

# JULIE E. SIMONS

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## RESEARCH INTERESTS

Mathematical biology, fluid mechanics, scientific computing, statistics education.

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## PROFESSIONAL EXPERIENCE

**Associate Professor**, 2021–present

Department of Sciences & Mathematics, California State University Maritime Academy

**Assistant Professor**, 2015–2021

Department of Sciences & Mathematics, California State University Maritime Academy

**Postdoctoral Researcher and Lecturer**, 2012–2015

Department of Mathematics and the Center for Computational Science, Tulane University

**Postdoctoral Researcher and Lecturer**, 2010–2011

Departments of Mathematics and Ecology and Evolutionary Biology, University of California, Irvine

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## EDUCATION

**PhD, Mathematics**: University of Wisconsin–Madison, 2010

**Advisor**: Paul Milewski

**Dissertation subject**: Multiscale Modeling of Bacterial Chemotaxis

**MA, Mathematics**: University of Wisconsin–Madison, 2006

**BA, Mathematics**: University of California–Berkeley, May 2004

**Minor**: Statistics

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## PUBLICATIONS

- (1) **Simons, J.** and S. Olson (2018). *Sperm motility: models for dynamic behavior in complex environments*, Cell Movement, Birkhäuser, Cham, pp. 169–209.
- (2) **Simons, J.** and L. Fauci (2018). *A model for the acrosome reaction in mammalian sperm*, Bulletin of Mathematical Biology, Volume 80, Issue 9, pp. 2481–2501.
- (3) Cripe, P., Richfield, O., and **J. Simons** (2016). *Sperm pairing and measures of efficiency in planar swimming models*, Spora: A Journal of Biomathematics, Volume 2, Issue 1, Article 5.
- (4) **Simons, J.**, Fauci, L. and R. Cortez (2015). *A fully three-dimensional model of the interaction of driven elastic filaments in a Stokes fluid with applications to sperm motility*, Journal of Biomechanics, Volume 48, Issue 9, pp. 1639–1651.
- (5) De Pillis, L., Hood, K., Graham, E.J., Ma, Y., Radunskaya, A. and **J. Simons** (2015). *Injury-initiated clot formation under flow: a mathematical model with warfarin treatment*, Applications of Dynamical Systems in Biology and Medicine. The IMA Volumes in Mathematics and its Applications, Vol. 158, pp. 75–98.
- (6) **Simons, J.**, Olson, S., Cortez, R. and L. Fauci (2014). *The dynamics of sperm detachment from epithelium in a coupled fluid-biochemical model of hyperactivated motility*, Journal of Theoretical Biology 354C, pp. 81–94.
- (7) **Simons, J.** and P. Milewski (2011). *The volcano effect in bacterial chemotaxis*, Mathematical and Computer Modelling, Special Issue on Biophysical Phenomena. Volume 53, pp. 1374–1388.

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## GRANTS

- AWARDED:
  - Research Program (as PI):
    - \* CSU STEM-NET (STEM Affinity Group) Grant (2019-2020), **\$17,000**.
    - \* CSUPERB (CSU Biotechnology Affinity Group) New Investigator Award (2019-2020), **\$12,200**.
    - \* CSU Maritime: Research, Scholarly & Creative Activities (RSCA) Grant (2017-2018), **\$1,520**.
  - Pedagogical or Curriculum Development (PI or co-PI):
    - \* Graduation Initiative 2025 CSU Maritime Mathematics Education Proposal (2019-2020), **\$45,000**.
    - \* Graduation Initiative 2025 CSU Maritime Classroom iPad Proposal (2019-2020), **\$17,000**.
    - \* CSU Maritime: Provost's Curriculum Redesign Grant, Statistics Proposal (2018), **\$10,000**.
    - \* CSU Course Redesign with Technology Grant, Statistics Proposal (2017-2018), **\$8,209**.
  - Service-related:
    - \* Graduation Initiative 2025 CSU Maritime Gender Equity Consultant Proposal (2020), **\$30,000**. Authored by Gender Equity Committee led by Dr. Elizabeth McNie in collaboration with Dean Michele Van Hoeck. I am a co-PI, as chair of the Gender Equity Committee.
- Under review or unfunded:
  - CURM Mini Grant (2019), \$12,500
  - CSUPERB New Investigator Award (2018), \$12,750.
  - CSU Course Redesign with Technology Grant, Scientific Computing Proposal (2017), \$8,709

