

# Justin S. Bois

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## Education

Ph.D., Chemical Engineering, California Institute of Technology, 2007  
B.S., Chemical Engineering, University of Illinois at Urbana-Champaign, 1999

## Experience

Jan. 2014 – present      Lecturer  
Division of Biology and Biological Engineering, Caltech  
Course topics: Data analysis, physical cell biology, undergraduate biology lab, morphogenesis, systems biology, biomolecular engineering, computer programming, biodevice engineering

Jan. 2011 – Dec. 2013    Postdoctoral Researcher  
Department of Chemistry and Biochemistry, UCLA  
Research Group: Margot Quinlan  
Project: Experimental and theoretical analysis of cytoplasmic streaming in the *Drosophila* oocyte

Oct. 2007 – Dec. 2010    Visiting Scientist, Biological Physics Group  
Max Planck Institute for Physics of Complex Systems and  
Max Planck Institute of Molecular Cell Biology and Genetics, Dresden  
Research Groups: Stephan Grill and Frank Jülicher  
Project: Pattern formation in active fluids with application to the polarizing *C. elegans* zygote

May 2007 – July 2007    Postdoctoral Scholar  
Department of Bioengineering, Caltech  
Research Group: Niles Pierce  
Project: Coarse graining nucleic acid free energy landscapes

Oct. 2001 – Apr. 2007    Graduate Student  
Department of Chemical Engineering, Caltech  
Research Groups: Niles Pierce and Zhen-Gang Wang  
Thesis title: Analysis of interacting nucleic acids in dilute solutions

Jan. 2000 – Apr. 2001    Research Engineer  
Kraft Foods Technology Center, Glenview, IL  
Project: Product management and process optimization

## Teaching

*As course instructor at Caltech*

|   |           |
|---|-----------|
| Data analysis in the biological sciences                        | 2014–2017 |
| Introduction to programming in the biological sciences bootcamp | 2015–2017 |
| The great ideas of biology: Exploration through experimentation | 2014–2018 |
| Signal transduction and mechanics in morphogenesis              | 2014–2018 |

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| Order-of-magnitude biology (with R. Phillips)                                | 2015, 2016       |
| Design principles of genetic circuits (with M. Elowitz)                      | 2015–2018        |
| Physical biology of the cell   | 2014, 2016, 2018 |
| Introduction to biomolecular engineering (with F. Arnold or N. Pierce)       | 2014, 2016, 2018 |
| Design and construction of biodevices  | 2017 (2 terms)   |
| <i>Extramural</i>  |                  |
| Case Studies in Statistical Thinking (online course with DataCamp)           | 2017             |
| Statistical Thinking in Python parts I and II (online courses with DataCamp) | 2016             |
| MBL Physiology Course Matlab Bootcamp (with H. Garcia and J. Boedicker)      | 2016             |
| Guest instructor, Clubes de Ciencia, Ensenada, México                        | 2014             |
| <i>Courses in previous positions</i>   |                  |
| Physical principles for cell biologists (with N. Licata), MPI-CBG Dresden    | 2010             |
| Introduction to biomolecular engineering (TA with N. Pierce), Caltech        | 2007             |
| Graduate stat. mech. (TA with Z.-G. Wang and R. Marcus), Caltech             | 2003, 2005, 2006 |
| Graduate thermodynamics (TA with C. Smolke), Caltech                         | 2004             |
| General chemistry (TA with D. DeCoste), U. of Illinois                       | 1998, 1999       |

