

**UE15 – Application of neutron scattering and synchrotron radiation in materials science:** This teaching unit is organized as summerschool holding two weeks at University of Montpellier in early September. It consists in an intensive program dedicated to the use and applications of synchrotron x-ray and neutron sources scattering and spectroscopy techniques to investigate the intimate nature of matter in relation to materials properties.

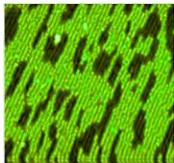


**UE16 – Master-thesis project:** In this unit, students run personal work to prepare their master-thesis. They perform bibliographic search and scientific case study under the control of a tutor. Introduction to dedicated scientific software or programming, as well as training on research lab experiments can also be done to prepare student to research world as they will encounter during the master-thesis.

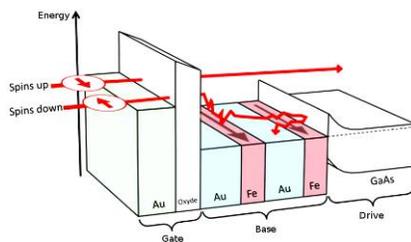
**UE17 – Advanced materials 1:** This teaching block is composed of two parts. The first one is dealing with brittle materials and their mechanical properties. It particularly focuses on fragile-ductile transition, abrasion, friction and wear mechanism and on how elastic / visco-plastic behavior influences damaging in these materials. The lecture also presents experimental techniques used for characterization of brittle materials. The second part of this teaching block concerns advanced techniques to probe the structure and dynamics of matter. It mainly focuses on x-ray scattering techniques, including ultra-fast time resolved methods, and solid state NMR.



**UE18 – Advanced materials 2 (Chemistry):** The objective of this course is to present the chemical properties of materials and the chemical processes necessary to control their integration in advanced technological applications. The first part concerns "new" materials (nano and biomaterials). The second part concerns the processes of thin film growth, the advanced applications of polymers and materials for sensors. The learning outcome consist in advanced knowledge and skills on the elaboration of high technological added value materials, characterization techniques of new materials, nano-materials and thin films, as well as their applications and their integration in a process of sustainable development.



**UE19 – Advanced materials 3 (Physics):** The first part of this lecture is dedicated to condensed matter. A survey of general concepts, mainly from statistical physics, is done in order to give students a general overview of equilibrium and out of equilibrium properties of condensed matter and how these concepts are involved in the control of materials.



The second parts concerns magnetic properties of materials and their use in electronics and spintronics (surface properties, thin films, multilayers, giant magneto-resistance, spin valves).

**UE20 – Management:** The objective of this course, given at the management institute of Rennes (IGR) is to give students an introduction to management, in order to contribute to a better understanding of companies and industry. The lecture focuses on topics such as the design of an optimal portfolio of logistics approaches and strategies for various segments or the identification, design, and implementation of appropriate forecasting methodology.

