

1125-AA-2350 **Laurie J Heyer*** (lahey@ davidson . edu) and **Jeffrey L Poet**. *Combinatorial and Computational Models in Synthetic Biology*.

Synthetic biology is an interdisciplinary field in which biological machines, designed to do a variety of useful things, are built and tested in the laboratory. Mathematical modeling plays a key role in the design and testing phases, as we can model and predict the performance of the machine much faster than we can build the living implementation. Our math and biology students have designed, built and tested a system we call Programmed Evolution, a way of forcing cells to produce the desired small molecule (e.g., a drug for treating asthma) at an optimal rate, and not evolve away from this optimal solution. We have applied mathematical and computational tools, including local search algorithms, probability models and agent-based models, to predict and interpret data from the system. (Received September 20, 2016)