


# Stanford

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## Drew Endy

Associate Professor of Bioengineering

 Curriculum Vitae available Online

### Bio

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#### BIO

Drew Endy developed the world's first "fables" genetic engineering teaching lab in the new Bioengineering program at Stanford and previously helped start the Biological Engineering major at MIT. His Stanford research team develops genetically encoded computers and redesigns genomes. He co-founded the BioBricks Foundation as a public-benefit charity supporting free-to-use standards and technology that enable the engineering of biology (BioBricks.org). He co-organized the International Genetically Engineered Machines (iGEM.org) competition, the BIOFAB International Open Facility Advancing Biotechnology (BIOFAB.org), and Gen9, Inc. (Gen9bio.com). He serves on the US Committee on Science Technology and Law and is a new voting member of the US National Science Advisory Board for Biosecurity. He chaired the 2003 Synthetic Biology study as a member of DARPA ISAT, served as an ad hoc member of the US NIH Recombinant DNA Advisor Committee, and co-authored the 2007 "Synthetic Genomics: Options for Governance" report with colleagues from the Center for Strategic & International Studies and the J. Craig Venter Institute. Esquire named Endy one of the 75 most influential people of the 21st century. He lives in Menlo Park CA with his wife and Stanford Bioengineering colleague Prof. Christina Smolke.

#### ACADEMIC APPOINTMENTS

- Associate Professor, Bioengineering
- Member, Bio-X

#### HONORS AND AWARDS

- Arthur Humphrey Teaching Award, Lehigh University (1993)
- Darling Fellowship, Thayer School, Dartmouth College (1994)
- Goodrich Prize, Thayer School, Dartmouth College (1998)
- Certificate of Appreciation, Synthetic Biology Study Chair, DARPA (2003)
- Certificate of Service, DARPA ISAT (2004)
- Cabot Career Development Award, MIT (2005)
- WIRED Rave Awards, WIRED (2005)
- Best & Brightest, Esquire (2007)
- Terman Fellow, Stanford University (2008)
- Most Influential People of the 21st Century, Esquire (2009)
- Best Research Article for 2011, Journal of Biological Engineering (2011)
- Kavli Fellow, US National Academies of Sciences (2012)
- Best Research Article for 2012, Journal of Biological Engineering (2012)

- Presidential Champion of Change, The White House (2013)
- The Seymour Benzer Lectureship, US National Academy of Sciences (2013)

## PROFESSIONAL EDUCATION

- PhD, Dartmouth , Biotechnology & Biochemical Engineering (1998)
- MS, Lehigh , Environmental Engineering (1994)
- BS, Lehigh , Civil Engineering (1992)

## LINKS

- <http://endy.web.stanford.edu/>: <http://endy.web.stanford.edu/>

## Teaching

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### COURSES

#### 2017-18

- Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems: BIOE 244 (Spr)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)

#### 2016-17

- Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems: BIOE 244 (Spr)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)
- LAW, TECHNOLOGY, AND LIBERTY: BIOE 242, ENGR 243 (Win)
- Law, Technology, and Liberty: LAW 4014 (Win)

#### 2015-16

- Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems: BIOE 244 (Spr)
- Introduction to Bioengineering (Engineering Living Matter): BIOE 80, ENGR 80 (Spr)

#### 2014-15

- Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems: BIOE 244 (Spr)
- Introduction to Bioengineering: BIOE 80, ENGR 80 (Spr)

## STANFORD ADVISEES

### Med Scholar Project Advisor

Akshay Maheshwari

### Doctoral Dissertation Reader (AC)

Angelica Parente

### Doctoral Dissertation Advisor (AC)

Akshay Maheshwari

## Publications

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### PUBLICATIONS

- **Amplifying genetic logic gates.** *Science*  
Bonnet, J., Yin, P., Ortiz, M. E., Subsoontorn, P., Endy, D.  
2013; 340 (6132): 599-603

