

AMUTECH DOCTORAL PROGRAM 2026

ADVANCED MATERIALS AND NANOTECHNOLOGIES

OBJECTIVE

The AMUTech Institute offers a doctoral program designed to provide a robust understanding of nanomaterials and their distinctive properties, with a focus on the phenomena that emerge at the nanoscale. Its ambition is to equip participants with a solid and cross-disciplinary perspective on the field, providing them with both the scientific foundations and the current research challenges.

TARGET AUDIENCE

Designed to be cross-disciplinary and accessible, the program welcomes physicists, chemists, and engineers without requiring specific prerequisites. It is primarily intended for doctoral candidates wishing to strengthen their knowledge or broaden their skill set. It is also open to master's students, as well as engineers and researchers seeking to deepen or update their expertise in the field of nanomaterials.

INTENDED COMPETENCIES

Upon completion, participants will be able to understand the fundamental concepts that endow nanomaterials and nanostructured materials with their novel properties, and to use this knowledge to guide choices in fabrication, characterization, and technological applications.

STRUCTURE

The program is organized into two complementary parts.

First part: Nanomaterials - Description and properties

This introductory section presents the foundations of nanomaterials through two complementary subsections.

I / Introduction to the Properties of Nanomaterials (7 hours)

This subsection covers surfaces, interfaces, and the characteristic properties of nano-objects. Its goal is to provide a clear and accessible understanding of the physical and chemical mechanisms that emerge at the nanoscale. It highlights how, at these dimensions, the properties of a material no longer depend solely on its composition or atomic structure, but also on its size, shape, and surface-to-volume ratio.

COURSES IN 2026 (SAINT JÉRÔME CAMPUS – MARSEILLE)

I.1 / Surfaces and interfaces

Pierre MÜLLER - Wednesday, 18 February 2026, Room 1 Étoile Nord (formerly EGIM) VP, 8:30 - 10:30

I.2/ Properties and characteristic length scales

Pierre MÜLLER - Wednesday, 18 February 2026, Room 1 Étoile Nord (formerly EGIM) VP, 10:30 - 12:30

I.3/ Size effects on mechanical, thermodynamic, optical, electronic, magnetic, chemical and transport properties

Frédéric LEROY - Monday, 2 March 2026, Room 1 Étoile Nord (formerly EGIM) VP, 8:30 - 11:30

II/ Nanostructured materials (8 hours)

This second section focuses on materials defined by their nanostructuring. These objects may be macroscopic while exhibiting properties altered by their bulk or surface structuration. The case of low-dimensional materials, where the usual notions of bulk and surface no longer apply, will also be addressed.

COURSES IN 2026 (SAINT JÉRÔME CAMPUS – MARSEILLE)

II.1/ Metamaterials

Nicolas BONOD - Thursday, 12 March 2026, Room 1 Étoile Nord (formerly EGIM) VP, 10:00 - 12:00

II.2/ Porous materials

Isabelle Beurroies - Tuesday, 17 March 2026, Room 1 Étoile Nord (formerly EGIM) VP, 10:15 - 12:15

II.3/ Molecular assemblies on surfaces

Thomas LEONI - Wednesday, 25 March 2026, Room 1 Étoile Nord (formerly EGIM) VP, 14:00 - 16:00

II.4/ 2D, 1D, and 0D Materials

Thierry ANGOT - Thursday, 26 March 2026, Room 1 Étoile Nord (formerly EGIM) VP, 14:00 - 16:00

Second part: Nanofabrication and nanoengineering

This part focuses on fabrication approaches and the integration of nanomaterials and is also structured into two components:

I. Nanofabrication Methods (8 hours)

II. Nanoengineering and Integration (7 hours)

It will be scheduled in autumn 2026.