

JOSEPH H. DAVIS

Whitehead Assistant Professor of Biology
Massachusetts Institute of Technology

A. PERSONAL

Name: Joseph H. Davis
Birth Date: February 9, 1982 in Durango, CO
Citizenship: USA

Primary Office: Massachusetts Institute of Technology
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B. EDUCATION

09/2005-03/2010 **Ph.D.**, Biochemistry, Department of Biology,
Massachusetts Institute of Technology.
Advisors: Dr. Robert T. Sauer and Dr. Tania A. Baker
Thesis: “*Understanding and harnessing energy-dependent proteolysis for controlled protein degradation in bacteria.*”

09/2000-12/2003 **B.A.**, Computer Science, College of Letters and Sciences,
University of California, Berkeley
Research advisor: Dr. Richard Karp
Thesis: “*Distributed computing to calculate RNA secondary structure.*”
Minor: Chemistry

09/2000-12/2003 **B.S.**, Biological Engineering, College of Engineering,
University of California, Berkeley
Research advisor: Dr. Michael A. Marletta
Thesis: “*Spectral characterization of bacterial nitric-oxide binding proteins.*”

C. RESEARCH POSITIONS HELD

Current Primary Appointment:

09/2017-present **Whitehead CD Assistant Professor**, Department of Biology
Massachusetts Institute of Technology.

Current Affiliate Appointments:

04/2017-present **Affiliate Faculty**
MIT Computational and Systems Biology Graduate Program
MIT Microbiology Graduate Program

01/2021-present **Affiliate Faculty**
Microsystems Technology Laboratories/MIT.nano, MIT.

04/2021-present **Associate Member**
Broad Institute of MIT and Harvard.

Previous Appointments:

01/2015-09/2017 **Visiting Scientist, Laboratory of Dr. Malene Hansen**
Neuroscience and Aging Research Center
Sanford Burnham Prebys Medical Discovery Institute.

01/2012-09/2017 **Postdoctoral Fellow, Laboratory of Dr. Jamie Williamson**
Department of Integrative Structural and Computational Biology
The Scripps Research Institute.

01/2010-01/2012 **Lead Scientist, 1st employee**
Ginkgo BioWorks, Inc.
Boston, MA.

06/2006-03/2010 **Graduate Student, Laboratory of Dr. Robert T. Sauer**
Department of Biology
Massachusetts Institute of Technology.

01/2003-11/04 **Research Technician, Laboratory of Dr. Michael A. Marletta**
Department of Chemistry
University of California at Berkeley

D. AWARDS AND FELLOWSHIPS

08/2000 – 12/2003 **Regent's and Chancellor's Scholarship Award.**
University of California, Berkeley.

08/2008 – 03/2010 **Vertex MIT Ph.D. Fellow**
Vertex Pharmaceuticals and MIT Biology.

08/2012 – 08/2015 **Jane Coffin Childs Postdoctoral Fellowship**
The Scripps Research Institute, La Jolla, CA.

08/2015 – 08/2017 **National Institute on Aging K99 Pathway to Independence Fellowship**
The Scripps Research Institute, La Jolla, CA.

07/2019 – present **Whitehead Career Development Professorship**
Massachusetts Institute of Technology.

02/2021 **Alfred P. Sloan Foundation Fellow**
Computational and Evolutionary Biology.

E. RESEARCH GRANTS

Active Funding

Homogeneous structures determined in situ

Source of Support: Alfred P. Sloan Foundation Fellow
Total Award Amount: \$75,000
Period: 3/1/21-

CAREER: Developing novel structural techniques to untangle bacterial ribosome biogenesis

Source of Support: National Science Foundation CAREER program
Total Award Amount: \$1,000,000
Period: 3/1/21-2/28/26

Understanding Cargo Selection in Autophagy

Source of Support: James H. Ferry Fund
Total Award Amount: \$75,000
Period: 7/1/20-

Discovering essential components of the cellular homeostasis network

Source of Support: John Jarve Seed Fund
Total Award Amount: \$114,500
Period: 8/1/19-8/1/21

Whitehead Career Development Professorship

Source of Support: The Whitehead Family
Total Award Amount: \$60,000
Period: 7/1/19 – 7/1/22

Direct measurement of autophagic flux in human cells

Source of Support: Charles E. Reed Fund
Total Award Amount: \$75,000
Period: 7/1/18-

