

**Course:** Magnetic Properties of Oriented and Non-oriented Grain Electric Steels

**Code:** POSMAT0017

**Credits:** 03

**Module:** Specific formation

**Research area:** Selection, processing e characterization

**Contents:**

Origin of the atomic magnetic moment. Types of magnetic ordering. Itinerant magnetism principle (from metals based on transition metals such as Fe, Ni ..) and localized (from oxides and metals based on rare earth). Magnetic texture. Hysteresis cycle. Domain walls. Magnetic losses. Properties of non-oriented and oriented grain of electrical steels. Magnetic characterization techniques.

**References:**

1. A. P. Guimarães. **Magnetismo e Ressonância Magnética em Sólidos**. EdUsp. 2017.
2. M. S. Reis. **Fundamentals of Magnetism**. Elsevier. Academic Press. 2013
3. K. H. Buschow and F. R. de Boer. **Physics of Magnetism and Magnetic Materials**. Kluwer Academic Publishers. 2003
4. William D. Callister, Jr. **Ciência e Engenharia de materiais: Uma introdução**. LTC. 2001S. Welding Metallurgy. 3<sup>th</sup> edition. John Wiley and Sons, 2002.