

Course: Fundamentals of Mechanical Transformation of Metals **Code:** MEM.007

Credits: 03

Module: Specific formation

Research area: Selection, processing and characterization

Contents:

Description and types of stress and strain. Tension test – principles, mechanical properties and plastic instability. True stress – strain curves. Work hardening and work hardening rate. Effect of temperature and strain rate on the mechanical behavior of materials. Mechanisms of plastic deformation in metals – deformation by slip, deformation by twinning and deformation by grain boundary sliding. Dislocation theory. Cross-slip and stacking fault. Strengthening mechanisms in metals – work hardening of monocrystalline and polycrystalline materials, grain boundary strengthening, static and dynamic strain aging, solid solution strengthening, precipitation and dispersion hardening.

References:

1. DIETER, G.E. **Mechanical metallurgy**. London: McGraw-Hill, 1988.
2. ABBASCHIAN, R.; ABBASCHIAN, L.; REED-HILL, R.E. **Physical metallurgy principles**. 4th ed. Stamford: Cengage Learning, 2009.
3. HULL, D.; BACON, D. J. **Introduction to dislocations**. 4th ed. Oxford: Elsevier, 2001.
4. HOSFORD, W. F. **Mechanical behavior of materials**. 2nd ed. Cambridge: Cambridge University Press, 2010.
5. MEYERS, M. A.; CHAWLA, K. K. **Princípios de metalurgia mecânica**. São Paulo: Edgard Blücher Ltda, 1982.