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## HONORS AND AWARDS

- CSU Wang Family Outstanding Faculty Service Award nominee, 2019
- Outstanding Service Award, CSU Maritime Faculty Awards, 2019
- Outstanding Scholar Award, CSU Maritime Faculty Awards, 2018
- Top ePortfolio Award, CSU Course Redesign with Technology Program, 2018
- Outstanding Teaching nominee, CSU Maritime Faculty Awards, 2016, 2017, 2018
- Research cited in SIAM NEWS article, "Biofluids of Reproduction: Oscillators, Viscoelastic Networks, and Sticky Situations." September, 2016
- Newcomb Fellow, in support of co-curricular programming and leadership opportunities for women. Tulane University, 2012
- Elizabeth Hirschfelder Award for Outstanding Graduate Research. Department of Mathematics, UW–Madison, Spring 2009
- Scholarship for International Graduate Students, Ecole Normale Supérieure de Cachan, France
- BACTER Institute graduate training fellowship. Spring 2005–Spring 2010
- NSF VIGRE fellowship recipient, University of Wisconsin, Spring 2005

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## COURSES TAUGHT

- Introductory Statistics
- Precalculus and Trigonometry
- Calculus I, II, III
- Ordinary Differential Equations
- Linear Algebra
- Introduction to Applied Mathematics (includes topics from ODEs, linear algebra, and modeling)
- Partial Differential Equations in Applied Mathematics
- Scientific Computing and Numerical Methods

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## PROFESSIONAL AND CIVIC ACTIVITIES

### • CSU-Wide Service

- (1) Reviewer for CSUPERB New Investigator Seed Grant, 2021.
- (2) Reviewer for CSUPERB Glenn Nagel Undergraduate Award, 2021.
- (3) Faculty Ambassadors for the Cadet Experience (FACE) mentor, 2020–21.
- (4) University Faculty Adviser (UFA) to CSU STEM-NET Multi-Campus Collaboration, involves campus outreach and steering future development of the program, 2019–2020.
- (5) Campus representative for CSUPERB (CSU Biotechnology Affinity Group) Faculty Consensus Group, involves campus outreach, reviewing grant proposals from across the CSU and steering the program's future, 2019–2023.
- (6) Campus representative for CSU Chancellor's Office Executive Order math-related compliance webinars and meetings, 2018–2020.
- (7) Reviewer for CSU travel grant program through CSUPERB, 2018.
- (8) Campus representative for California Faculty Association action day in Sacramento, 2018.
- (9) Campus representative for California Faculty Association Spring Kickoff 2016: attended Membership & Organizing Chairs Meeting, Council for Affirmative Action, Joint Council Meeting, and Faculty Rights Training, 2016.
- (10) CSU Math Council (CSU math department chairs) representative, 2015–2016.

### • CSU Maritime Service

#### – Committee Membership:

- (1) Gender Equity Committee Chair, Spring 2019–present.
- (2) General Education (GE) Committee member, 2018–present.
- (3) Honorary Degree Committee member, 2016–present.
- (4) Web Developers Committee member, 2015–present.
- (5) Instructionally-Related Activities (IRA) Committee member, 2016–2019.
- (6) Marketing Advisory Committee member, 2017.
- (7) Hiring Committees: VPSA (2020), Commandant (2 positions, 2019), Mathematics Education (2017, 2019), Oceanography (2017, 2018), School of Letters and Sciences Dean Search (2017–2018), International Business and Logistics (2017), Physics (2016), and English (2016).

