

# LEARNING MODULE DESCRIPTION

## GENERAL INFORMATION

1. Module title: **Materials Characterisation Techniques**
2. Module code: **MCTech**
3. Term: **4<sup>th</sup> semester.**
4. Duration: **15h**
5. ECTS: **2**
6. Module lecturer: **prof. Simona Delsante**
7. E-mail: **simona.delsante@unige.it**
8. Language: **English**

## DETAILED INFORMATION

The aim of this course is to provide sufficiently detailed understanding of some of the most important materials characterization techniques. Techniques covered throughout the course will be:

- Scanning Electron Microscopy (SEM) coupled with Energy Dispersive and Wavelength Dispersive Spectrometry (EDS/WDX);
  - Thermoanalytical and calorimetric techniques (DTA, TG, DSC, Direct reaction Calorimetry).
- The courses will be illustrated by examples for the different materials classes.

## READING LIST

1. J. I Goldstein et al., "Scanning Electron Microscopy and X-Ray Microanalysis", ed. Kluwer Academic
2. R. Ferro et al., "Remarks about data reliability in experimental and computational alloy thermochemistry", *Intermetallics*, 11 (2003) 1081–1094.

**NB:** Additional references and reading material will be given during the course.

## SYLLABUS:

### Lectures

**Issue 1:** Scanning electron Microscope: general scheme, beam production, interaction volume. Image construction: secondary and back-scattered electrons signals. Qualitative and quantitative analysis by X-Ray: Energy Dispersive and Wavelength Dispersive Spectrometry. Mapping. Examples of real samples.

**Issue 2:** Thermoanalytical techniques: overview, principles and application. Thermal Analysis, Differential Thermal Analysis, Thermogravimetry. Calorimetric techniques: overview,

principles and application. Experimental measurements of thermodynamic properties by Differential Scanning Calorimetry and Direct Reaction Calorimetry.

**Student workload (ECTS credits)**

Activity types	Mean number of hours* spent on each activity type
Contact hours with the teacher as specified in the programme	<b>15</b>
Independent study (1)	<b>15</b>
Independent study (2)	<b>15</b>
Total hours	<b>45</b>
Total ECTS credits for the module	<b>2</b>

\* Class hours – 1 hour means 45 minutes

(1) Independent study – examples of activity types: preparation for classes, data analysis,

(2) library-based work, PowerPoint presentation of the chosen topic related to the lecture .