

39. Protein-nucleic acid interactions

1 unit, Christopher Lima, October 24, 2025

Interactions between proteins, DNA and RNA in biological systems and the structural features that enable these interactions.

Sequence specific nucleic acid binding proteins and how they find their sites, direct versus indirect readout.

DNA binding domains and how they are used to recognize DNA in different structural contexts.

Protein-RNA interactions; similarities and differences with protein-DNA interactions.

Hybrid systems where proteins use nucleic acid to guide selectivity and specificity.

Discussion Paper:

Jinek et al. Structures of Cas9 endonucleases reveal RNA-mediated conformational activation. *Science*. 2014 Mar 14;343(6176):1247997. doi: 10.1126/science.1247997. Epub 2014 Feb 6.

Background Papers:

Wang et al., Structural Biology of CRISPR-Cas immunity and genome editing enzymes. *Nat Rev Micro* 2022 <https://doi.org/10.1038/s41579-022-00739-4>

Wilson and Doudna. Molecular Mechanisms of RNA interference. *Annu Rev Biophys*. 2013;42:217-39. doi: 10.1146/annurev-biophys-083012-130404.

van der Oost J. et al. Unravelling the structural and mechanistic basis of CRISPR-Cas systems. *Nat Rev Microbiol*. 2014 Jul;12(7):479-92. doi: 10.1038/nrmicro3279. Epub 2014 Jun 9.