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# NET-HERITAGE

EUROPEAN NETWORK ON RESEARCH PROGRAMME APPLIED
TO THE PROTECTION OF TANGIBLE CULTURAL HERITAGE'

Instrument:

## Deliverable 5.1

**Model programme for advanced training to disseminate research to the conservation professions, to serve as a benchmark for the evaluation of existing programmes and a template for future developments, enabling the development of a larger and more effective cadre in the heritage sector, including SMEs, across the European Union.**

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| P | Restricted to other programme participants (including the Commission | |
| R | Restricted to a group specified by the consortium (including the | |
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# REPORT
# ON THE OPPORTUNITIES IN ADVANCED EDUCATION IN CONSERVATION-RESTORATION AND SCIENCE FOR CONSERVATION IN EUROPE

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## Executive Summary

This Executive Summary sets out the main conclusions from the survey on opportunities in advanced education in conservation-restoration and science for conservation in Europe, carried out within the NET-HERITAGE project. The numbers in brackets refer to the relevant paragraphs in the main text of the report.

Based on this survey, the Panel of Experts supporting the WP5 team (1, and Appendix 1) made a number of recommendations which, it is believed, are essential to encourage opportunities to carry out advanced study and research in the broadest possible range of disciplines of the heritage field and thereby better meet the many challenges to the long-term preservation of European cultural heritage.

Three categories of advanced education opportunities have been identified: study and research leading to a doctoral degree, long courses not leading to a degree, short courses and other training possibilities (3).

The NET-HERITAGE survey revealed two basic approaches to educating students at the doctoral level (4): one bases education on the research work of a student supplemented by a limited training component, the other puts greater emphasis on a strong set training component. The education programmes leading to a doctoral degree, which were described in sufficient detail, differed in proportion of time ascribed to the set training component from 15% to an estimated 40-50% (4.2). Additionally, the emphasis put on the doctoral thesis varied similarly from 85% of a student's time in a science-oriented doctoral programme (Box 1 in 4.2) to merely 15% of a student's activity in a programme strongly oriented to training in management (Box 3 in 4.2).

It may be perceived that the two systems produce professionals of diverse backgrounds: on the one hand, researchers providing high-quality, frontier research in the field, and on the other, professionals capable of managing heritage resources in the high-level administrative and service sector. NET-HERITAGE found the first stream of research-oriented doctoral education in the field predominant, fostering the leadership of Europe in maintaining the science base for conservation not only when applying natural or engineering sciences to the heritage field but also in the area of conservation and heritage management.

Therefore, doctoral studies with a strong research component and limited set courses should be promoted, but modules developing generic aspects like communication and presentation skills, ability to design and manage projects and similar aspects should be embedded in the doctoral education programmes to develop skills and competences of future researchers and professionals managing heritage resources.

Several effective funding mechanisms were revealed by the NET-HERITAGE survey for students interested in study and research focusing on a conservation-restoration subject leading to a doctoral degree:

- A system of specific grant programmes dedicated to doctoral education in conservation-restoration and science for conservation which are particularly suited to countries which would like to rapidly increase the capacity of their heritage sector and create a vibrant research community in the field (5.1).
- The possibility of supporting doctoral students in applications for research grants by academic staff. This will enable students to develop theses related to high-quality, cutting-edge research in projects (Appendix 7)

- Grants supporting enterprises which employ PhD students in the framework of research collaboration between academic organisations and businesses. These awards provide opportunities for doctoral students to gain firsthand experience of work outside an academic environment (Appendix 7).
- The support of scholarships as co-operative ventures between universities and museums, to enhance scientific work in preventive conservation, active conservation and material-based studies of collections (Appendix 7).

It should be stressed that students interested in study and research focusing on a conservation-restoration subject leading to a doctoral degree should be encouraged to compete for studentships or grants from general research funding competitions available nationally. The need to compete with other disciplines is a challenge as well as an opportunity because it can improve quality.

It should be underlined that the artistic, humanistic, ethical and philosophical dimensions enrich heritage science and reflect the complexity of scientific problems. Heritage research is a science that requires the same tools as other disciplines. Therefore, it is recommended that adequate funding of doctoral research in which the humanities and science overlap is ensured.

