Renee Dale

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Education

Louisiana State University
Ph.D. in Biological Sciences   2019
    Dissertation: *Model Scaling from Protein Subnetworks to Populations in Mathematical Biology*

M. Stat. in Applied Statistics   2019
    Thesis: *Bayesian Estimate of the Parameters of a Stochastic Differential Model of HIV Incidence in the United States*

M.S. in Cell Biology   2015
    Thesis: *Mathematical Model of the Split Firefly Luciferase Assay*

B.S. in Biological Sciences   2013

B.A. in Philosophy   2013
    Thesis: *Empathy, Altruism, and Prosocial Behavior in Humans and Primates*

Appointments

Teaching Assistant   2013 - 2018
    BIOL 1208 Introductory Biology Lab I & BIOL 1209 Lab II   LSU
    BIOL 1005 Introductory Biology Lab for Non Majors   LSU
    Duties: Development of teaching materials and in-class activities, quiz and exam writing, leading student experiments in inquiry-based lab setting

***Plantae* Fellow**   Fall 2017 – Fall 2018
    Duties: Development of materials for Plantae, particularly Big data and Computational Infrastructure network

Guest Instructor   Fall 2017
    BIOL 7800 Mathematical Modeling   LSU

Research Assistant   Summer 2017
    Mathematics   LSU

Research Assistant   Spring & Summer 2017
    Biological Sciences   LSU

Supplemental Instruction Leader   Fall 2012
    Biology 1001   Center for Academic Success, LSU

Undergraduate Researcher   Aug 2010 – Jan 2012
    Environmental Engineering   LSU

Publications

(9) (*in preparation*) **Dale, R.**, Chen, Y., He, H. (2018) Hierarchical modeling of the dynamics of HIV prevention demonstrates the importance of rural American healthcare.

(8) (*submitted*) Kumar, N., **Dale**, **R.**, Kemboi, D., Zeringue, E. A., Kato, N., Larkin, J. C. (2018) Functional Analysis of Short Linear Motifs in the Plant Cyclin-Dependent Kinase Inhibitor SIAMESE.

(7) (*accepted with minor revisions*) **Dale, R.**, Guo, B. (2017) Estimating epidemiological parameters of a stochastic differential model of HIV dynamics using a hierarchical Bayesian model. PLoS ONE. (preprint: https://doi.org/10.1101/219832)

(6) Chen, Y.C., **Dale, R.**, He, Hongyu, Le, Quoc-Anh T. (2017) Posterior Estimates of Dynamic Constants in HIV Transmission Modeling. Computational and Mathematical Methods in Medicine. https://doi.org/10.1155/2017/1093045

(5) Brauer, E. K., Ahsan, N., **Dale, R.**, Kato, N., Coluccio, A. E., Piñeros, M. A., Kochian, L. V., Thelen, J. J., Popescu, S. C. (2016). The Raf-like kinase ILK1 and the high affinity K+ transporter HAK5 are required for Innate Immunity and Abiotic Stress Response. Plant Physiol. pp.00035.2016. http://dx.doi.org/10.1104/pp.16.00035

(4) **Dale, R.**, Kato, N. (2016). Truly quantitative analysis of the firefly luciferase complementation assay. Current Plant Biology 5(2016): 57-64.

(3) **Dale, R.**, Ohmuro-Matsuyama, Y., Ueda, H., Kato, N. (2016). Mathematical Model of the Firefly Luciferase Complementation Assay Reveals a Non-Linear Relationship between the Detected Luminescence and the Affinity of the Protein Pair Being Analyzed. PLoS ONE 11(2): e0148256. http://dx.doi.org/10.1371/journal.pone.0148256

(2) Kumar, N., Harashima, H., Kalve, S., Bramsiepe, J., Wang, K., Sizani, B. L., Bertrand, L. L., Johnson, M. C., Faulk, C., **Dale, R.**, Simmons, L. A., Churchman, M. L., Sugimoto, K., Kato, N., Dasanayake, M., Beemster, G., Schnittger, A., Larkin, J. C. (2015). Functional Conservation in the SIAMESE-RELATED Family of Cyclin-Dependent Kinase Inhibitors in Land Plants. Plant Cell 27(11): 3065-3080.

(1) Fontenot, E. B., Ditusa, S. F., Kato, N., Olivier, D. M., **Dale, R.**, Lin, W. Y., Chiou, T. J., Macnaughtan, M. A., Smith, A. P. (2015). Increased phosphate transport of Arabidopsis thaliana Pht1;1 by site-directed mutagenesis of tyrosine 312 may be attributed to the disruption of homomeric interactions. Plant Cell Environ 38(10): 2012-2022.