Quantitation and biochemical characterization of autophagy's role in aging

Source of Support: National Institute on Aging R00
Total Award Amount: \$745,128
Period: 9/15/17-12/31/20

Completed Funding

Deep generative models for Cryo-EM reconstruction of heterogeneous biological structures

Source of Support: Abdul Latif Jameel Clinic for Machine Learning in Health
 Total Award Amount: \$150,000
 Period: 5/1/19-4/30/20

Variational Autoencoders to determine molecular structures

Source of Support: NVIDIA Corporation
 Total Award Amount: \$5,000
 Period: 2/1/19 – 6/1/19

Quantitation and biochemical characterization of autophagy's role in aging [TSRI]

Source of Support: National Institute on Aging K99
 Total Award Amount: \$745,128
 Period: 9/15/15-9/15/17

Mechanistic and structural studies of ribosome biogenesis [TSRI]

Source of Support: Jane Coffin Childs Memorial Fund for Medical Research
 Total Award Amount: \$154,500
 Period: 6/1/12 – 6/1/15

Volatile reporters for biomanufacturing of protein therapeutics [Ginkgo BioWorks, Inc]

Source of Support: National Institute of Standards and Technology
 Total Award Amount: \$2,300,000
 Period: 2/1/11 – 7/31/13

Environment dependent copy protection of engineered organisms [Ginkgo BioWorks, Inc]

Source of Support: Defense Advanced Research Projects Agency
 Total Award Amount: \$5,000,000
 Period: 8/1/11 – 8/1/13

Proteolysis-based tools for engineering of amino acid producing strains [Ginkgo BioWorks, Inc]

Source of Support: National Science Foundation SBIR Phase I
 Total Award Amount: \$150,000
 Period: 7/1/11 – 6/30/12

Bioproduction of Feedstock Amino Acids [Ginkgo BioWorks, Inc]

Source of Support: National Science Foundation SBIR Phase I
 Total Award Amount: \$180,000
 Period: 1/1/13 – 12/31/13

Active Trainee Funding

Dr. Danica Cui [Post-doctoral fellow]

Uncovering molecular mechanisms of the multifunctional TAX1BP1 selective autophagy receptor

Life Sciences Research Foundation

Ms. Samantha Webster [Ph.D. student]

Probing the role of liquid-liquid phase separation in autophagy initiation

National Science Foundation Graduate Research Fellowship

Ms. Ellen Zhong [Ph.D. student]

Rapid and accurate prediction of protein-ligand binding from simulation-generated structural solvent density maps

National Science Foundation Graduate Research Fellowship

Dr. Jose Nieto-Torres [Post-doctoral fellow in Dr. Malene Hansen's lab; I am a co-mentor]

Mechanisms of Aging: Regulation of Canonical and Non-canonical Autophagy

National Institutes of Health K99 Post-doctoral fellowship

Former Trainee Funding

Ms. Virginia (Katie) Blackwell [Summer undergraduate research student]

Two Models for Ubiquitin-Selective Autophagic Degradation

National Science Foundation Graduate Research Fellowship

F. PUBLICATIONS & PATENTS

As principal investigator

1. Zhong ED, Bepler T, Berger B*, Davis JH*. *CryoDRGN: Reconstruction of heterogeneous cryo-EM structures using neural networks*. **Nature Methods** 2021, <https://www.nature.com/articles/s41592-020-01049-4>.
2. Zhong ED, Lerer A, Davis JH*, Berger B*. *Exploring generative atomic models in cryo-EM reconstruction*. **NeurIPS Machine Learning for Structural Biology**, 2020.
3. Gui M, Ma M, Sze-Tu E, Wang X, Koh F, Zhong ED, Berger B, Davis JH, Dutcher S, Zhang R, Brown A. *Structures of radial spokes and associated complexes important for ciliary motility*. **Nature Structural and Molecular Biology** 2020, <https://www.nature.com/articles/s41594-020-00530-0>.
4. Zhong ED, Bepler T, Davis JH*, Berger B*. *Reconstructing continuous distributions of 3D protein structure from cryo-EM images*. **International Conference on Learning Representation**, 2020. <https://arxiv.org/abs/1909.05215>.

