ALEX C. ENGEL, Ph.D.

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EDUCATION

University of California, San Francisco
Ph.D. in Cell Biology, December 2007
Graduate advisor: Peter Walter
Doctoral project: Membrane fusion during yeast mating

Pomona College, Claremont, California
B.A. in Molecular Biology, May 2001
Undergraduate thesis advisor: Len Seligman
Senior exercise: DNA cleavage by homing endonucleases

PROFESSIONAL EXPERIENCE

Lecturer, Department of Bioengineering, Stanford University
April 2022 – present

Lecturer-Consultant, Center for Teaching and Learning, Stanford University
July 2021 – August 2022

Research Engineer and Instructor, Sattely Lab & Department of Chemical Engineering, Stanford University
June 2019 – June 2022

Assistant Professor, Department of Biology, Mills College
July 2016 – August 2019

Assistant Professor, Department of Biology, Williams College
July 2014 – June 2016

Visiting Assistant Professor, Department of Biology, Williams College
July 2013 – June 2014

Instructor, Berkeley City College
January 2012 – June 2013

Postdoctoral scholar, University of California, Berkeley
October 2008 – June 2013
Postdoctoral advisor: Greg Barton
Postdoctoral project: Compartmental regulation of Toll-like receptor signaling

Laboratory Instructor, University of San Francisco
January 2008 – May 2008

TEACHING EXPERIENCE

Lecturer, Department of Bioengineering, Stanford University

Courses taught
BIOE 44 Fundamentals for Engineering Biology Lab
BIOE 103 Systems Physiology and Design

- Rebooted an introductory synthetic biology lab course that supports student teams in designing and validating bioengineered systems cells using DNA synthesis.
- Effectively coordinated the large BIOE 103 teaching team with multiple instructors, guest speakers, and teaching assistants and led communication with students, yielding strong course and instructor evaluations.
- Dedicated and supportive teaching recognized with the 2023 Dept. of Bioengineering Teaching Award.

Research Engineer & Instructor, Sattely Lab & Department of Chemical Engineering, Stanford University

Courses taught
CHEMENG 055 Foundational Biology for Engineers
CHEMENG 185A Chemical Engineering Laboratory A
CHEMENG 185B Chemical Engineering Laboratory B

- Led writing workshops to help undergraduate students develop technical writing skills and implement effective writing processes in the context of an inquiry-driven lab course.
- Supported student team-led course-based research projects addressing renewable energy using chemical engineering. Helped to design and execute a course structure that promoted students practice and evaluation of expert decision-making skills.
- Co-created remote versions of 185A/B lab series with adjustments to promote learning community and continue student-led experimental design and data analysis.
- Co-designed a foundational biology course with quantitative approaches and an introduction to scientific method and analysis, including reading primary literature

Assistant Professor of Biology, Mills College

Courses taught
BIO 001 Introductory Biology I (lecture and lab sections)
BIO 133 Molecular Cell Biology (lecture and lab sections)
BIO 135PB Genetics
BIO 191 Senior seminar

- Implemented daily active learning classroom activities using Learning Catalytics device-based classroom response system to guide collaborative problem-solving.
- Created Camtasia lectures to partially flip course content and run additional in class collaborative problem-solving worksheets.
- Orchestrated a sequential individual & group exam to promote collaborative problem-solving.
- Developed counterstereotypical scientist spotlight assignments to promote an inclusive classroom environment.
- Implemented weekly metacognition reflections on muddy-point content and study skills.
- Revised the introductory biology lab program to increase inquiry and quantitative exercises.
- Created a hybrid lecture/active problem solving advanced cell and molecular biology course (BIO 133) involving in class problem solving, worksheets, and a summative research proposal individual project.
- Leveraged ASCB funding to partner with a teaching mentor and design a Course Based Undergraduate Research Experience (CURE) module in the advanced cell and molecular biology lab section.