The survey also found that after PhD studies are complete, there are not enough opportunities for postdoctoral researchers. Therefore, creating opportunities for postdoctoral positions should be an important part of national frameworks for advanced education.

It is recommended that the continuity of funding at the doctoral and post-doctoral-level is ensured with structured programmes and clear funding sources to create incentives for the long-term commitment of talented, enthusiastic early stage researchers to the heritage field.

The survey revealed that many institutions offer a diverse range of opportunities for study and research at doctoral degree level. Many provide research environments of exceptional quality for a young researcher interested in a specific subject in the field of science-led conservation. At the same time, the survey exposed a fragmented and dispersed field lacking effective coordination of what is offered educationally at the doctoral level, clear identification of research priorities and gaps to reduce duplication. The fragmentation of the field makes it difficult to exploit the potential of the cultural heritage research sector. It also makes it difficult for early-stage researchers to obtain information on available opportunities and to find their way around the system. This situation prevents greater mobility within the heritage sector.

It would be beneficial for the cultural heritage field if a key national institution in each member state acted as a secretariat to the network of institutions offering opportunities for study and research for a doctoral degree and provided information to young researchers, wanting to enter the field. It is also recommended that this information on the national frameworks is made available at the Net Heritage Observatory which would increase the visibility of the social and economic importance of the cultural heritage sector. Additionally, it would be advantageous to publish the information on www.findaphd.com which is the largest database of PhD possibilities and an opportunity to attract students.

Long courses – leading to various specialisations – can be an important path within national educational frameworks to provide the third cycle level of education in many areas of the heritage field (6). Other long courses which do not provide participants with clear, legally recognised qualifications meet various educational needs to enhance the professional backgrounds of participants.

Bearing in mind that huge amounts of time and effort are often invested by participants into long courses that do not lead to a doctoral degree, it is recommended that they should provide knowledge, skills and competences that are clearly recognised according to the Bologna system.

The survey clearly demonstrated that short Continuous Professional Development (CPD) courses are of great value especially to practitioners for whom it is important to gain new knowledge and skills, but who can only afford to invest a little time in training (7). However, the value of CPDs depends on the quality of the pedagogy.

As the value of short Continuous Professional Development (CPD) courses depends on the quality of pedagogy, it is recommended that the organisers of each CPD course articulate learning objectives and outcomes explicitly in the publicity material of each course.