Awards & Honors

CIRTL Associate	2017
International Conference on Health Policy and Statistics 2018 Travel Award	2017
Duke University *Geometry of Redistricting Hackathon* Travel Award	2017
International Society for Bayesian Analysis New Researcher Travel Award, *O'Bayes*	2017
Emory University *StatFest* Travel Award	2017
Women in Statistics and Data Science Travel Award	2017
SMB Subgroup on Immunology and Infection Travel Award	2017
NIMBioS: *Pan-Microbial Trait Modeling* Travel Award	2017
LSU Graduate Student Travel Award	2017
Finding Your Inner Modeler Travel Award	2017
Quantitative Cell Biology Network Workshop Travel Award	2017

Distinguished Communicator, Communication Across the Curriculum, LSU   2013

Grants

Sea Grant Undergraduate Research Grant   2011
    "Ideal CO2 Concentration for Algal Growth"

Presentations

International Conference on Health Policy and Statistics 2018 Contributed Talk   2018

ULL Graduate Symposium   2017

SCALA 2017: Scientific Computing Around Louisiana   2017

Posters

AAAS 2018   2018

SCALA 2018   2018

Objective Bayes Workshop   2017

Emory University Stat Fest   2017

Annual Meeting of the Society for Mathematical Biology   2017

LSU Boyd Adventures in Research: A Pathway to Biomedical Research   2017

Professional Development

AAAS Proposal Writing Program   2017

SMB *Early Careers* Workshop   2017

Power of Persuasion: A COACh Workshop for PhD Students   2017

Learning Theories that Drive Student Success   2017

Scientific Outreach & Service to the Community

Journal Reviewer, *Heliyon* (2018)

Guest editor, *What we're reading*. Collection of recent research on mathematical modeling in plant biology. https://plantae.org/what-were-reading-january-19th/ (2018)

***Plantae* Fellow**: scientific outreach with a focus on mathematical plant biology https://community.plantae.org/user/ReneeDale (2017-2018)

Website Development: Volunteered to assist in web development for interdisciplinary collaborative website compmodelmatch.org. Current version: https://rdale1.shinyapps.io/compmodelmatch/ (2017)

Academic blogging detailing computational procedures to help beginners in computational biology and the general computing public (iambecomecomputational.com) (2017)

Academic Twitter devoted to scientific breakthroughs, opportunities for graduate students, computational methodologies, and mental health related information (@b10_m0del1ng) (2017)

Education & Mentoring Activities

Volunteer statistical consultant with *Statistics Without Borders* (2018)

Developed web application for undergraduate introductory biology students to enhance their understanding of traditionally difficult concepts, such as membrane potential. Current version: https://rdale1.shinyapps.io/wischu_biol2018/ (2017). The app will allow the instructor access to student activities when using the illustrations and answering questions.

Developed web application on Ecological Inference to include RxC analysis for assisting laywers to determine possible cases of gerrymandering using district data (2017). Currently the code is private and still under development.

CIRTL Scholar: The LSU Center for the Integration of Research, Teaching, and Learning (CIRTL) provides this certificate to graduate students who study STEM education, design and carry out an experiment, and present or publish their findings. I took discipline-based education resource (DBER) courses, independently studied the literature, designed and carried out an experiment while guest instructor with BIOL 7800, and analyzed the data. I am currently writing up the results.

Curriculum Development: BIOL 7800 Mathematical Modeling in Cellular Biology with Dr. Kato at LSU (2017). I assisted in conceptual course material development (differential equations, cell biology) and was completely responsible for the technical, programming materials for the course. My lecture materials are available at iambecomecomputational.com and my code examples at https://github.com/rdale1/Matlab-Programming-Examples

Curriculum Development: Helped develop a new coursework for use at LSU course BIOL 1005 Laboratory for non-science majors (2016). To help the students come up with independent research topics, I suggested the inclusion of a proposal presentation prior to their writeup.

Mentor: Association for Women in Math Mentor Network (2017)

Mentor: MentorNet (2017)

Judge: Louisiana Science and Engineering Fair (LSEF) for middle and high school students (2014 – present)

Mentor: Assisted local middle school students with their science fair projects (2014)

Affiliations

American Society for Plant Biologists	2017
Society for Mathematical Biology Subgroup: Immunology and Infection	2017
American Statistical Association	2017
Sigma Xi Full Member	2017
Society for Industrial and Applied Mathematics	2017

AAAS	2017
Association for Women in Mathematics	2017
Women in Science at LSU	2017
Society for Mathematical Biology	2015
Institute for Mathematical Statistics	2015
Graduate Student Association	2013
BioGrads	2013

Computational Skills

Computing languages
Python, Matlab, Mathematica, R, Java, Comsol, C++, JMP, SAS, Spark

Mathematical techniques
Ordinary differential equations, stochastic differential equations, differential algebraic equations, mixed differential equations; Multivariate calculus, linear algebra

Computational techniques
Flux balance analysis, flux variability analysis; Global and local optimization; Parameter estimation, kinetic modeling, population modeling, protein-protein interaction modeling, gene expression and control modeling; Algorithm development and design;

Statistical techniques
Bayesian statistics, Data mining, linear and nonlinear regression, parameter selection, categorization, clustering

Big Data-related skills
Statistical techniques; Parallel computing (Matlab, R); GPU computing (CUDA in Matlab, R); Data sorting and large data set manipulation; Graphics (heat map, contour map, 3D graphics, 2D and 3D animation); Data mining; Matrix manipulation, High Performance Computing (Matlab); Database handling (Matlab, Python, Spark)

Engineering-related skills
Linux; Raspberry Pi setup and extension; RPi programming (including motors, automatic imaging); COMSOL microfluidic device design and fluids simulation

Application development
Graphical user interface design and implementation (Matlab, R), web application development (R Shiny); Virtual machines

Other skills
Latex, vector graphics in Latex;