Assistant Professor of Biology, Williams College

Courses taught
BIOL 101 The Cell (lecture and lab sections)
BIOL 313 Immunology (lecture and lab sections)
BIOL 322 Biochemistry II: Metabolism (lecture and lab sections)
BIOL 406 Dynamics of Internal Membrane Systems
BIMO 401 Topics in Biochemistry and Molecular Biology

- Developed an active learning introductory biology class structure using clicker questions to maximize student engagement.
- Improved design of and assessment for an inquiry-based introductory lab course.
- Designed an immunology course that covers core immunity principles, introduces reading and analysis of primary immunology literature, and incorporates inquiry-based laboratory exercises using tissue culture models.
- Updated a Biochemistry course focused on human metabolism with strong connections to clinical applications and experimental techniques. To engage a large course of approximately 80 students, developed an active lecture format with short lecture segments followed by clicker or small group discussion questions.
- Built an original cell biology course in membrane trafficking based on current and classic primary literature. This course scored 6.38 on a 1-7 scale for both the quality of instruction and the educational value of the course, where 6=excellent and 7=truly exceptional.

Visiting Instructor, Berkeley City College

Courses taught BIO 33 Applied Immunology (lecture, lab sections)

- Created a clear and engaging set of lectures that introduce the key concepts of immunology and emphasize experimental design and interpretation.
- Designed a novel set of laboratory protocols based on current immunology lab practices that requires students to design experiments within each exercise.

Microbiology Laboratory Instructor, University of San Francisco

Courses taught BIOL 135 Microbiology Lab

- Delivered prelab lectures, guided student thinking and laboratory technique during lab exercises, and graded lab reports and oral presentations.
- Formative and summative evaluations recognized my preparation, establishment of a fun classroom environment, and effort to get students to think critically and independently.

PEDAGOGY TRAINING AND CURRICULAR DESIGN

Course Design Institute, Stanford University CTL, Summer 2021

IDEAL Pedagogy course on inclusive and equitable pedagogy, Stanford University CTL, Summer 2021

Mentoring the Integration of Research Into the Classroom (MIRIC) mentor and participant, 2018 – present

Stanford STEM LATS (Lecturers and Academic Teaching Staff) teaching and learning series, 2019 – present

Stanford TEACH Symposia on online learning and community, 2020 – present

Society for the Advancement of Biology Education Research (SABER) West meeting, January 2018

Mills College Center for Teaching and Learning *Classroom Discussion* focus group

Rethinking Gateway Courses conference, UCI, October 2017

Mills College Internal Mellon grant: Supporting Underrepresented Students in the Biology major, 2018 – 2019

Biology Department Mission Statement, co-author, 2017

Faculty roundtable: Redesigning introductory STEM courses for variable preparation incoming student population, Williams College, Fall 2015

Faculty Roundtable working group: Design of upper-level lab courses, Williams College, Spring 2015

Course Design Group pedagogy course, Williams College, 2014

Advances in Science Education series, Williams College, 2013 – 2016

Preparing Future Faculty Teaching Apprentice Program, UCSF in partnership with the USF, Spring 2008

Becoming an Effective Science Teacher course, UCSF, 2008

RESEARCH MENTORING

Principal investigator, Mills College
Lead a cell fusion in yeast mating research program. In three years at Mills College, I trained nine lab members who worked on subprojects during the semesters and over the summer. My summer research team successfully completed a four-step cloning project, amplified and cloned cell fusion genes from distantly related yeast strains, and assayed these orthologous cell fusion proteins for fusion activity and subcellular localization. Summer students presented findings at the Genetics Society's *Yeast* meeting at Stanford, August 2018.

Principal investigator, Williams College
At Williams I mentored three honors thesis students, five research assistants, and seven summer and winter study research students. Each student was responsible for personal research goals, techniques, and lab jobs. Built a strong and positive rapport with this carefully selected group by maintaining a fun and supportive lab environment.

