

# L14: 14 Lectures past and 11 to go

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## Part I: 'The cell as a well-stirred bioreactor'

### *topics*

- Lambda phage lysis-lysogeny switch
- Synthetic genetic switch
- Switches as memory storage
- Chemotaxis: perfect adaptation or not?
- Synthetic genetic oscillators

### *main assumption*

- well-stirred reactor
- absence of chemical gradients  
(justification: small cells, diffusion mixes)

Switch from  
Systems Microbiology  
to  
Systems Cell Biology

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The importance of diffusion and gradients  
for cellular regulation

# Part II: Systems Cell Biology

‘Importance of gradients and diffusion  
in cellular regulation’

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After two lectures on diffusion and reaction-diffusion equations, we will focus during the coming lectures on the following biological systems:

## 1. Eukaryotic chemotaxis

Gradient sensing in *Dictyostelium*

(aka ‘amoeba’)

## 2. Computing the middle of a cell

Pole-to-pole oscillations in *Escherichia coli*

## 3. Self organization of the cytoskeleton