- **Precise and reliable gene expression via standard transcription and translation initiation elements** *NATURE METHODS*  
Mutalik, V. K., Guimaraes, J. C., Cambray, G., Lam, C., Christoffersen, M. J., Quynh-Anh Mai, Q. A., Tran, A. B., Paull, M., Keasling, J. D., Arkin, A. P., Endy, D.  
2013; 10 (4): 354-?
- **Rewritable digital data storage in live cells via engineered control of recombination directionality** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Bonnet, J., Subsoontorn, P., Endy, D.  
2012; 109 (23): 8884-8889
- **Engineered cell-cell communication via DNA messaging.** *Journal of biological engineering*  
Ortiz, M. E., Endy, D.  
2012; 6 (1): 16-?
- **Measuring the activity of BioBrick promoters using an in vivo reference standard.** *Journal of biological engineering*  
Kelly, J. R., Rubin, A. J., Davis, J. H., Ajo-Franklin, C. M., Cumbers, J., Czar, M. J., de Mora, K., Gliberman, A. L., Monie, D. D., Endy, D.  
2009; 3: 4-?
- **Determination of cell fate selection during phage lambda infection** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
St-Pierre, F., Endy, D.  
2008; 105 (52): 20705-20710
- **Refinement and standardization of synthetic biological parts and devices** *NATURE BIOTECHNOLOGY*  
Canton, B., Labno, A., Endy, D.  
2008; 26 (7): 787-793
- **Engineering BioBrick vectors from BioBrick parts.** *Journal of biological engineering*  
Shetty, R. P., Endy, D., Knight, T. F.  
2008; 2: 5-?
- **DNA synthesis and biological security** *NATURE BIOTECHNOLOGY*  
Bugl, H., Danner, J. P., Molinari, R. J., Mulligan, J. T., Park, H., Reichert, B., Roth, D. A., Wagner, R., Budowle, B., Scripp, R. M., Smith, J. A., Steele, S. J., Church, et al  
2007; 25 (6): 627-629
- **Foundations for engineering biology** *NATURE*  
Endy, D.  
2005; 438 (7067): 449-453
- **Refactoring bacteriophage T7** *MOLECULAR SYSTEMS BIOLOGY*  
Chan, L. Y., Kosuri, S., Endy, D.  
2005; 1
- **Modelling cellular behaviour** *NATURE*  
Endy, D., Brent, R.  
2001; 409 (6818): 391-395
- **Computation, prediction, and experimental tests of fitness for bacteriophage T7 mutants with permuted genomes** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Endy, D., You, L. C., Yin, J., Molineux, I. J.  
2000; 97 (10): 5375-5380
- **Toward antiviral strategies that resist viral escape** *ANTIMICROBIAL AGENTS AND CHEMOTHERAPY*  
Endy, D., Yin, J.  
2000; 44 (4): 1097-1099
- **One-step cloning and chromosomal integration of DNA.** *ACS synthetic biology*  
St-Pierre, F., Cui, L., Priest, D. G., Endy, D., Dodd, I. B., Shearwin, K. E.  
2013; 2 (9): 537-541

