK

- Editorial Board, Computational and Systems Oncology (2020-present)
- Associate Editor, Mathematical Biosciences and Engineering (2017-present)
- Associate Editor, Journal of Biological Dynamics (2019-present)
- Guest Editor, PLoS Computational Biology (2017, 2019)

#### GRANTS AND PRIZE PANELS

- Department of Energy Computational Science Graduate Fellowship screening committee (2010-present)
- AWM Alice T. Schaefer Prize selection committee (2017-2020)
- NSF Division of Mathematical Sciences (Dec 2020)
- NIH NCI, Physical Sciences-Oncology U01 review panel (Nov 2019)
- Wellcome Trust UK grant review (2018)
- NSF Division of Mathematical Sciences review panel (March 2017)
- NIH Informatics Technology in Cancer Research panel (March 2017)
- NIH Modeling and Analysis of Biological Systems review panel (2016)
- NSF Division of Mathematical Sciences review panel (Mar 2016)
- NIH review panel, Integrative Cancer Biology Program (Nov 2015)
- NIH review panel, Physical Sciences Oncology Centers (June 2015)

- NSF Division of Mathematical Sciences review panel (Oct 2014)

## REFEREEING

*Nature Communications, Nature Ecology and Evolution, Proc. National Academy of Sciences, Annals of Applied Probability, Journal of Computational Physics, SIAM Review, SIAM Applied Math, SIAM Journal of Scientific Computing, Communications in Computational Physics, Journal of Mathematical Biology, Journal of Fluids and Structures, Journal of Scientific Computing, Public Library of Science (PLoS) Computational Biology, Journal of Theoretical Biology, Integrative Biology, Physical Biology, Theoretical Population Biology, PLoS ONE, Proceedings of Royal Society Interface, Mathematical Biosciences and Engineering, IEEE Transactions on Biomedical Engineering, BMC Evolutionary Biology, Cancer Research.*