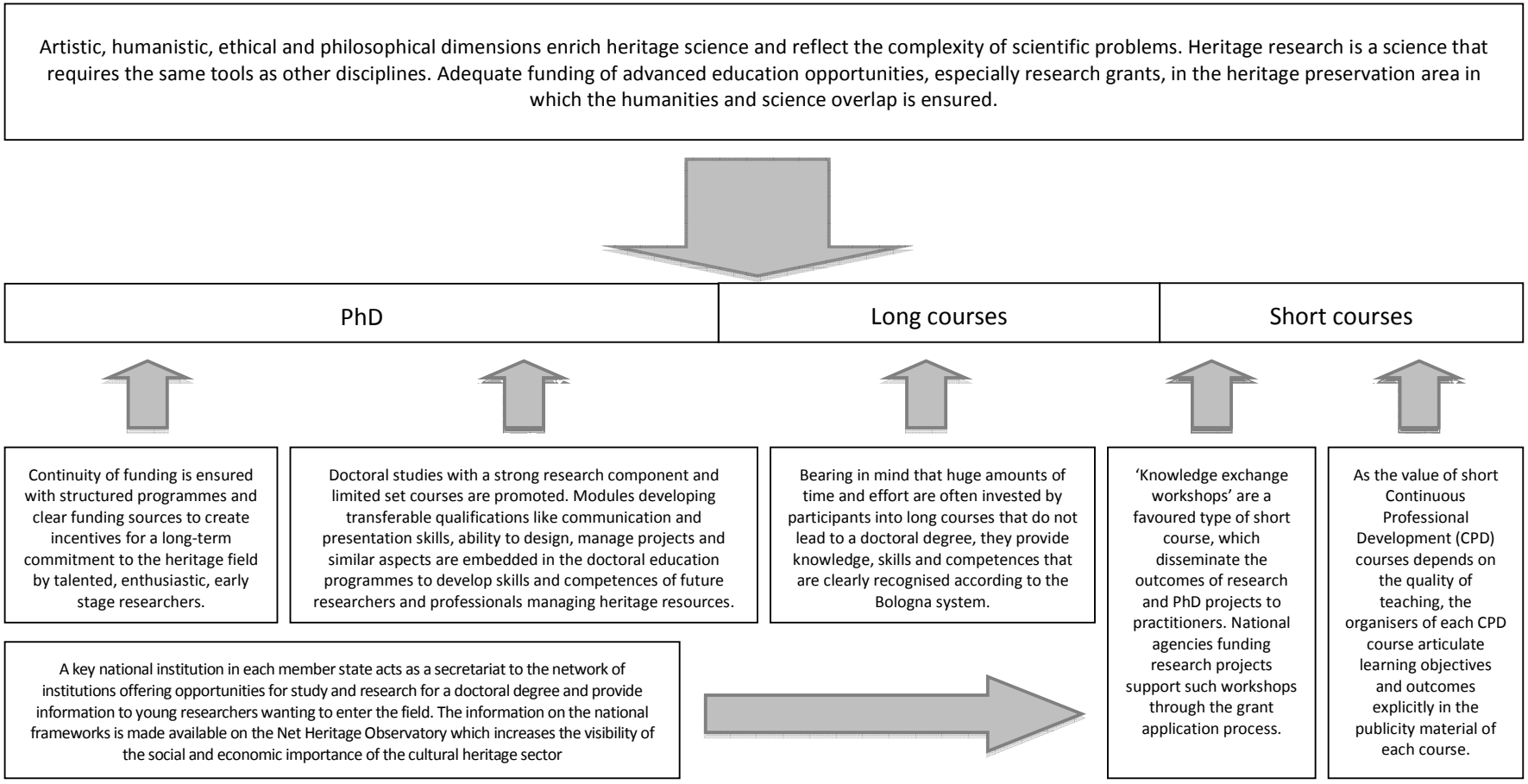
A particularly interesting category of high-level short courses are international knowledge exchange workshops organised at the end of research projects funded within the European Commission Framework Programmes to promote projects and therefore disseminate recent knowledge into the field (9, Box 9).

Therefore, it is recommended that national agencies funding research projects support, through the grant application process, 'knowledge exchange workshops' as a way of disseminating the outcomes of projects.

The educational schemes and activities described can be combined in a model framework for advanced education which is set out below.

## Model Framework for Advanced Education

The opportunities for advanced education, study and research in conservation-restoration and science for conservation in Europe, a specific area where science and the humanities overlap, range from studies for formal qualifications like doctoral degrees, through long courses, down to workshops and short courses aimed at the exploration of a specific topic or the transfer of results of innovative research. The educational activities, providing an optimum environment for professionals interested in a specific subject in the field of science-led conservation, share a common framework which is characterised by the elements set out below:



# Report on the opportunities in advanced education in conservation-restoration and science for conservation in Europe

## 1. General information

This report is an outcome of the implementation of Task 5.1 'Analysis of existing training possibilities' of Workpackage 5 'Implementation of joint activities through the coordination of advanced training in the field of tangible cultural heritage' of the NET-HERITAGE project.

Following the description of the task, the analysis covers '...the existing training options available in partner countries' and explores 'their impact in three key areas: contribution to the formation of scientific researchers and conservation professionals, established means of disseminating research findings into the conservation professional community, especially SMSs working in the field, accessibility to participants from other countries'. The scope of this review includes 'both permanent institutions and initiatives organised on a sporadic basis, such as summer schools, scientific meetings, or regular workshops on specific topics'.

It was decided to cover advanced training opportunities available in Europe over the last five years.

The report was prepared by dr. Łukasz Bratasz - the WP5 leader - and Barbara Świątkowska – the Net-Heritage project manager in Poland. The WP5 team was supported by the Panel of Experts of WP5 who were selected from national experts on education in conservation and conservation science nominated by the project's partners. Additionally, one external expert – Professor René Larsen - was asked to join the Panel. The six experts represent different backgrounds and professional areas and provide insight into various training schemes in different parts of Europe. The list of members of the Panel of Experts is attached as Appendix 1 to this report.