As post-doctoral fellow

5. Razi A, Davis JH, Hao Y, Jahagirdar D, Thurlow B, Basu K, Jain N, Gomez-Blanco J, Britton RA, Vargas J, Guarne A, Woodson SA, Williamson JR, Ortega J. *Role of Era in assembly and homeostasis of the ribosomal small subunit*. **Nucleic Acids Research** 2019. [10.1093/nar/gkz571](https://doi.org/10.1093/nar/gkz571).
6. Tan YZ, Baldwin PR, Davis JH, Williamson JR, Potter CS, Carragher B, Lyumkis D. *Single-Particle CryoEM Analysis: Addressing Preferred Orientation through Tilting*. **Nature Methods** 2017. [14\(8\):793-796](https://doi.org/10.1038/nmeth.4388).
7. Davis JH*, Tan YZ*, Carragher B, Potter CS, Lyumkis D, Williamson JR. *Modular assembly of the bacterial large ribosomal subunit*. **Cell** 2016. [167\(6\):1610-1622](https://doi.org/10.1016/j.cell.2016.05.042).
8. Davis JH, Williamson JR. *Structure and dynamics of bacterial ribosome biogenesis [review]*. **Philosophical Transactions of the Royal Society B** 2017. [10.1098/rstb.2016.0181](https://doi.org/10.1098/rstb.2016.0181).
9. Ni X, Davis JH, Jain N, Razi A, Benlekbir S, McArthur AG, Rubinstein JL, Britton RA, Williamson JR, Ortega J. *YphC and YsxG GTPases assist the maturation of the central protuberance, GTPase associated region, and functional cure of the 50S ribosomal subunit*. **Nucleic Acids Research**. 2016. [44\(17\):8442-55](https://doi.org/10.1093/nar/nkw055).
10. Thurlow B, Davis JH, Leong V, Moraes T, Williamson JR, Ortega J. *Binding properties of YjeQ (RsgA), RbfA, RimM, and Era to assembly intermediates of the 30S subunit*. **Nucleic Acids Research**. 2016 [44\(20\):9918-8832](https://doi.org/10.1093/nar/nkw055).
11. Gulati M*, Jain N*, Davis JH, Williamson JR, Britton RA. *Functional interaction between ribosomal protein L6 and RbgA during ribosome assembly*. **PLOS Genetics**. 2014. [10\(10\) e1004694](https://doi.org/10.1371/journal.pgen.1004694).
12. Stokes JM, Davis JH, Mangat CS, Williamson JR, Britton RA. *Discovery of a small molecule that inhibits bacterial ribosome biogenesis*. **eLife** 2014. [18\(3\) e03574](https://doi.org/10.7554/eLife.03574).

13. Jomaa A*, Jain N*, Davis JH*, Williamson JR, Britton RA, Ortega J. *Functional domains of the 50S subunit mature late in the assembly process*. **Nucleic Acids Research**, 2014. [42\(5\):3419-35](#).
14. Chen SS, Sperling E, Silverman JM, Davis JH, Williamson JR. *Measuring the dynamics of E. coli ribosome biogenesis using pulse-labeling and quantitative mass spectrometry*. **Mol. Biosystems**. 2012. [8\(12\):3325-34](#).
- As doctoral student
15. Davis JH, Baker TA, Sauer RT. *Small-molecule Control of Protein Degradation Using Split Adaptors*. **ACS Chemical Biology**. 2011 [6\(11\):1205-13](#).
16. Davis JH, Rubin, AJ, Sauer RT. *Design, Construction, and Characterization of a Set of Insulated Bacterial Promoters*. **Nucleic Acids Research**. 2010 [39\(3\):1131-41](#).
17. Shin Y*, Davis JH*, Brau RR, Martin A, Kenniston JA, Baker TA, Sauer RT, Lang MJ. *Single-molecule denaturation and degradation of proteins by the AAA+ ClpXP protease*. **PNAS** 2009 Nov 17; [106:19340-5](#).
18. Kelly J, Rubin AJ, Davis JH, Franklin CM, Cumbers J, Czar MJ, Mora K, Gliberman AL, Monie D, Endy D. *Measuring the activity of BioBrick promoters using an in vivo reference standard*. **J. Biol. Eng.** 2009 [20; 3:4](#).
19. Davis JH, Baker TA, Sauer RT. *Engineering synthetic adaptors and substrates for controlled ClpXP degradation*. **J. Biol. Chem.** 2009 284([33](#)):[21848-55](#).

