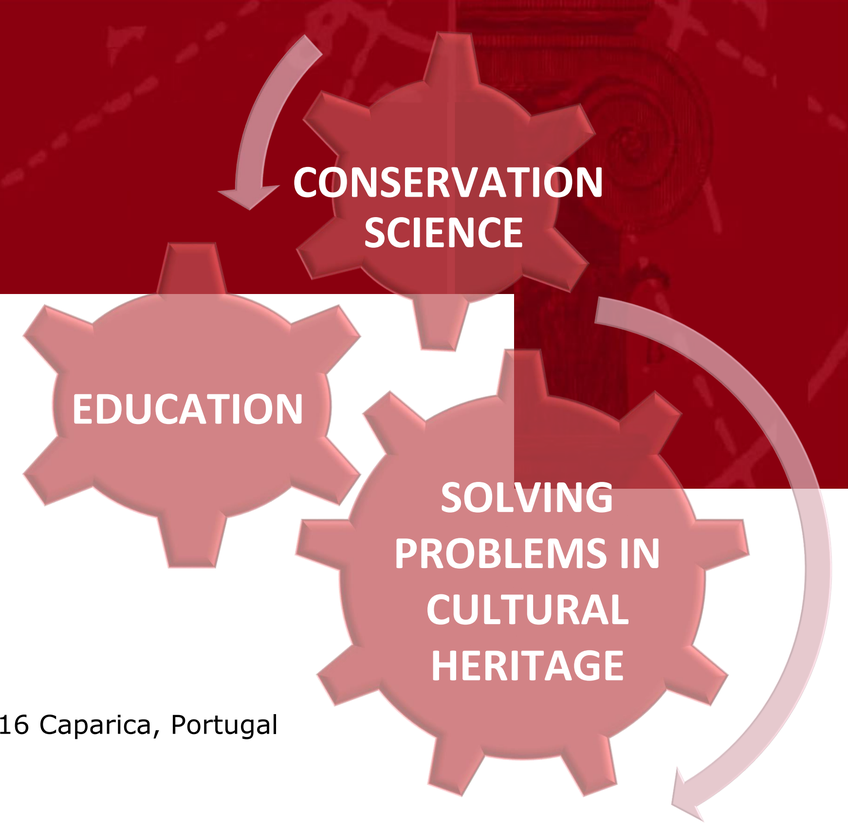
NOVA SCHOOL OF SCIENCE & TECHNOLOGY
DEPARTMENT OF CONSERVATION AND RESTORATION



Integrating Expertise for Teaching Collaborations in Conservation Science
(teaching method)

Susana França de Sá and Márcia Vilarigues

Department of Conservation and Restoration, VICARTE and LAQV-REQUIMTE, NOVA School of Science and Technology, 2829-516 Caparica, Portugal

Intended audience: lecturers in conservation and restoration courses

Introduction

Since 2017, *Introduction to Conservation Science* (ICS) is part of the BA in Conservation-Restoration from FCT NOVA (PT). This course was created to fill a gap in the BA structure – the need for a bridge between fundamental science (tough in the 1st year) and conservation diagnosis (3rd year) courses. ICS was designed with the main goal of teaching students how to look at, approach and solve problems of the Cultural Heritage combining reflexive thinking and object-led analysis with instrumentation.

To achieve better and quicker learning outcomes from students, ICS coordinator posed the following hypothesis: should ICS bring together two lecturers with different education backgrounds?

ICS students will be able to:

Apply scientific knowledge in future conservation decision-making processes

How?

By being able to apply the **principles of the scientific method,** and to read and undertake **bibliographic research**

By understanding and knowing **how to use scientific concepts** related to the physical, mechanical and physical-chemical properties of materials

By **understanding the methodologies** to study the materials of works of art and of conservation and restoration, and ageing phenomena with the use of photo-documentation and analytical instrumentation techniques

By being able **to define the best methodology** (**experimental design**) to answer questions of the cultural heritage such as lighting, hanging artworks (tensions), colour assessment, and identification of materials (elemental and molecular) and causes of deterioration

By knowing **how to assess and present data**, based on their critical assessment of the advantages and limitations of several imaging and analytical instrumentation

Since 2018, ICS BRINGS TOGETHER ONE PHYSICIST AND ONE CONSERVATOR and this collaboration has been resulting in better communication of science subjects to (and comprehension from) students, while keeping rigorous scientific language and in-depth knowledge of concepts, along with a strong sense of application and purpose to conservation. One main achievement has been the students' acquisition of solid connection skills between science methods and their future professional activity in conservation.

Course Structure

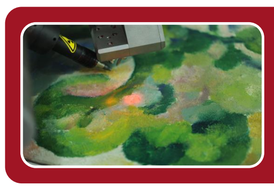
The syllabus of ICS was built by the physicist in close collaboration with the conservator

The Fundamentals

The principles of the scientific method
The experimental design
Mechanical, physical and chemical magnitudes of materials

Radiation in Cultural Heritage

The various ranges of electromagnetic radiation in cultural heritage characterization - Examination techniques (imaging, elemental and molecular)
Radiation as source of deterioration
- Radiation in museum lighting sources – criteria of selection



Conservation science into practice

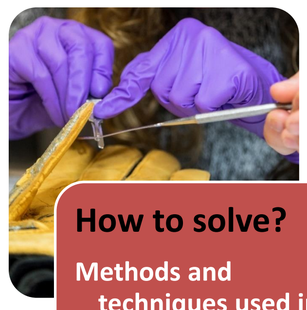
- The importance of experimental design to solve problems from the Cultural Heritage
- Science communication work of case studies

Course Teaching Methodology

ICS is taught through theoretical-practical (TP) classes, in a total of 56h of contact with the student (6 ECTS).

Problem

Concepts related to the problem (material, ageing causes, properties affected…) are explained



How to solve?

Methods and techniques used in conservation science are introduced

Learning by seeing and doing

Students have demonstrations and hands-on sessions in the lab

ICS classes always start with a problem or question posed by the cultural heritage that is answered throughout the class based on the knowledge and/or methods of conservation science. Then, the topics end with a demonstration in the lab with advanced analytical instrumentation or with practical sessions with hands-on experience by the students in more straightforward techniques (stress analysis with polariscope, colorimetry, use of environmental meters and optical microscopy).

Short list of references

ICCROM. (2013). Forum on Conservation Science, Rome, 16–18 October 2013.
May, E. & Jones, M. (eds). (2006). Conservation Science: Heritage Materials. Cambridge: The Royal Society of Chemistry.
Artioli, G., & Angelini, I. (2010). Scientific methods and cultural heritage: an introduction to the application of materials science to archaeometry and conservation science. Oxford University Press.
Varella, E. A. (Ed.). (2012). Conservation science for the cultural heritage: applications of instrumental analysis (Vol. 79). Springer Science & Business Media.

The full contents of the curricular unit are available in the academic online platform *Moodle.*

Acknowledgments Fundação do Ministério de Ciência e Tecnologia de Portugal through the research units VICARTE (UIDB/00729/2020 and UIDP/00729/2020), and the Associate Laboratory for Green Chemistry – LAQV (UIDB/50006/2020 and UIDP/50006/2020).