This report is based on information provided by all partner countries of the NET-HERITAGE project in the 'Questionnaire on the opportunities in advanced training in conservation-restoration and science for conservation in Europe'. The inquiry and report preparation was organised in the following way:

1. The draft of the questionnaire was first presented by the WP5 leader at the project meeting held on March 23-24, 2009 in Berlin.
2. Remarks, additions and modifications were received and introduced by the end of April 2009.
3. The Panel of Experts met in Krakow on June 19, 2009 and decided the final form of the questionnaire.
4. The questionnaire was circulated to all partners in July 2009.
5. The preliminary analysis of 12 answers to the questionnaire received in September 2009 was presented by the WP5 leader during the project meeting held on October 6, 2009 in Sofia.
6. Further responses to the questionnaires, as well as additional data and corrections, were received by the end of 2009.

7. The Panel of Experts held its second meeting in Rome on February 16, 2010, discussed the draft report prepared by the WP5 leader and suggested modifications and improvements which were introduced by the beginning of March 2010.

The final form of the questionnaire, was circulated to the partners. One important change was introduced by the Panel of Experts concerning the terminology used in the questionnaire. The survey carried out within WP5 revealed that the training component of specific doctoral courses could be limited to just 15%. The Experts pointed out that the word 'course' might therefore be misleading as it suggests a strong training component. As a result the Experts decided to introduce the term 'education programme leading to a doctoral degree' to describe study and research leading to a doctoral degree with a set training component. Therefore, the term 'education programme leading to a doctoral degree' is used in this report.

The list of collaborators who collected information at the national levels with their contact details are listed in Appendix 2.

# 2. Definitions

## 2.1 Advanced training

By 'advanced training' we understand studies, programmes or courses aimed at developing specialised skills and competences of professionals who have completed tertiary level academic education, for example: conservators-restorers who have graduated at least at the Master's level from a university or a recognised equivalent and are professionally qualified, and conservation scientists who have completed their Master's degree or equivalent in natural sciences or engineering, and work in the heritage field in a wide range of organisations.

The learning outcomes of the 'advanced training' should be relevant to level 7 and 8 qualifications within the European Qualifications Framework for lifelong learning (EQF), which are described in Annex 1 of the Recommendation of the European Parliament and of the Council of 28 April, 2008.

Learning outcomes relevant to level 7 are 'highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking, specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields, competence demonstrating ability to manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches and to take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams'.

Learning outcomes of level 8 are 'knowledge at the most advanced frontier of a field of work or study and at the interface between fields, the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice, competence demonstrating substantial authority, innovation, autonomy, scholarly

and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research'.

Detailed description of EQF levels 7 and 8 in various areas of conservation is contained in a handbook 'Defining Common Standards for Training in Cultural Heritage Conservation-Restoration', an outcome of the Leonardo da Vinci project 'European Conservation Practitioners Licence (ECPL)' (see www.ecpl-project.eu).

### 2.2 Conservation-restoration

'Conservation-restoration' in the context of this report should be understood in the broadest possible sense as 'a cautious approach to the management of change of the physical objects that constitute our cultural heritage' (quoted from the report 'Heritage and Science' published by the Science and Technology Committee of the House of Lords, UK, 2006). According to the clarification document of the European Network for Conservation Restoration Education ENCoRE (www.encore-edu.org) 'the discipline of conservation/restoration is an empirical science, devoted to the prevention and treatment of the decay of objects of cultural heritage. It is characterised by being a mixture of theoretical knowledge and practical skills, and includes the ability to judge in a systematic way on ethical and aesthetic issues. It has its origins in arts and craftsmanship as well as in the humanistic, technical and natural sciences. Cognitive and systematic analysis, diagnosis and solution of problems as the basis for practical conservation and restoration skills is what differentiates the conservator/restorer from the artist and the craftsman. The strong basis in practical skills and knowledge of the complexity and interactivity of object material behaviour and information including environmental influences is what differentiates the conservator/restorer from professionals in other related academic fields.'