Other

20. Boon EM, Davis JH, Tran R, Karow DS, Huang SH, Pan D, Miazgowiec MM, Mathies RA, Marletta MA. *Nitric oxide binding to prokaryotic homologs of the soluble guanylate cyclase beta1 H-NOX domain*. **J. Biol. Chem.** 2006 [281\(31\):21892-902](#).
21. Karow DS, Pan D, Davis JH, Behrends S, Mathies RA, Marletta MA. *Characterization of functional heme domains from soluble guanylate cyclase*. **Biochemistry**. 2005 [44\(49\):16266-74](#).
22. Way JC, Davis JH. Methods And Molecules For Yield Improvement Involving Metabolic Engineering. PCT International Application Serial No. PCT/US2010/036902
23. Davis JH, Shetty RP. Genetically-Encoded Volatile Reporters of Cell State. USPTO Patent Application # 61/423,569. Priority Date 12/15/2010.

G. INVITED LECTURES AND SELECTED TALKS

As faculty at MIT

1. *Visualizing molecular machines in motion using cryo-electron microscopy and deep learning.* **AI in Chemical Biology: New Frontiers.** New York Academy of Sciences. Virtual Meeting, March 2021.
2. *Exploring approaches for analyzing highly heterogeneous structures.* **5th Annual New England Cryo-EM Symposium.** Virtual Meeting, November 2020.
3. *Interrogating conformational ensembles via machine learning and cryo-electron microscopy.* **American crystallographic association annual meeting.** Virtual Meeting, August 2020.
4. *CryoDRGN: A tool for reconstructing highly heterogeneous structural ensembles from cryo-electron micrographs.* **International conference on image analysis in three-dimensional cryo-EM.** Lake Tahoe, CA March 2020 (*Canceled*).
5. *Computational approaches to analyze highly heterogeneous structural ensembles.* **Three dimensional electron microscopy gordon research conference.** Castelldefels, Spain June 2020 (*Canceled*).
6. *Deep generative models for Cryo-EM reconstruction of heterogeneous biological structures.* **J-Clinic Executive Board Meeting.** Cambridge MA February 2020.
7. *Understanding structural heterogeneity in molecular machines.* **Whitehead Forum Cryo-EM Mini-Symposium.** Cambridge, MA February 2018.
8. *Principles of macromolecular complex assembly.* **MIT Biology Department Retreat.** Falmouth, MA June 2018.
9. *Untangling ribosome biogenesis.* **Computational and Systems Biology Retreat.** Kennebunkport, ME October 2017.

As post-doctoral fellow

1. Davis JH. *Biological Assembly of Macromolecular Machines: Insights into Ribosome Biogenesis.* Invited seminars.

<p>UCLA Department of Biological Chemistry</p> <p>Colorado University at Boulder Department of Biochemistry</p> <p>Emory University Department of Biochemistry</p> <p>The Scripps Research Institute</p> <p>Dartmouth University Department of Biochemistry and Cell Biology</p> <p>Stony Brook University Department of Biochemistry and Cell Biology</p>	<p>Weill Cornell School of Medicine Department of Physiology and Biophysics</p> <p>UCI Department of Molecular Biology</p> <p>University of Minnesota Hormel Institute</p> <p>University of Florida Medical School</p> <p>Northeastern Department of Biological Engineering</p> <p>Washington University School of Medicine in St. Louis Department of Biochemistry and Molecular biophysics</p>
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2. Davis JH, Williamson JR. *Visualization of ribosome assembly intermediates.* **Southern California Cryo-EM Symposium.** La Jolla, CA, 2016. Selected Talk.
3. Davis JH, Williamson JR. *Approaches to understand macromolecular complex assembly.* **80th Annual Harden conference: Genes on Machines IV.** Macclesfield, UK 2016. Selected Talk.

4. Davis JH. *Quantitation of autophagic flux.* **10th Annual Division of Aging Biology New Investigators Forum.** NIA/NIH, Bethesda, MD 2016. Invited speaker.
5. Davis JH. *A view of ribosome biogenesis.* **Rising Stars in Chemical Biology Symposium.** University of Utah, UT, 2015. Invited speaker.
6. Davis JH. Williamson JR. *A structural analysis of ribosome biogenesis intermediates.* **Visible Molecular Cell Consortium Kickoff.** La Jolla, CA, 2015. Invited speaker.
7. Davis JH. *Untangling ribosome biogenesis using quantitative mass spectrometry, electron microscopy and chemical probing.* **28th Annual Symposium of the Protein Society.** San Diego, CA, 2014. Selected talk
8. Davis JH. *Quantitative approaches to understand ribosome biogenesis.* **2nd Annual winter Quantitative Biology Conference.** Kona, HI, 2014. Selected talk.
9. Davis JH. *Bacterial ribosome biogenesis as measured by qMS.* **San Diego RNA Club.** 2012. Selected talk.
10. Davis JH., Chen SS, Williamson JR. *Measuring ribosome biogenesis dynamics in bacteria using stable isotope pulse-labeling and quantitative mass spectrometry.* **9th International Conference on Ribosome Biogenesis,** Banff, Alberta, Canada, 2012. Selected talk.

