



Course Syllabus

<b>Department/Faculty</b> School of Engineering		
<b>Graduate Program</b> Materials Engineering and Nanotechnology		
<b>Degree</b> <input checked="" type="checkbox"/> Academic Master's <input checked="" type="checkbox"/> Doctorate (PhD) <input type="checkbox"/> Professional Master's		
<b>Course Name</b> Materials Characterisation		
<b>Professor</b>		
<b>Office hours</b> 48		
<b>Course Overview</b> <p>This module covers the characterisation of different materials (ceramics, metals, polymers, and composites) used in various engineering fields. The course will present techniques such as infrared absorption spectroscopy, thermal analysis, optical and electron microscopy, X-ray diffraction, and mechanical behaviour analysis.</p>		
<b>Topics outline</b> <ul style="list-style-type: none"><li>• Infrared Absorption Spectroscopy.</li><li>• Thermal Analysis.</li><li>• Optical Microscopy and Scanning Electron Microscopy with semi-quantitative energy dispersive X-ray microanalysis, backscattered electron diffraction.</li><li>• Transmission Electron Microscopy.</li><li>• X-ray Diffraction with Phase Determination.</li><li>• Mechanical Behaviour of Tensile Testing in Metallic and Polymeric Materials, and Three-Point Bending in Ceramic Materials.</li></ul>		
<b>Letter Grade Assignment</b> Grade A (Excellent) - Grade points between 9 and 10 Grade B (Good) - Grade points between 8 and 8.9 Grade C (Satisfactory) - Grade points between 7 and 7.9 Grade D (Unsatisfactory) - Grade points between 6 and 6.9		



**Texts, Materials, and supplies**

**Basic Bibliography**

FLEWITT, P. E. J.; WILD, R. K. *Physical Methods for Materials Characterization*. 3rd edition, Boca Raton, CRC Press, 2017.

GROOVER, Mikell P. *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems*. 6th ed. Bethlehem: Wiley, 2016.

PAVANATI, Henrique Cezar (Org). *Science and Technology of Materials*. São Paulo: Pearson, 2015.

**Supplementary Bibliography**

CALLISTER, William D.; RETHWISCH, David G. *Materials Science and Engineering: An Introduction*. 9th ed. Rio de Janeiro: LTC, 2016.

LENG, Y. *Materials Characterization: Introduction to Microscopic and Spectroscopic Methods*, Wiley-VCH, Germany, 2013.

GIACOVAZZO, Carmelo. *Fundamentals of Crystallography*. 3rd ed. New York: Oxford University Press, 2011.

ALMEIDA, Gustavo Spina Gaudêncio de. *Polymer Engineering: Types of Additives, Properties, and Applications*. São Paulo: Erica, 2015.

IKHMAYIES, S. J. ET AL, *Characterization of Minerals, Metals, and Materials 2016: Proceedings of a Symposium Sponsored by the Materials Characterization Committee of the Extraction and Processing Division of The Minerals, Metals, & Materials Society (TMS), Held During TMS 2016 145th Annual Meeting & Exhibition, Nashville, Tennessee, February 14-18, Downtown Nashville, Tennessee Music City Center*. New Jersey: Wiley, 2016.