The term, therefore, covers all areas of professional activity including: recording and documenting the physical condition of artefacts, technical examination to better understand the history of artefacts, preventing degradation and developing treatments to stabilise the condition of objects or to treat damage, facilitating public access to heritage through exhibitions or loans, or by the digitisation of cultural objects or records relieving the wear caused by the physical use of originals.

### 2.3 Conservation science/science for conservation

By 'conservation science/science for conservation' we understand the scientific area which provides knowledge, technical information or skills related to the natural sciences or engineering which enable the more effective preservation and conservation of cultural heritage. Chemistry, physics, biology, geology, environmental science can be mentioned as examples of scientific disciplines that have the highest impact on conservation. According to the Bologna document of 1999 (http://www.episcon.scienze.unibo.it/episcon/bologna-document) 'a Conservation Scientist today can be defined as a scientist with a degree in one of the natural, physical and/or applied scientific disciplines and with further knowledge in conservation - ethics, history, cultural values, historical technologies, past and present conservation technologies and practice, specific scientific aspects, etc. - which enables him/her to contribute to the study and conservation of cultural heritage within an interdisciplinary team.'

## 3. Categories of advanced education opportunities

Three categories of advanced education opportunities are distinguished in this report:

1. Study and research leading to a doctoral degree.
2. Long courses not leading to a doctoral degree.
3. Short courses and other training possibilities.

Category 1 is further divided in two sub-categories:

1.1 Education programmes leading to a doctoral degree which are understood as programmes of study at universities or other competent bodies, specifically dedicated to education and research in the field of conservation-restoration or science for conservation leading to a doctoral degree.

1.2 Any other form of study and research focussing on a conservation-restoration subject leading to a doctoral degree.

Category 2 covers courses lasting at least one year that usually end with some kind of independent project or dissertation by a student or a participant. Many long courses do not end with clear, legally recognised qualifications but they meet various educational needs by dealing with a wide range of issues related to conservation-restoration and science for conservation, building on the professional backgrounds of the participants.

All remaining forms of the advance education fall within Category 3 as short courses. They cover initiatives organised both on a regular and sporadic basis.

## 4. Education programmes leading to a doctoral degree

Seven countries – Belgium, Denmark, France, Italy, Poland, Slovenia and Spain - have described education programmes leading to a doctoral degree for graduates with science- or conservation-based masters. Additionally three countries - Bulgaria, Greece and Romania – have indicated that there are such education programmes available in their countries but have not described them sufficiently.

A complete list of education programmes leading to a doctoral degree reported in this survey is given in Appendix 3.

All doctoral programmes have been conceived within the general framework established by the Bologna Declaration (1999) which became the primary document of the harmonisation and reform of higher education in the European Union. The Bologna Declaration has affirmed the intention to create a European field of higher education where mobility and employability would be facilitated by the compatibility of national higher education systems. One of the objectives was to adopt a system of comparable degrees based on two main cycles, undergraduate and graduate, to which the doctoral level was added as the third cycle in the Berlin Communiqué (2003).

The conservation-restoration education programmes based on three main cycles have also been postulated by ENCoRE – the European Network for Conservation - Restoration which is a network of 36 higher educational institutions in the field. In addition, 24 leading

institutions and organisations working in the field of cultural heritage protection and research are partners to the network. The ENCoRE document 'Clarification of Conservation-Restoration at University level or recognized equivalent' states that the conservator-restorer qualified for independent practice is by definition a graduate at the Master's level from a university or recognised equivalent, or at the doctoral research level. The overall length of the study for entry into the profession or to continue to the doctoral level should be five years.

Also ECCO – the European Confederation of Conservators/Restorer's Organisations – states in its Professional Guidelines that education in conservation/restoration must be at the level of a Master's degree achieved through a period of full-time study of no less than five years.

The European countries have largely adapted the three-cycle format of higher education (Ba, MA, PhD) with five years for the two first cycles, fulfilling the ENCoRE/ECCO requirements, and the subsequent three years for the third cycle at the doctoral level. An interesting overview of the implementation of the Bologna process in European conservation education has been presented by Auer (2008).

This survey has provided information on the organisation and outcome of the three-year education programmes leading to a doctoral degree. The information is still limited as some programmes have been launched relatively recently and more time is needed to map how beneficial they have been professionally and academically to the students, especially in developing their careers and professional networks. However, the questionnaire responses shed light on attitudes to the education programmes leading to a doctoral degree in various countries, their organisation and the areas of training and research covered.