As research scientist at Ginkgo BioWorks

11. Davis JH. **U.S. Air Force Manufacturing Technologies Workshop.** Dayton, OH, 2011. Invited speaker.
12. Davis JH. *A bio-based manufacturing future.* **DARPA/MTO Biomanufacturing of Impossible Materials Workshop.** Laguna Niguel, CA, 2011. Invited speaker.
13. Davis JH. *Design and characterization of genetically-encoded devices.* **TARPOL Synthetic Biology Summer Course,** ETH Basel, Switzerland, 2010. Invited speaker.
14. Davis JH. *Programming DNA ... for fun, for art and for human needs.* **Fractal '10.** Medellín, Colombia, 2010. Invited speaker.

As graduate student

15. Davis JH, Baker TA, Sauer RT. *Controlled degradation for synthetic biology.* **Synthetic Biology 4.0.** Hong Kong, China 2008. Selected talk.
16. Davis JH, Rubin, AJ, Sauer RT. *Design of physically and functionally composable transcriptional promoters.* **MIT Synthetic Biology Working Group** 2007. Invited speaker
17. Davis JH, Baker TA, Sauer RT. *A small-molecule controlled protein degradation system* **Cold Spring Harbor Labs Molecular Chaperones & Stress Response** 2007. Selected talk

H. SCIENTIFIC COLLABORATIONS

Active

1. Dr. Joaquin Ortega (McGill University). *Visualizing highly heterogeneous bacterial ribosome assembly intermediates using single particle cryo-electron microscopy.*
2. Dr. Alan Brown (Harvard University). *Structural basis for the mechanoregulation of ciliary motility by radial spokes.*
3. Dr. Nozomi Ando (Cornell University). *Revealing regulation of ribonucleotide reductase through structure.*
4. Dr. David Thompson (Purdue). *Direct purification and imaging of protein complexes in cryo-electron microscopy grids.*
5. Dr. Calvin Yip (University of British Columbia). *Structural analysis of the SAGA complex.*
6. Dr. David Haselbach (Vienna BioCenter). *Structural analysis of the proteasome.*
7. Drs. Robert T. Sauer and Tania A. Baker (MIT). *Visualizing motions in bacterial AAA+ proteases.*

G. TEACHING

As faculty at MIT

Quantitative biology for graduate students | Spring 2019-2021.

Introduces the fundamental concepts and tools of quantitative approaches to molecular and cellular biology. Covers a wide range of mathematical, computational, and statistical methods, although no previous expertise in these areas is required. Focuses on understanding quantitative approaches through the analysis of particular problems and examples drawn from classical genetics, molecular biology, cell biology, genomics, and systems biology.

Note: Revamped curriculum and restructured entire course.

Communication in experimental biology | Spring 2020.

A capstone course for junior and senior Biology majors with the aim of teaching creativity, quantitative reasoning, and communication (written, graphical, and oral) in the molecular life sciences. The course has two components: Methods and Logic of Human Genomics; and Scientific communication in both oral and written forms.

A biologist's guide to programming | Winter intersession (IAP) 2018, 2019, 2020.

A six-lecture intersession course designed as a 'bootcamp' for biologists to learn to program in Python.

Note: Created all curriculum and content

As a guest lecturer at MIT

Principles of biochemical analysis for graduate students | Fall 2017, 2018, 2019

Applying mass spectrometry and cryo-electron microscopy to understand macromolecular assembly

Fundamentals of experimental molecular biology | Fall 2018, 2019, 2020, Spring 2021

Cellular assembly of massive molecular machines

Methods and Logic in Molecular Biology | Fall 2018

Genetic approaches to identify genetic regulators of development

As a teaching assistant at MIT

Principles of biochemical analysis for graduate students | Taught by Drs. Robert Sauer, Frank Solomon, and Tania Baker | Fall 2006, 2008

Principles of biochemistry, emphasizing structure, equilibrium studies, kinetics, informatics, single-molecule studies, and experimental design. Topics include macromolecular binding and specificity, protein folding and unfolding, allosteric systems, transcription factors, kinases, membrane channels and transporters, and molecular machines.