#### – Other activities:

- (1) Senator At Large, Faculty Senate, 2020–2022.
- (2) California Faculty Association CSU Maritime Treasurer, 2019–2021.
- (3) Mathematics curricular development leader for GI 2025-related grants, 2018–2020.
- (4) Gender Equity: initiated the development of Gender Equity Group in Spring 2018, which was awarded ad hoc committee status in 2019.
- (5) “My First Year at Cal Maritime” panelist, New Faculty Orientation, 2016, 2019.
- (6) Women in Maritime Leadership Conference participant, 2016–2019.
- (7) Campus Safety Walk participant, 2018.
- (8) Co-sponsor of an internal (IRA) grant (Tom Oppenheim, primary sponsor) to bring a mechanical engineering workshop to campus, 2017.
- (9) Common Reading Orientation Week discussion leader (for new students), 2017.
- (10) Judicial hearing officer for student conduct issues, 2016.
- (11) Drafted mission and vision statements for the School of Letters and Sciences, 2016.
- (12) Faculty Panelist for Living Learning Community program on college success for first year engineering students, 2016.
- (13) Initiated faculty website capabilities and co-developed the faculty development seminar “Web Wizards: Workshop on Creating your Professional Web Page,” 2016.

- **Wider Mathematics and STEM Community Activities**

- (1) Chair of the Golden Section of the Mathematical Association of America (MAA), 2021–2022.
- (2) Vice chair of the Golden Section of the Mathematical Association of America (MAA), 2020–2021.
- (3) Reviewer for scientific journals including Biophysical Journal, PLOS One, MDPI Mathematics, Fluids, Royal Society Interface, Bulletin of Mathematical Biology, Letters in Biomathematics, Spora: A Journal of Biomathematics, the American Journal for Undergraduate Research, and the Proceedings of the 2017 Women Advancing Mathematical Biology: Understanding Complex Biological Systems with mathematics (WAMB).
- (4) Reviewer for a chapter in the book entitled, *A Celebration of the EDGE Program's Impact on the Mathematics Community and Beyond*, 2018.
- (5) Judge for undergraduate research awards for the annual International Symposium on Biomathematics and Ecology, Education and Research, 2017, 2018.
- (6) Bay Area Math Olympiad Volunteer, 2016–2018, 2020.

- **Activities Prior to CSU Maritime Position:**

- (1) Workshop Leader & Program Developer, Mathematical Biology, Girls in STEM at Tulane, 2012–2015.
- (2) Workshop for Women in Applied Math, Institute for Mathematics and its Applications, 9/2013.
- (3) Workshop for Young Researchers, Mathematical Biosciences Institute, 8/2013 .
- (4) Organizer, Careers in Computational Biomathematics: High School Outreach Day, Metairie Park Country Day School, 2013.
- (5) Tutor for Success in Math and Focus Academy, Irvine, 2012.
- (6) COSMOS Instructor, UC–Irvine, Mathematical Game Theory and Computer Programming, 2011.
- (7) Sonia Kovalevsky Day Talk, UC–Irvine, 2011.
- (8) Mentor for high school women in mathematics program, UW–Madison, 2005, 2007, 2008.
- (9) Study group leader, Athletic Study Center, UC–Berkeley, 2003–2004.
- (10) Instructor, Math, Engineering, & Science Achievement (Americorps), Berkeley, CA, 2002–2003.

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## PROFESSIONAL DEVELOPMENT ACTIVITIES

