

## Regulation of gene expression by time-varying signaling inputs

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- Overview of signaling systems in which the temporal characteristics of the initial response pathway determine which target genes are expressed. We will discuss the MAPK, p53, and NF- $\kappa$ B pathways, along with other examples.
- Conceptual models of networks that perform temporal signaling filtering at the gene expression level. Basic models of gene expression and how negative and positive feedback affect expression output.
- Modern experimental approaches to measuring time-dependent gene expression patterns. Highlights of recent studies combining live-cell microscopy and molecular techniques such as CRISPR or single-mRNA tagging to quantify gene expression over time in individual cells.
- Physiological roles for time-filtering gene expression systems. How time-dependent expression controls differentiation and diversification of cell state; implications for plasticity in tumor cells.