MATH:7450 (22M:305) Topics in Topology: Scientific and Engineering Applications of Algebraic Topology

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http://www.math.uiowa.edu/~idarcy/AppliedTopology.html
DNA is Antiparallel

5' to 3', Direction of Polarity

Non-polar, hydrophobic Interior Bases
Antiparallel implied
no Mobius bands
Fig. 4.11 Supercoiled (Form I) and relaxed (Form II) closed circular DNA.

http://bioweb.wku.edu/courses/biol22000/6StructureNA/
Crossing Sign Determination
Right-hand Rule

Right-handed Crossing
+1

Left-handed Crossing
-1
Writhe

Fig. 4.11 Supercoiled (Form I) and relaxed (Form II) closed circular DNA.

Form I

Form II

http://bioweb.wku.edu/courses/biol22000/6StructureNA/
Linking number
Linking number

http://en.wikipedia.org/wiki/Linking_number
Linking number

http://en.wikipedia.org/wiki/Linking_number
Fig. 4.11 Supercoiled (Form I) and relaxed (Form II) closed circular DNA.
Linking Number = Twist + Writhe

http://sites.fas.harvard.edu/~biotext/animations/topology2.html
Covalently closed circular template

DNA replication

Unwound parental duplex

Overwound region

supercoils

precatenanes

(J. Mann) http://www.sbs.utexas.edu/herrin/bio344/
Topoisomerases are involved in

- Replication
- Transcription
- Unknotting, unlinking, supercoiling.
- Targets of many anti-cancer drugs.
Topoisomerases are proteins which cut one segment of DNA allowing a second DNA segment to pass through before resealing the break.