Postdoctoral scholar, University of California, Berkeley
Over the course of my postdoctoral training, I directly mentored three rotation students and two undergraduates. Two of these trainees came from traditionally underrepresented groups and I invested additional effort to ensure these students felt confident and comfortable both with the experiments they conducted and with the lab and institutional environment. For each trainee, I developed an introductory document to the projects they were assigned, demonstrated relevant techniques, and guided final presentations. I helped trainees find success and generate results they could proudly display. One of these student's work resulted in publication as a coauthor.

Graduate student, University of California, San Francisco
As a graduate student, I was assigned to mentor one rotation student and one summer research undergraduate student who continued to work in the lab for an addition year following her summer program. This undergraduate was the first of her family to attend college and she loved the project and lab atmosphere she was introduced to in the Walter lab.

HONORS AND AWARDS

Dept. of Bioengineering Teaching Award, 2023

American Society for Cell Biology travel award, 2018, $400

Gibbons-Young Professorship, 2018 – 2019, $5,000

American Society for Cell Biology MALT (Mentorship in Active Learning and Teaching) fellowship, September 2017 – May 2019, $2,000

Gordon Research Conferences Predominantly Undergraduate Institution Fund award, June 2014, $600

Center for Emerging and Neglected Diseases (CEND) facilities competition award for "Proteomic-based analysis of innate immune regulation of phagosome maturation," May 2011, $8,500

Cancer Research Institute Irvington Postdoctoral Fellow, January 2009 – December 2011, $155,000

Earle C. Anthony Graduate Division Travel Award, July 2007, $750

Senior exercise passed with distinction, Pomona College, May 2001

Graduated *cum laude*, Pomona College, May 2001

Phi Beta Kappa, May 2001

NSF REU summer fellowship, University of Washington, June – August 2000

SERVICE

Undergraduate Curriculum Committee, Department of Bioengineering, Summer 2022 – present
Uytengsu Teaching Lab Instructors and Staff Committee, Fall 2020 – present
Equity and inclusion group meeting lab facilitator, Sattely Lab, Spring 2020 – Spring 2022
Experience Mills Admissions Open House lectures, Fall 2018 and Spring 2019
Biochemistry job search committee, 2018
Poster judge for undergraduate poster session, ASCB/EMBO meeting, December 2018
Academic Standing Committee, Mills College, 2017 – 2019
Biochemistry and Molecular Biology Program Committee, Mills College, 2017 – 2019
Post-Baccalaureate Pre-Medical Program Committee, Mills College, September 2017 – 2019
Poster judge, Bay Area Meeting on Organelle Biology, June 2017
Health and Natural Sciences Division secretary, Mills College, September 2016 – 2019
Information and Technology Committee, Williams College, 2015 – 2016
Liberal Arts Consortium on Online Learning (LACOL) representative, Williams College, 2015 – 2016
Biology Senior Thesis Poster working group, Williams College, Summer 2015

OUTREACH

Guest speaker, Stanford iGEM BioE Research Program, August 2023
Lightbox Art Project: Research program and process, the Exploratorium, 2019
Mills College booth, Contra Costa College Transfer Day STEM alley, October 2018
March for Science, Mills College table, April 2018
Mills Educational Talent Search high school career outreach guest speaker, July 2017
GE girls summer research instructor, Summer sessions 2016, 2017
iBiology ambassador, September 2015 – 2019
Science fair judge, Berkshire Arts & Technology Charter School, 2014 and 2015

PRESENTATIONS

Poster presenter, American Society of Cell Biology, December 2018. Implementation of a CURE module investigating yeast mating and cell fusion to build student research skills within the curriculum.

Group meeting guest speaker, Thorner Lab UC Berkeley, December 2018. Cell fusion defect of aminophospholipid flippase mutants.

Poster presenter, Genetics Society of America, Yeast meeting, August 2018. Mapping Functional Domains of the Cell Fusion Protein Prm1p.

Seminar speaker, University of Washington Tacoma branch, February 2018. Cell fusion during yeast mating.

Seminar speaker, University of San Francisco, May 2017. Searching for the cell fusion machinery in a budding yeast model.

