Genetic Engineering

Genetic Engineering the set of technologies that let us manipulate DNA by design. Our basic approach to developing these technologies has always been to adapt the machineries that we find in nature for our own use. With them we are now able to change DNA in the test tube and in the genomes of almost whatever organisms as we want. Of course, this doesn't mean that we will get what we want.



Reading:

MBoC(6th) Ch8: *ANALYZING AND MANIPULATING DNA* Gupta & Musunuru, 2014.

Need to know and understand

Agarose and polyacrylamide gel electrophoresis Cutting DNA at specific sequences: Restriction Endonucleases, Zinc Finger Nucleases (ZFNs), Transcription activator-like effector nucleases (TALENs), CRISPR/Cas9 Joining DNA (Ligation): T4 DNA ligase Cloning Vectors Transformation, Transfection, Transduction cDNA Libraries: genomic, cDNA, expression Library screening probes hybridization Sanger dideoxy chain-terminator DNA sequencing Next Generation Sequencing Polymerase Chain Reaction (PCR)

Genetic Engineering in Medicine. The ability to work with DNA outside of its normal genomic context is central to the medical research community as it tries to understand how information is encoded and used in DNA. It has been crucial in establishing the links between inherited disease and genes. It is a starting point for engineering genomes in situ for generating mutant animals and for gene therapy in humans.

Focus illustrations: Source: Molecular Biology of the Cell: Sixth Edition (2015) Alberts et al., Garland Science, NY

There are no focal illustrations for this topic. The material is quite concisely laid out and largely equivalent in relevance.