### 4.1 Do we need education programmes leading to a doctoral degree in the field of conservation-restoration or science for conservation?

Two different attitudes to establishing education programmes leading to a doctoral degree prevail in Europe and shape the national strategies in education.

One attitude is that of scepticism about the value of such programmes based on the belief that the research component is only important at the doctoral level of education. Such an attitude has been explicitly formulated in the UK response to the questionnaire that 'all doctoral level study within the UK is research-based only and does not include set taught components' because 'students are expected to have undertaken course specific training and teaching under their Masters courses, which are designed to prepare students through a combination of taught courses and research for the next stage in their education: the doctoral degree. Therefore, once they begin at a doctoral level, a student is able to concentrate on research based study only as opposed to combining set training'.

The other attitude is that of belief in a positive impact the taught component can have on doctoral students who initially can be largely focussed on the fields in which they have graduated, and unprepared for the interdisciplinary, problem-solving approach necessary in the conservation field. Such an attitude was particularly strongly voiced in the case of the doctoral programme in science for conservation at the University of Bologna: 'while the natural sciences and engineering play a crucial role in the proper selection of conservation materials, methods and strategies, scientific research in conservation is often conducted by natural scientists who originally come from outside the cultural heritage field. These natural

scientists lack the affinity with cultural heritage and conservation necessary to fully understand and cooperate with other professions working in the field'. Therefore, the programme has implemented 'academic education and training curriculum that should aim at producing a professional profile capable – from the very beginning – of working within an interdisciplinary environment and of exchanging and communicating scientific information to other non-scientific conservation professionals' (both quotations are from Mazzeo and Eshoj 2008).

If one analyses the education systems in the six largest countries participating in the survey, Italy is the country with the largest number of education programmes leading to a doctoral degree in the field, most of which are in architectural conservation, France has courses just in architectural conservation, Poland and Spain have courses in conservation-restoration whereas Germany and UK have not established any.

### 4.2 Training versus research components

The education programmes leading to a doctoral degree, based on the details provided by the project's partners in the questionnaire, differed in proportion of time and European Credit Transfer System (ECTS) points ascribed to the training component from 15% - five months of the three-year doctoral programme in science for conservation at the University of Bologna (see Box 1) - to an estimated 40-50% in a typical doctoral programme in architectural conservation exemplified by the 'Cultural Heritage' programme at the Polytechnic University of Turin (see Box 2). Furthermore, different emphasis is placed on the importance of the doctoral dissertation: again the science-oriented doctoral programme in Bologna understandably reserves 85% of a student's time for the preparation of the PhD thesis whereas the 'Economics and Techniques for the Conservation of the Architectural and Environmental Heritage' programme at the University of Nova Gorica (see Box 3), is strongly oriented to training in management and requires a mere 15% of student's time for the preparation of the dissertation (30 ECTS out of 180 ECTS total).

For detailed descriptions of courses comprised in the training components of several education programmes leading to a doctoral degree described in this survey see Appendix 4.

**Box 1**
**Three-year doctoral programme in science for conservation**
**Chemistry Department, University of Bologna, Italy**

The programme was developed within the EPISCON project (2005 – 2009) – European PhD in Science for conservation – funded by the European Union's Marie Curie programme. During the project, 16 international students with a master's degree in one of the natural sciences developed their PhDs in the field of science for conservation.

The programme was based on the following long-term preparatory activities:

The international seminar co-organised by Bologna University and ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome) in 1999 which agreed to the Bologna Document stating that a university programme at the post-master level, with both education and research components, would be the appropriate educational path for scientists interested in careers in conservation science

Project CURRIC funded by the European Leonardo da Vinci programme which designed the curriculum for a PhD in science for conservation

Project EU-αlfa which developed guidelines for post-graduate education and training in conservation science within the Latin American context

The project was implemented by 10 university science departments and conservation institutions across Europe. The programme included five months of intensive training courses at the University of Bologna Ravenna campus in many aspects of heritage science and conservation, followed by a research project lasting two years and seven months at one of the collaborating institutions. Table 1 in Appendix 4 lists 11 core courses comprised in the five-month training component. Table 1 in Appendix 5 lists 16 research topics selected by doctoral fellows.