Poster presenter, Molecular Membrane Biology Gordon Research Conference, June 2015. Partitioning of nucleic acid sensing innate immune receptors to endosomal compartments.

Seminar speaker, University of Wisconsin Madison, February 2015. Cell biological underpinnings of immune recognition: Endosomal localization of Toll-like receptors.

Poster presenter, Lysosomes and Endocytosis Gordon Research Conference, June 2014. Endosomal sorting and signaling of innate immune receptors.

Poster presenter, Lysosomes and Endocytosis Gordon Research Conference. June 2010. Toll-like receptor sorting and differential signaling from endosomal pathogen sensing compartments.

Speaker, Cell-Cell Fusion Gordon Research Conference. July 2007. Regulation of membrane fusion during yeast mating.

PUBLICATIONS

Sandquist, E., B. Schofield, K. Taylor, A. Engel, J. Liu, A. Putzke, L. Sagwan-Barkdoll, S. Walsh, T. Buchanan, L. Barton, K. Resendes, and M.J. Wolyniak. A Community of Practice for CURE Development: The MIRIC (Mentoring the Integration of Research into the Classroom) Network. *Journal of College Science Teaching*. In press.

Chiang, C.*, **A. Engel***, A.M. Opaluch*, I. Ramos, A.M. Maestre, I. Secundino, P.D. De Jesus, Q.T. Nguyen, G. Welch, G.M. Bonamy, L.J. Miraglia, A.P. Orth, V. Nizet, A. Fernandez-Sesma, Y. Zhou, G.M. Barton, and S.K. Chanda. Cofactors Required for TLR7- and TLR9- Dependent Innate Immune Responses. 2012. *Cell Host & Microbe* 11(3):306-18.

Ewald, S.E., **A. Engel**, J. Lee, M. Wang†, M. Bogyo, and G.M. Barton. 2011. Nucleic acid recognition by Tolllike receptors is coupled to stepwise processing by cathepsins and asparagine endopeptidase. *J Exp Med* 208:643-651.

Engel, A., and G.M. Barton. 2010. Compartment-specific control of signaling from a DNA-sensing immune receptor [Perspective]. *Sci Signal* 3:pe45.

Engel, A., and G.M. Barton. 2010. Unfolding new roles for XBP1 in immunity [Perspective]. *Nat Immunol* 11:365-367.

Aguilar, P.S., M.G. Heiman, T.C. Walther, **A. Engel**, D. Schwudke, N. Gushwa, T. Kurzchalia, and P. Walter. 2010. Structure of sterol aliphatic chains affects yeast cell shape and cell fusion during mating. *Proc Natl Acad Sci U S A* 107:4170-4175.

Engel, A., P.S. Aguilar, and P. Walter. 2010. The yeast cell fusion protein Prm1p requires covalent dimerization to promote membrane fusion. *PLoS One* 5:e10593.

Engel, A., and P. Walter. 2008. Membrane lysis during biological membrane fusion: collateral damage by misregulated fusion machines [Review]. *J Cell Biol* 183:181-186.

Aguilar*, P.S., **A. Engel***, and P. Walter. 2007. The plasma membrane proteins Prm1 and Fig1 ascertain fidelity of membrane fusion during yeast mating. *Mol Biol Cell* 18:547-556.

Heiman, M.G., **A. Engel**, and P. Walter. 2007. The Golgi-resident protease Kex2 acts in conjunction with Prm1 to facilitate cell fusion during yeast mating. *J Cell Biol* 176:209-222.

Sussman, D., M. Chadsey, S. Fauce†, **A. Engel**†, A. Bruett†, R. Monnat, Jr., B.L. Stoddard, and L.M. Seligman. 2004. Isolation and characterization of new homing endonuclease specificities at individual target site positions. *J Mol Biol* 342:31-41.

* equal contribution
† undergraduate author

PROFESSIONAL MEMBERSHIPS

Society for the Advancement of Biology Education (SABER), 2018 – current
American Society of Cell Biology, 2015 – 2019
Genetics Society of America, 2018