



UNIVERSIDADE FEDERAL DE SÃO CARLOS
PRÓ – REITORIA DE PÓS-GRADUAÇÃO

COURSE DESCRIPTION SHEET



1. Course Name: **Materials Science II**
2. Course Code: 002
3. Semester offered: 1st
4. Total course credits: 10
5. Course workload
 - 5.1. Lecture classes: 60h
 - 5.2. Practical classes:
 - 5.3. Seminars: 90h
6. Course Syllabus:
 - Principles of Materials Thermodynamics. Phase equilibrium in solid-liquid and solid-solid systems.
 - Equilibrium diagrams. Kinetics of phase change processes. Solid-state reactions.
 - Electrical properties of materials (conductivity; band theory, semiconductivity; dielectric behavior; ferroelectricity and piezoelectricity);
 - Magnetic properties of materials (magnetization, permeability, and interactions between magnetic dipoles and the magnetic field; domain structure and hysteresis, magnetic storage and superconductivity);
 - Thermal properties of materials (heat capacity and specific heat; thermal expansion and thermal conductivity; thermal stresses);
 - Optical properties of materials (electromagnetic spectrum; radiation interactions with matter; refraction; reflection; absorption; transmission; luminescence; photoconductivity; lasers; optical fibers);
 - Materials degradation (thermal, radiation, and chemical environment effects).
7. Main Bibliography:
 - P. W. Atkins, Physical Chemistry, 4th Edition, Oxford University Press, Oxford, 1992.
 - W. D. Callister Jr. Materials Science and Engineering: an introduction, 3rd Edition, John Wiley, New York, 1994
 - N.W. Aschcroft, N. D. Mermin, Solid State Physics, Saunders College-HRW, Filadelfia, E.U.A, 1976.
 - J. F. Shackelford, Introduction to Materials Science for Engineers, 4th, Edition, Prentice Hall, 1996.

- D. R. Askeland, The Science and Engineering of Materials, 3rd Edition, ITP, New York, 1994.
- C. Kittel, Introdução à Física do Estado Sólido, 5ª Edição, Guanabara-Koogan, Rio de Janeiro, 1978
- R. T. De Hoff Thermodynamics in Materials Science, Mc Graw Hill , New York, 1993