As a student learning center tutor at UC Berkeley

Biophysical Chemistry | Dr. Jay Groves | Fall 2003

Bioenergetics, equilibrium and non-equilibrium states, molecular distributions, active and passive transport, reaction rates and mechanisms, enzyme reactions. The weekly one-hour discussion is for problem solving and the application of calculus in physical chemistry.

Introduction to Data Structures | Dr. Jonathan Shewchuk | Spring 2003

Fundamental dynamic data structures, including linear lists, queues, trees, and other linked structures; arrays strings, and hash tables. Storage management. Elementary principles of software engineering. Abstract data types. Algorithms for sorting and searching. Introduction to the Java programming language.

G. MENTORSHIP

Current laboratory trainees

Ph.D. Students

1. Ms. Ellen Zhong (CSB; co-advised with Prof. Bonnie Berger). Joined 05/2018
2. Ms. Bertina Telusma (Biology). Joined 05/2018
3. Ms. Samantha Webster (Biology). Joined 05/2018
4. Mr. Barrett Powell (Biology). Joined 05/2019
5. Ms. Laurel Kinman (Biology). Joined 05/2019
6. Ms. April Lee (Biology). Joined 05/2019
7. Ms. Jennifer Kosmatka (Biology; co-advised with Prof. Amy Keating). Joined 08/2020

Post-doctoral scholars

1. Dr. Andrew Grasseti. Joined 08/2018
2. Dr. Danica Cui. Joined 10/2019

Undergraduate students

1. Mr. Albert Liu. Joined 01/2021

Former laboratory trainees

Masters students

Mr. Daniel Montero (Biology). 01/2019-08/2019. Currently Ph.D. student at TU Delft

Post-doctoral scholars

Dr. Osvaldo Cruz. 10/2017-10/2018. Currently Senior Scientist at AbbVie

Research technician

Mr. Gustavo Sanchez. 10/2017-08/2018. Current position unknown

Undergraduate students

Ms. Katie Blackwell. 06/2020-09/2020. Ph.D. student, MIT Biology

Thesis committee membership

1. Irene Shih. Laboratory of Dr. Tania A. Baker. 2018-
2. Arish Shaw. Laboratory of Dr. Eliezer Calo. 2018-
3. Annie Zhang. Laboratory of Dr. Steve Bell. 2018-
4. Bingxu Lu. Laboratory of Dr. Darrell Irvine. 2018-
5. Justin Roberts. Laboratory of Dr. David Sabatini. 2018-
6. Sheena Vasquez. Laboratory of Dr. Cathy Drennan. 2019-
7. Talya Levitz. Laboratory of Dr. Cathy Drennan. 2019-
8. David Driscoll. Laboratory of Dr. Steve Bell. 2019-
9. Francesca Vaccaro. Laboratory of Dr. Cathy Drennan. 2019-
10. Avi Singer. Laboratory of Dr. Amy Keating. 2019-
11. Shaun Lim. Laboratory of Dr. Malene Hansen (Sanford Burnham Prebys). 2019-
12. Victoria Hernandez. Laboratory of Dr. Thomas Schwartz. 2020-
13. Ellen Hill. Laboratory of Dr. Troy Littleton. 2020-
14. Mirae Parker. Laboratory of Dr. Gene-Wei Li. 2020-
15. Gerardo Perez. Laboratory of Dr. Cathy Drennan. 2020-

16. Matthew Allan. Laboratory of Dr. Mark Bathe. 2020-
17. Gayathri Muthukumar. Laboratory of Dr. Jonathan Weissman. 2020-
18. Sam Block. Laboratory of Dr. Matt Vander Heiden. 2021-

Undergraduate advising

1. Anna Khoroshilov, 2019-
2. Margaret Libby, 2019-
3. Daniel Gutierrez, 2019-
4. Kenneth Viera, 2019-2020 (graduated)
5. Justin Cordero, 2020-
6. Andrea Lo, 2020-
7. Michael Kuoch, 2020-
8. Jillian Parker, 2020-