- CSU-wide workshops, courses or meetings:
  - (1) “COAST & CSUPERB: A Conversation on Power, Structural Racism, and Perceptions of Normality in STEM Through a Lens of Critical Race Theory,” 5/2021.
  - (2) “CSUPERB Preparing for Fall 2020” Webinar, 8/2020.
  - (3) “Assessing Student Learning Outcomes in Undergraduate STEM Courses,” CSU Webinar, 6/2020.
  - (4) “Inquiry-Based Learning,” CSU Webinar, 4/2020.
  - (5) CSU Math Teaching and Solidarity COVID-19 Webinar Series, 4/2020–5/2020.
  - (6) “Equity-Minded Practices for Remote Teaching,” CSU Webinar, 4/2020.
  - (7) “CSU Major Institutional Grants,” CSU STEM-NET Webinar, 3/2020.
  - (8) “Conflict Psychology: Seven Fundamental Cognitive Biases,” CSU Webinar, 2/2020.
  - (9) “Mid-Course Check-Ins to Improve Teaching and Learning,” CSU Webinar, 2/2020.
  - (10) CSU Biotechnology Symposium (CSUPERB annual conference on biotechnology education and research), 1/2020.
  - (11) “The Better Book Project: A Continuously-Improving Interactive Textbook for Introductory Statistics,” CSU Webinar, 12/2019.
  - (12) Campus representative for CSU Institute for Teaching and Learning Summer Retreat: Building Capacity to Create Equitable Learning Environments, 6/2019.
  - (13) Student Success in First-Year Mathematics/Quantitative Reasoning: Stretching Maths and Minds in Year-Long Courses (EO1110 Workshop), 5/2019.
  - (14) Corequisite Math Courses: Lessons from the First Year (EO1110 Workshop), 5/2019.
  - (15) Introducing EQUIP, a Free Web App to Promote Equitable Teaching in Math/QR Classrooms, 4/2019.
  - (16) Pathway to Stats Meeting about EO1110 implementation progress, 11/2018.

- CMA faculty development workshops:
  - (1) Student Panel: Learning from a Distance, Faculty Panel: Learning from a Distance, Quick Tips for Engaging your Online Class, Introducing Voicethread in Brightspace, and Introducing Ally in Brightspace Workshops, 1/2021.
  - (2) Best Practices for Brightspace Course Design, 8/2020.
  - (3) Best Practices for Incorporating Videos in Brightspace, 8/2020.
  - (4) Best Zoom Practices for Synchronous Online Learning, 8/2020.
  - (5) AL\$ Faculty Brunch, 1/2020.
  - (6) Immersive Learning Experiences, 8/2019.
  - (7) What Students Want Faculty to Know: Female cadets discuss their perspective on the teaching and learning environment at Cal Maritime, 4/2019.
  - (8) Brightspace training, 2/2019, 8/2019.
- Workshops/conferences outside the CSU:
  - (1) Mastery Grading Conference (<https://www.masterygrading.com/>), 6/2020.
  - (2) “TPSE Math’s Options and Advice for Assessing Students’ Learning Online” Webinar, 5/2020.
  - (3) International Symposium on Biomathematics and Ecology Education Research, La Crosse, WI, 10/2019.

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## PRESENTATIONS

- *Sperm Motility in Groups*, International Symposium on Biomathematics and Ecology Education Research, La Crosse, WI, October 2019.
- *The Mathematics of Sperm Motility*, Mathematics Seminar, St. Olaf College, Northfield, MN, October 2019.
- *Calcium Signaling in the Sperm Head*, International Symposium on Biomathematics and Ecology Education Research, Phoenix, AZ, October 2018.
- *Calcium Signaling in the Sperm Head*, Annual Meeting of the Society for Mathematical Biology, Sydney, Australia, July 2018.
- *Heads AND Tails*, International Symposium on Biomathematics and Ecology Education Research, Normal, IL, October 2017.
- *Investigating Life’s Mysteries with Mathematical Modeling*, California Maritime Academy Scholar Series, December 2016.
- *Rodents of Unusual Sperm and Other Topics*, Seminar for the Center for Computational Science, Tulane University, New Orleans, LA, October 2016.
- *Rodents of Unusual Sperm*, International Symposium on Biomathematics and Ecology Education Research, Charleston, SC, October 2016.
- *Sperm Motility in Populations*, Sonoma State University, March 2016.
- *Sperm Motility in Populations*, Mathematics Colloquium, University of San Francisco, October 2015.
- *Sperm Motility in 3D: Towards an Understanding of Swimming in Groups*, International Congress on Industrial and Applied Mathematics, Beijing, August 2015.
- *Free versus Fixed: Boundaries in Stokes Flow*, International Congress on Industrial and Applied Mathematics, Beijing, August 2015.
- *Sperm Motility Near Surfaces in 3D*, Society for Mathematical Biology Annual Meeting, July 2015.
- *Sperm Motility in 3D*, SCALA Meeting, New Orleans, LA, March 2015.
- *Cooperative Swimming in Viscous Environments*, SIAM-CSE, Salt Lake City, UT, March 2015.
- *The Fluid Mechanics of Sperm Motility*, University of New Mexico, Albuquerque, NM, February 2015.
- *The Fluid Mechanics of Sperm Motility*, University of Portland, Portland, OR, February 2015.
- *Planar versus 3D Models in Sperm Motility*, International Symposium on Biomathematics and Ecology Education Research, Claremont, CA, October 2014.
- *Sperm Motility and Cooperativity in Epithelial Detachment*, MathFest, Portland, OR, August 2014.
- *Sperm Altruism and Motility Near Surfaces*, SIAM Life Sciences, Charlotte, NC, August 2014.
- *The Role of Sperm Motility and Cooperativity in Epithelial Detachment*, World Congress of Biomechanics, Boston, MA, July 2014.