## Research Publications

- R. D. Nath, C. N. Bedbrook, M. J. Abrams, T. Basinger, **J. S. Bois**, D. A. Prober, P. W. Sternberg, V. Gradinaru, L. Goentoro (2017) The jellyfish *Cassiopea* exhibits a sleep-like state, *Curr. Biol.*, **27**, 2984-2990.
- B. Bor, N. Poweleit, **J. S. Bois**, L. Cen, J. K. Bedree, Z. H. Zhou, R. P. Gunsalus, R. Lux, J. S. McLean, X. He, W. Shi (2016) Phenotypic and physiological characterization of the epibiotic interaction between TM7x and its basibiont *Actinomyces*, *Microb. Ecol.*, **71**, 243–255.
- A. Webster, S. Li, J. K. Hur, M. Wachsmuth, **J. S. Bois**, E. M. Perkins, D. Patel, and A. A. Aravin (2015) Aub and Ago3 are recruited to nuage through two mechanisms to form a ping-pong complex assembled by Krimper, *Molecular Cell*, **59**, 564-575.
- B. Bor, **J. S. Bois**, M. E. Quinlan (2015) Regulation of the formin cappuccino is critical for polarity of *Drosophila* oocytes, *Cytoskeleton*, **72**, 1-15.
- A. S. Rasson, **J. S. Bois**, D. S. L. Pham, H. Yoo, M. E. Quinlan (2015) Filament assembly by Spire: Key residues and concerted actin binding, *J. Mol. Biol.*, **427**, 824-839.
- K V. Kumar, **J. S. Bois**, F. Jülicher, S. W. Grill (2014) Pulsatory patterns in active fluids, *Phys. Rev. Lett.*, **112**, 208101.
- E. A. Roth-Johnson, C. L. Vizcarra, **J. S. Bois**, M. E. Quinlan (2014) Interaction between microtubules and the *Drosophila* formin Cappuccino and its effect on actin assembly, *J. Bio. Chem.*, **289**, 4395-4404.
- N. W. Goehring, P. Khuc Trong, **J. S. Bois**, D. Chowdhury, E. M. Nicola, A. A. Hyman, S. W. Grill (2011) Polarization of PAR proteins by advective triggering of a pattern-forming system, *Science*, **334**, 1137–1141.
- J. S. Bois**, F. Jülicher, S. W. Grill (2011) Pattern formation in active fluids, *Phys. Rev. Lett.*, **106**, 028103.

- J. N. Zadeh<sup>\*</sup>, C. Steenberg<sup>\*</sup>, **J. S. Bois<sup>\*</sup>**, B. R. Wolfe<sup>\*</sup>, M. B. Pierce, A. R. Khan, R. M. Dirks, N. A. Pierce (2011) NUPACK: Analysis and design of nucleic acid systems, *J. Comput. Chem.*, **32**, 170–173.
- M. Mayer, M. Depken<sup>\*</sup>, **J. S. Bois<sup>\*</sup>**, F. Jülicher, S. W. Grill (2010) Anisotropies in cortical tension reveal the physical basis of polarizing cortical flows, *Nature*, **467**, 617–621.
- A. V. Klopper, **J. S. Bois**, S. W. Grill (2009) Influence of secondary structure on the early stages of RNA transcription, *Phys. Rev. E*, **81**, 030904.
- L. Carvalho, J. Stühmer, **J. S. Bois**, Y. Kalaidzidis, V. Lecaudey, C.-P. Heisenberg (2009) Control of convergent yolk syncytial layer nuclear movement in zebrafish, *Development*, **136** (8), 1305–1315.
- R. M. Dirks<sup>\*</sup>, **J. S. Bois<sup>\*</sup>**, J. M. Schaeffer, E. Winfree, N. A. Pierce (2007) Thermodynamic analysis of interacting nucleic acid strands, *SLAM Rev.*, **49**, 65–88.
- J. S. Bois<sup>\*</sup>**, S. Venkataraman<sup>\*</sup>, H. M. T. Choi, A. J. Spakowitz, Z.-G. Wang, N. A. Pierce (2005) Topological constraints in nucleic acid hybridization kinetics, *Nucleic Acids Res.*, **33** (12), 4090–4095.

### Review Articles and Book Chapters

- J. S. Bois**, S. W. Grill (2013) Mechanochemical pattern formation in the polarization of the one-cell *C. elegans* embryo, in *Engineering of Chemical Complexity*, A. S. Mikhailov and G. Ertl, Eds., World Scientific.
- J. Howard, S. W. Grill, **J. S. Bois** (2011) Turing's next steps: The mechanochemical basis of morphogenesis, *Nature Rev. Mol. Bio.*, **12**, 392–398.

### Honors and Awards

|             |   |
|-------------|---|
| 2015        | Caltech Graduate Student Council Teaching and Mentoring Award for instruction         |
| 2014        | Associated Students of the California Institute of Technology Teaching Award          |
| 2008 – 2011 | Human Frontier Science Program Cross-Disciplinary Fellowship                          |
| 2003        | Caltech Graduate Student Council Teaching and Mentoring Award for teaching assistants |
| 2001 – 2002 | William H. Corcoran Memorial Fellowship, Caltech                                      |
| 1999        | UIUC Department of Chemical Engineering: Highest Distinction                          |
| 1999        | UIUC List of Teachers Ranked as Excellent (both semesters)                            |
| 1998        | UIUC List of Teachers Ranked as Excellent (fall semester)                             |

November, 2017

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<sup>\*</sup> Authors contributed equally.