

5.0 credits	52.5 h	2q
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Teacher(s) :	Gaigneaux Eric ; Dufrêne Yves ; Dupont Christine ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	<p>The course presents an overview of methodologies for characterizing organized matter and their application to the surface of materials. It provides a link between the use of characterization methods and understanding associated physico-chemical phenomena. Three levels of characterization are covered, a specific technique being emphasized at each level. Each part of the course may be taken separately.</p> <p>Partim A. Chemical analysis of surfaces with an emphasis on X-ray photoelectron spectroscopy : principle, instrumentation, qualitative and quantitative aspects of data interpretation.</p> <p>Partim B. Gas adsorption and its use for characterizing the texture of solids: physical and chemical adsorption, different types of adsorption isotherms, application to specific surface area and porosity measurements.</p> <p>Partim C. Scanning probe microscopies, emphasizing atomic force microscopy: instrumentation, imaging and force spectroscopy modes, applications dealing with engineering and bioengineering of surfaces.</p> <p>The course combines the study of concepts, illustrations with practical examples and demonstrations on the instruments.</p>
Aims :	<p>The course aims at developing a detailed knowledge and a critical attitude regarding the surface analysis of solids. The students will acquire a know-how in the characterization of the chemical composition of surfaces, the texture of solids and the spatial organization of interfaces. Students will be asked to integrate this know-how with a global approach of the analysis of organized matter, starting from their skills in chemical analysis towards various application areas (materials, catalysis, biotechnology,).</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Content :	<p>Introduction Overview of the characterization of complex solids : texture, composition, structure, specific properties.</p> <p>A. Chemical analysis of surfaces. Context - Principles (electronic levels, elemental analysis of the surface) - Instrumentation - Qualitative aspects (main peaks and satellites, chemical shift and functional analysis) - Quantitative aspects (from the basic equation to the pragmatic approach, complex systems, models for interpretation).</p> <p>B. Gas adsorption and characterization of surfaces. Physical and chemical adsorption - Organized study of the different types of adsorption isotherms: type II (BET), type IV (capillary condensation, porosity), type I (chemisorption, micropore filling), types III et V - Characterization of the texture of porous solids (know-how) - Equation of state - Heat of adsorption.</p> <p>C. Atomic force microscopy. Instrumentation - Topographic imaging: principles, applications - Force spectroscopy: principles, applications - Other imaging modes.</p>
Other infos :	Prerequisites : General chemistry, physics and physical chemistry Written examination Support : Notes provided by the professors
Cycle and year of study :	> Master [120] in Chemistry and Bio-industries
Faculty or entity in charge:	AGRO