- *Understanding Sperm Motility in Changing Environments*, Society for Engineering Sciences Meeting, Providence, RI, July 2013.
- *Understanding Sperm Motility*, SCALA Meeting, New Orleans, February 2013.
- *One and Two Dimensional Models for the Volcano Effect*, Department of Mathematical Sciences, University of Bath, Applied Mathematics Seminar, September 2011.
- *The Volcano Effect in Bacterial Chemotaxis: new models for a biological and computational phenomena*, FOM Institute for Atomic and Molecular Physics, Amsterdam, Netherlands. Systems biology seminar, July 2009.
- *The Volcano Effect in Bacterial Chemotaxis: a multiscale modeling approach*, Ecole Normale Supérieure de Cachan, France. Seminar of the Centre de Mathématiques et Leurs Applications, April 2009.
- *The Volcano Effect in Bacterial Chemotaxis*, South African Symposium on Numerical and Applied Mathematics, Stellenbosch, South Africa, April 2009.

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## OTHER RELEVANT PROFESSIONAL EXPERIENCE

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|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>1/2014 to 5/2014</b> | <b>Division of Hematology</b><br><i>Dr. J. Evan Sadler Lab Visiting Scientist</i>                                                                             | <b>St. Louis, MO</b> |
|                         | <ul style="list-style-type: none"> <li>• Collaboration on kinetic models for blood clotting mechanisms.</li> </ul>                                            |                      |
| <b>8/2008 to 1/2009</b> | <b>Department of Biochemistry, UW–Madison</b><br><i>Donohue and Weibel Lab Scientist</i>                                                                      | <b>Madison, WI</b>   |
|                         | <ul style="list-style-type: none"> <li>• Performed bacterial chemotaxis wet-lab assays.</li> </ul>                                                            |                      |
| <b>5/2006 to 8/2006</b> | <b>Centre for Mathematical Biology, Oxford University</b><br><i>VIGRE Summer Intern</i>                                                                       | <b>Oxford, UK</b>    |
|                         | <ul style="list-style-type: none"> <li>• Collaborated with Oxford University mathematics and biology faculty.</li> </ul>                                      |                      |
| <b>2/2004 to 5/2004</b> | <b>Department of Statistics, UC–Berkeley</b><br><i>VIGRE Research Assistant</i>                                                                               | <b>Berkeley, CA</b>  |
|                         | <ul style="list-style-type: none"> <li>• Undergraduate project on normal approximation to combinatorial sequences.</li> </ul>                                 |                      |
| <b>6/2003 to 8/2003</b> | <b>National Security Agency</b><br><i>Summer Mathematics Research Intern</i>                                                                                  | <b>Ft. Meade, MD</b> |
|                         | <ul style="list-style-type: none"> <li>• Cryptology research, resulting in an internal publication &amp; presentation for the Director of the NSA.</li> </ul> |                      |

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## PROFESSIONAL MEMBERSHIPS

Society for Mathematical Biology, Mathematical Association of America, Association for Women in Mathematics.