UNIVERSIDADE FEDERAL DE SÃO CARLOS

PRÓ – REITORIA DE PÓS-GRADUAÇÃO

COURSE DESCRIPTION SHEET

1. Course Name: **Materials Characterization**
2. Course Code: 004
3. Semester offered: 2nd
4. Total course credits: 5
5. Course workload

   5.1. Lecture classes: 45h

   5.2. Practical classes: 30h

   5.3. Seminars:
6. Course Syllabus:

   - The objective of this course is to provide students interested in the interdisciplinary research of functional materials (optical, electrical, magnetic, and catalytic) of ceramic, metallic, vitreous, and polymeric nature, with a comprehensive overview of the fundamentals of experimental techniques that are applied in materials studies, providing conditions for analysis and interpretation of results. The focus will be on training graduate students to use analytical equipment available on the Sorocaba campus: FTIR, visible and UV light spectrometer, optical microscope, scanning electron microscope.
   - General principles of quantum mechanics and spectroscopy: Interaction of radiation with matter, Absorption, Emission, etc. Radiation sources, penetration depth, damage, resolution, loss.
   - Vibrational spectroscopy: Raman, infrared absorption (FTIR). Fundamentals, spectral manipulation, spectrum acquisition modes, applications to materials. Experimental practice.
   - Optical Properties of Solids: Visible and ultraviolet light spectroscopy: fundamentals (UV-Vis). Absorbance and reflectance measurement modes, experimental practice.
   - Morphological Study: Optical microscopy, fundamentals, quantitative morphological analysis, sample preparation and experimental practice. Scanning electron microscope fundamentals, imaging modes.

7. Main Bibliography:

   - P.E.J. Flewitt, R.K. Wild, Physical Methods for Materials Characterisation, 2003, Institue of Physics Publishing.
   - S. C. Carnevarolo Jr., Técnicas de Caracterização de Polímeros, 2004, Artlieber.
   - ASM Metals Handbook vol9 Metalography and Microstructures, 8 th ed. 1998

- W. A. MANNHEIMER: Microscopia dos materiais. E-papers Serviços Editoriais Ltda, Rio de Janeiro, 2002.
- PADILHA, A.F.; AMBROSIO FILHO, F. Técnicas de Análise Microestrutural.
- SILVERSTEIN, Robert et al. Identificação Espectrométrica de Compostos Orgânicos, 2006, Hemus.
- Schrader, B. and Bougeard, D., Infrared and Raman Spectroscopy, 1995, John Wiley & Sons.