COOPERATIVE MAGNETISM

The term magnetism refers to substances that at the atomic level exhibit temperature dependant paramagnetic behaviour.
The non-zero spin angular moment associated with an unpaired electron gives rises to a magnetic moment.
Upon pairing, electrons within an orbital exhibit opposite magnetic moments, resulting in no net magnetic moment.
Magnetic susceptibility is the degree of magnetization of a material in response to an applied magnetic field. $M = \chi H$ (M is magnetization , χ is susceptibility , H is applied field)
Magnetic momenta in single atoms, molecules or complexes are caused by the movement of the electrons (orbital momentum) and their spins (spin momentum).

Cooperative Magnetism

Bulk magnetic behavior arises from interactions between paramagnetic atoms or molecules. These interactions can create materials that are either magnetic or non-magnetic, depending on how adjacent magnetic spins align with each other.
Although magnetic interactions occur in three dimensions, the type and strength of these interactions can be different in each dimension. This gives rise to magnetic materials with one cooperative interaction type in one dimension and different cooperative interaction types in the other two dimensions.

The major classes of magnetism are paramagnetism, ferromagnetism, antiferro-magnetism, and ferrimagnetism.These classes of magnetic behaviour describe how adjacent magnetic moments would interact with each other at absolute zero.

FERROMAGNETISM is characterized by parallel alignment of adjacent magnetic spins those results in a large net magnetic moment.
Exhibit a net magnetic moment in the absence of an applied magnetic field.
(eg. Fe, Co, Ni, Tb, Dy, Gd, CrO_2)
χ decreases with increasing temperature up to the Curie temperature where the ferromagnetic behaviour transforms to a paramagnetic one (decreasing χ with increasing temperature).

In ANTIFERROMAGNETISM the magnetic spins are aligned anti parallel, which results in a material with no net magnetic moment (e. g. of MnO, CoO, NiO, MnF_2).
The magnetic moment compensate each other.
χ increases with increasing temperature up to the Curie temperature where the antiferromagnetic behaviour transforms to a paramagnetic one (decreasing χ with increasing temperature).

FERRIMAGNETISM is composed of two magnetic spins of different strength and exhibit an parallel alignment. (eg. $NiFe_2O_4$) .The magnetic momenta are different hence partially compensation occurs. Show the same behavior as ferromagnetic materials. eg. Spinells.

Reference: Shriver, D.F. Atkins, P.W.; Inorganic Chemistry, 4rd ed., Oxford University Press Pag. 606-607