

EC/BE552 Computational Synthetic Biology for Engineers

Prof. Douglas Densmore

Reading List

Introduction – Reading #1

- "Chapter 1: Fundamentals of Synthetic Biology" and "Chapter 2: Fundamentals of Biodesign" in BioBuilder.
- Endy, D. (2005). **Foundations for engineering biology**. *Nature*, 7067, 449–453.
- Arkin, A. (2008). **Setting the standard in synthetic biology**. *Nature biotechnology*, 7, 771–774.

Specification – Reading #2

- Erin H. Wilson, Shiori Sagawa, James W. Weis, Max G. Schubert, Michael Bissell, Brian Hawthorne, Christopher D Reeves, Jed Dean, and Darren Platt, **Genotype Specification Language**, *ACS Synthetic Biology* 2016 5 (6), 471-478. DOI: 10.1021/acssynbio.5b00194
- Ernst Oberortner, Swapnil Bhatia, Erik Lindgren, and Douglas Densmore. 2015. **A Rule-Based Design Specification Language for Synthetic Biology**. *J. Emerg. Technol. Comput. Syst.* 11, 3, Article 25 (December 2015), 19 pages. DOI:<https://doi.org/10.1145/2641571>
- Pedersen, M., Phillips, A. (2009). **Towards programming languages for genetic engineering of living cells**. *Journal of the Royal Society, Interface / the Royal Society*, S437-50.

Design – Reading #3

- Swapnil P. Bhatia, Michael J. Smanski, Christopher A. Voigt, and Douglas M. Densmore, **Genetic Design via Combinatorial Constraint Specification**, *ACS Synthetic Biology* 2017 6 (11), 2130-2135, DOI: 10.1021/acssynbio.7b00154
- Nicholas Roehner and Chris J. Myers, **Directed acyclic graph-based technology mapping of genetic circuit models** in *ACS Synthetic Biology*, vol. 3, pp. 543-555, 2014.
- Brophy, J. A., & Voigt, C. A. (2014). **Principles of genetic circuit design**. *Nature methods*, 5, 508–520.
- Huynh, L., Tsoukalas, A., Koppe, M., & Tagkopoulos, I. (2013). **SBROME: a scalable optimization and module matching framework for automated biosystems design**. *ACS synthetic biology*, 5, 263–273.
- Prashant Vaidyanathan, Bryan S. Der, Swapnil Bhatia, Nicholas Roehner, Ryan Silva, Christopher A. Voigt, and Douglas Densmore, **A framework for genetic logic synthesis**, in *Proceedings of the IEEE*, vol. 103, pp. 2196-2207, 2015.

Assembly – Reading #4

- **"Chapter 3: Fundamentals of DNA Engineering"** in BioBuilder.
- Casini, A., Storch, M., Baldwin, G. S., & Ellis, T. (2015). **Bricks and blueprints: methods and standards for DNA assembly**. *Nature reviews. Molecular cell biology*, 9, 568–576.
- Densmore, D., Hsiao, T. H., Kittleson, J. T., DeLoache, W., Batten, C., & Anderson, J. C. (2010). **Algorithms for automated DNA assembly**. *Nucleic acids research*, 8, 2607–2616.
- Linshiz, G., Stawski, N., Poust, S., Bi, C., Keasling, J. D., & Hillson, N. J. (2012). **PaR-PaR laboratory automation platform**. *ACS synthetic biology*, 5, 216–222.

Simulation and Modeling – Reading #5

- **"Chapter 3: Differential Equation Analysis"** and **"Chapter 4: Stochastic Analysis"** in Engineering Genetic Circuits.
- Curtis Madsen, Zhen Zhang, Nicholas Roehner, Chris Winstead, and Chris Myers, **Stochastic model checking of genetic circuits,** in ACM Journal of Emerging Technologies in Computing Systems, vol. 11, pp. 23:1 - 23:21, 2014.

Standards and Registries – Reading #6

- Galdzicki, M. et al. (2014) **The Synthetic Biology Open Language (SBOL) provides a community standard for communicating designs in synthetic biology**. *Nature Biotechnology* 32, 545-550.
- **"Section 1: Purpose"** and **"Section 6: Overview of SBOL"** in Synthetic Biology Open Language (SBOL) Version 2.3.0, Available at <https://sbolstandard.org/wp-content/uploads/2016/06/SBOL2.3.0.pdf>
- Peccoud, J., Blauvelt, M. F., Cai, Y., Cooper, K. L., Crasta, O., DeLalla, E. C., Evans, C., Folkerts, O., Lyons, B. M., Mane, S. P., Shelton, R., Sweede, M. A., & Waldon, S. A. (2008). **Targeted development of registries of biological parts**. *PLoS one*, 7, e2671.
- **A paper of your choosing**

Miscellaneous Reading

- K. Keutzer. 1987. **DAGON: technology binding and local optimization by DAG matching**. In *Proceedings of the 24th ACM/IEEE Design Automation Conference (DAC '87)*.
- E Appleton, C Madsen, N Roehner, D Densmore, **Design automation in synthetic biology**, Cold Spring Harbor perspectives in biology 9 (4), a023978
- H Huang, D Densmore, **Integration of microfluidics into the synthetic biology design flow**, Lab on a Chip 14 (18), 3459-3474
- DM Densmore, S Bhatia, **Bio-design automation: software+ biology+ robots**, Trends in biotechnology 32 (3), 111-113
- Bilitchenko, L., Liu, A., Cheung, S., Weeding, E., Xia, B., Leguia, M., Anderson, J. C., & Densmore, D. (2011). **Eugene--a domain specific language for specifying and constraining synthetic biological parts, devices, and systems**. *PloS One*, 4, e18882.