- **Composability of regulatory sequences controlling transcription and translation in *Escherichia coli*** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Kosuri, S., Goodman, D. B., Cambray, G., Mutalik, V. K., Gao, Y., Arkin, A. P., Endy, D., Church, G. M.  
2013; 110 (34): 14024-14029
- **Measurement and modeling of intrinsic transcription terminators** *NUCLEIC ACIDS RESEARCH*  
Cambray, G., Guimaraes, J. C., Mutalik, V. K., Lam, C., Quynh-Anh Mai, Q. A., Thimmaiah, T., Carothers, J. M., Arkin, A. P., Endy, D.  
2013; 41 (9): 5139-5148
- **Quantitative estimation of activity and quality for collections of functional genetic elements** *NATURE METHODS*  
Mutalik, V. K., Guimaraes, J. C., Cambray, G., Quynh-Anh Mai, Q. A., Christoffersen, M. J., Martin, L., Yu, A., Lam, C., Rodriguez, C., Bennett, G., Keasling, J. D., Endy, D., Arkin, et al  
2013; 10 (4): 347-?
- **Switches, Switches, Every Where, In Any Drop We Drink** *MOLECULAR CELL*  
Bonnet, J., Endy, D.  
2013; 49 (2): 232-233
- **A survey of enabling technologies in synthetic biology.** *Journal of biological engineering*  
Kahl, L. J., Endy, D.  
2013; 7 (1): 13-?
- **A fully decompressed synthetic bacteriophage empty setX174 genome assembled and archived in yeast** *VIROLOGY*  
Jaschke, P. R., Lieberman, E. K., Rodriguez, J., Sierra, A., Endy, D.  
2012; 434 (2): 278-284
- **Refactored M13 Bacteriophage as a Platform for Tumor Cell Imaging and Drug Delivery** *ACS SYNTHETIC BIOLOGY*  
Ghosh, D., Kohli, A. G., Moser, F., Endy, D., Belcher, A. M.  
2012; 1 (12): 576-582
- **Scaffold number in yeast signaling system sets tradeoff between system output and dynamic range** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Thomson, T. M., Benjamin, K. R., Bush, A., Love, T., Pincus, D., Resnekov, O., Yu, R. C., Gordon, A., Colman-Lerner, A., Endy, D., Brent, R.  
2011; 108 (50): 20265-20270
- **Editorial-Synthetic Biology** *NUCLEIC ACIDS RESEARCH*  
Collins, J. J., Endy, D., Hutchison, C. A., Roberts, R. J.  
2010; 38 (8): 2513-2513
- **Gemini, a Bifunctional Enzymatic and Fluorescent Reporter of Gene Expression** *PLOS ONE*  
Martin, L., Che, A., Endy, D.  
2009; 4 (11)
- **The Alpha Project: a model system for systems biology research** *1st q-bio Conference on Cellular Information Processing*  
Yu, R. C., Resnekov, O., Abola, A. P., Andrews, S. S., Benjamin, K. R., Bruck, J., Burbulis, I. E., Colman-Lerner, A., Endy, D., Gordon, A., Holl, M., Lok, L., Pesce, et al  
INST ENGINEERING TECHNOLOGY-IET.2008: 222-33
- **Genomics - Reconstruction of the Genomes** *SCIENCE*  
Endy, D.  
2008; 319 (5867): 1196-1197
- **Stimulus design for model selection and validation in cell signaling** *PLOS COMPUTATIONAL BIOLOGY*  
Apgar, J. F., Toettcher, J. E., Endy, D., White, F. M., Tidor, B.  
2008; 4 (2)
- **TABASCO: A single molecule, base-pair resolved gene expression simulator** *BMC BIOINFORMATICS*  
Kosuri, S., Kelly, J. R., Endy, D.  
2007; 8

- **Synthetic genomics - Options for governance** *BIOSECURITY AND BIOTERRORISM-BIODEFENSE STRATEGY PRACTICE AND SCIENCE*  
Garfinkel, M. S., Endy, D., Epstein, G. L., Friedman, R. M.  
2007; 5 (4): 359-361
- **Engineering life: Building a fab for biology** *SCIENTIFIC AMERICAN*  
Baker, D., Group, B. I., Church, G., Collins, J., Endy, D., Jacobson, J., Keasling, J., Modrich, P., Smolke, C., Weiss, R.  
2006; 294 (6): 44-51
- **Regulated cell-to-cell variation in a cell-fate decision system** *NATURE*  
Colman-Lerner, A., Gordon, A., Serra, E., Chin, T., Resnekov, O., Endy, D., Pesce, C. G., Brent, R.  
2005; 437 (7059): 699-706
- **Signal transduction - Molecular monogamy** *NATURE*  
Endy, D., Yaffe, M. B.  
2003; 426 (6967): 614-615
- **Signal transduction. Decoding NF-kappaB signaling.** *Science*  
Ting, A. Y., Endy, D.  
2002; 298 (5596): 1189-1190
- **Intracellular kinetics of a growing virus: A genetically structured simulation for bacteriophage T7** *BIOTECHNOLOGY AND BIOENGINEERING*  
Endy, D., Kong, D., Yin, J.  
1997; 55 (2): 375-389