First-year Ph.D. student advising

1. Fiona Chatterjee, 2019
2. Nikole Fendler, 2019
3. Erika Weiskopf, 2019
4. Christina Beck, 2020
5. Catherine Liu, 2020
6. Miram Meziane, 2020
7. Julian Stanley, 2020

Undergraduate research mentorship

1. Effectively communicating scientific research: development of a COVID19 vaccine. Remotely mentored undergraduate students writing articles explaining the pandemic and the challenges in vaccine development during the pandemic. Work was co-mentored by Prof. Chris Kaiser. Participating students (below) were all rising seniors (Summer 2020)
 - a) Sharron Onggo
 - b) Justin Cordero
 - c) Sandhya Kalavacherla
 - d) Siam Muquit
 - e) Emily DeBitetto
2. Applying Fourier-transform least squares fitting algorithms to analyze mass spectra. Worked to implement a novel fitting algorithm to complex isotopically labeled mass spectra in Python (Fall 2019-Fall 2020).
 - a) Matthew Ellison (MIT senior)
 - b) Albert Liu (MIT sophomore).
3. Exploring models of autophagic substrate selection. Mentored summer student to develop testable models explaining how cells direct cellular proteins for autophagosomal vs. proteasomal degradation.
 - a) Katie Blackwell (University of Texas at Dallas, senior).

H. SERVICE

Committee service

1. MIT CSB graduate admissions committee 2018
2. MIT Biology graduate admissions committee 2019
3. MIT Biology graduate program committee 2019-present
4. Machine Learning in Computational Biology Meeting Program committee 2020

Manuscript, grant, and conference review

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| 1. <i>Cell</i> | 12. <i>RNA</i> |
| 2. <i>Cell Reports</i> | 13. <i>Journal of Proteomic Research</i> |
| 3. <i>Molecular Cell</i> | 14. <i>Experimental Cell Research</i> |
| 4. <i>Molecular Systems Biology</i> | 15. <i>Journal of Molecular Biology</i> |
| 5. <i>PNAS</i> | 16. <i>Journal of Chemical Information and Modeling</i> |
| 6. <i>Nature Communications</i> | 17. <i>Machine Learning in Computational Biology Conference 2020 reviewer</i> |
| 7. <i>Nature Chemical Biology</i> | 18. <i>Swiss National Science Foundation Synergia Grant Review</i> |
| 8. <i>Nature Machine Intelligence</i> | |
| 9. <i>Nature Structure and Molecular Biology</i> | |
| 10. <i>EMBO</i> | |
| 11. <i>eLife</i> | |

Assigned prelim examination committee membership

1. Colin Fowler. Laboratory of Dr. Jackie Lees. 2020
2. Eeshit Vaishnav. Laboratory of Dr. Aviv Regev. 2020
3. Adam Atanas. Laboratory of Dr. Steve Flavel (CSB). 2020
4. Jimmy Ly. Laboratory of Dr. Iain Cheesman. 2020
5. Alex Tang. Laboratory of Dr. Mary Gehring. 2020

Other service

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| 2020 | Panelist: “ <i>What to do when you don’t know what to do</i> ”. MIT IAP career series |
| 2020 | Discussion moderator: “ <i>What can faculty do to combat racism in STEM?</i> ” |
| 2019-2020 | Teaching assistant training course [co-taught with Dr. Cathy Drennan]
<i>Led a one-day teaching assistant training course with Dr. Cathy Drennan</i> |
| 2019 | Panelist: “ <i>Finding and managing a faculty position</i> ”. MIT IAP career series |
| 2017 | Panelist: “ <i>Funding Fest</i> ”. UCSD Research career series. |
| 2013-2014 | Investment Analyst, San Diego Tech Coast Angels
<i>Provided technical due-diligence on synthetic-biology related investment opportunities for a group of angel investors.</i> |
| 2012-2017 | Graduate Student Mentor, Williamson Lab, TSRI
<i>Developed research programs and provided technical guidance for five rotation students.</i> |
| 2009 | International Genetically Engineered Machines (iGEM) team advisor (MIT) |

Provided guidance for the MIT iGEM team, which was composed of 13 undergraduate students.

2009-2020 President, MIT Synthetic Biology Working Group
Organized weekly symposium series for the local synthetic biology research community.

2006-2010 Graduate & Undergraduate Student Mentor, MIT
Developed research programs for three rotating graduate and two undergraduate students.