



Visiting Professor Program Academic Year 2023/2024

TEACHING COMMITMENT: 60 hours

COURSE TITLE

Bridges between Fine Art, Mathematics and Natural Sciences: the Case of Symmetry in Materials

TEACHING PERIOD

1st term

SCIENTIFIC AREA

Chemistry and Material Science

LANGUAGE USED TO TEACH

English

COURSE SUMMARY

This course will start from the discovery of C60, a third variety of carbon, in addition to the more familiar diamond and graphite forms, that has generated enormous interest in many areas of physics, chemistry and material science. The lecturer will review scientific achievements of the past on which foundation the modern fullerene science is based, and first of all – long history of exploration of polyhedra in mathematics and art. The students will “travel” in depth of time until the time of Renaissance and even classical Antiquity. The course will review the contribution of the great Renaissance artists to development of polyhedra geometry as well as analysis of their art (mostly from the points of view of mathematics and theory of perspective). Examples of fullerene-like polyhedra in other cultures (Arabic/Persian, Chinese) and modern art will be presented.

LEARNING OBJECTIVES

The specialization and even overspecialization in art and science led to the appearance of new disciplines and sub-disciplines. It became impossible for an artist or scholar to comprehend many fields, although the links between these could significantly help the developments. This is also a problem in university education since reality is not divided into departments like universities. As a result, we have “two cultures”: art and humanities vs. science and technology. This course is aimed to link the two main fields of our culture (art and science) by some bridge or rather by a number of bridges. Eventually the students and researchers should not stay on these bridges: they should remain in their own respective disciplines, but it is important to visit the other side of the gap(s), to have new impressions, and then to go back and use this knowledge and experience.

TUTORSHIP ACTIVITIES

The Visiting Professor may be a tutor or co-tutor in the presentation of the graduate student's thesis work or a co-tutor for PhD students (if a co-tutelage with the institution of the visiting will be signed)

LAB ACTIVITIES

The involvement of the Visiting Professor in the research activity of the different groups of the Department of Chemistry is encouraged.

OTHER ACTIVITIES BESIDES THE COURSE

Seminars and conferences for PhD students and research fellows will complement the teaching activities.

Other teaching activities 2 CFU course (8 hours) for PhD students within the PhD program in Chemical and Material Sciences (Department of Chemistry)

Title: Stability in Photoactive Materials for Energy Production

ADDITIONAL COURSE

COURSE TITLE

Sustainability of Materials in Renewable Energy-Related Devices

TEACHING PERIOD

1st term

SCIENTIFIC AREA

Chemistry and Material Science

LANGUAGE USED TO TEACH

English

COURSE SUMMARY

The world needs to switch from using fossil fuels to using renewable energy sources as soon as possible. Failure in this action will lead to accelerated and catastrophic climate damage, loss of biodiversity, and economic, social, and political instability. Good technology solutions are already present in the market, and we have started using them daily. There is no longer any technical or economic obstacle to the swift transition of our energy system to something far cleaner, cheaper, and more rational. However, these technologies rely on several types of materials, and unfortunately, not all of them are sustainable or in some cases, Critical Raw Materials are needed to obtain better performances. The next important revolution in this field will be related to using sustainable and circular materials and design..

LEARNING OBJECTIVES

The teaching is part of the general objective of the course to provide knowledge and skills in the field of innovative materials for smart applications, with particular reference to the knowledge and understanding of the role of the material's design in device performance.

Specifically, the learning objectives are:

- Ability to foresee and understand the role of each functional material within a specific application (renewable energy production, i.e. photovoltaics)
- Understand the functional principle of the devices and how they are related to technologically meaningful fields.

TUTORSHIP ACTIVITIES

The Visiting Professor may be a co-tutor in the PhD student's thesis work.

LAB ACTIVITIES

The involvement of the Visiting Professor in the research activity of the different groups that are involved in the PhD program in Innovation for the Circular Economy is encouraged.

OTHER ACTIVITIES BESIDES THE COURSE

Seminars and conferences for PhD students and research fellows will complement the teaching activities.

VISITING PROFESSOR PROFILE

Multidisciplinary expertise in material science, physical chemistry, photo-electrochemistry, material electrochemistry, and renewable energy system. Experience in the optoelectronic and photonic characterization of materials, interfaces, and surfaces. Expertise and experience in applications including optoelectronic applications, photoelectrochemistry, and electrochemistry, in particular, emerging photovoltaics (i.e. Perovskite solar cell) and phenomena related to the stability and photostability of materials in energy-related devices.

FURTHER INFORMATION

ADDITIONAL COURSE:

- PhD in Chemistry and Material Science (8 hours)

CONTACT REFERENT

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