Furthermore, three workshops were organised in the research phase of the programme with the aim to present individual research projects.

An interdisciplinary Doctoral School in Science for Conservation (joining disciplines, forces, skills, attitudes, competences) has been established at the University of Bologna and is capable of offering one or two PhD scholarships each year in science for conservation.

## Box 2
## Three-year doctoral programme 'Cultural Heritage' the Polytechnic University of Turin, Italy

The programme focuses on three fields of specialisation:

1. 'The History and Analysis of Cultural Heritage': The History of Architecture and Territory, Analysis, Mapping and Surveying Techniques, Representation and Modelling Methods.
2. 'Design': Restoration and Preservation, Planning Methodologies, Construction and Maintenance Techniques, Materials and Physical Chemical Methodologies, Technologies and Systems for Conservation.
3. 'Communication, Valorisation and Territory': Communication and Media, Archival Sciences, History and Technologies, Economy and Valorisation.

The structure of the programme is given below:

| Year | Activities | ECTS points |
|---|---|---|
| 1 | Coursework | 40 |
| | Activities which prepare the candidate for research work: active participation in seminars, meetings and conferences, periods of foreign study, participation in the polytechnic university's research projects in the specific area addressed by the doctoral program. | 20 |
| 2 | Courses in the candidate's selected field of specialisation | 15 |
| | Research in the area selected for the candidate's doctoral dissertation; periods of study and cooperative education in Italy and abroad; active participation in seminars, meetings and conferences. | 45 |
| 3 | Dissertation and personal research work; publications. | 60 |

Examples of doctoral dissertations:

1. Conservation Authenticity: Ideas, Horizons and Operative Instruments.
2. Garden Character and Identity in the Piedmont Region Between the 18th and 19th Centuries.
3. Knowledge, Complexity and Architectural Information Technologies in Architectural Planning: The Use of Personal Computers in Architecture.

4. Protection and the Safeguarding of Legally Bound Cultural Heritage Through the Management of a Geo-referenced Database (Topographic and Cadastral DB).

5. An Ancient Place of Performance. The Hierapolis of Frigia Theatre in the Environmental Urban Context: Analysis Methodology for its Protection and Promotion.

**Box 3**

**Three-year doctoral programme 'Economics and Techniques for the Conservation of Architectural and Environmental Heritage', University of Nova Gorica, Slovenia**

The programme is taught by teachers from renowned international scientific institutions in English in Venice in co-operation with the IUAV University of Venice,

The programme is subdivided into two specialisation courses:

1. 'Techniques and Materials in Conservation': knowledge of structural characteristics and properties of materials, planning of survey analysis, selection of priority interventions and building site administration, application and realisation of analytical techniques and tools in the field of restoration and conservation.

2. 'Management and Economics': establishing a critical comparison of international guidelines and laws for the conservation of cultural heritage, applying methods of economic evaluation to public cultural heritage, identifying integrated strategies for the promotion, management and development of cultural heritage markets.

Detailed structure of the specialisation course 'Techniques and Materials in Conservation' is given as an example in Table 2 of Appendix 4. It can be summarised as follows: the whole study programme comprises 4,500 hours of activities divided between 331 hours of lectures, 425 hours of seminars and 3,745 hours of individual work. The student is awarded 180 ECTS in total, of which 30 ECTS are awarded for the preparation of the doctoral thesis.

### 4.3 Courses in architectural conservation dominate the field

The majority of education programmes leading to a doctoral degree reported in the questionnaires (24 out of 37)[*] are established in the discipline of broadly conceived conservation, rehabilitation and use of built heritage and cultural landscapes. Ten programmes are available in Italy, 9 in France, 3 in Greece, 1 in Belgium and 1 in Slovenia. A complete list of the programmes is given in Table 1 of Appendix 3. The tendency reflects the interest of well-established departments of architecture or engineering at universities or technical universities in the high-level training of architects, surveyors, engineers, restoration workers to prepared them well for the care of historic buildings. The interest is induced by a growing awareness that the European construction industry will achieve greater competitiveness through research, development and innovations oriented towards protecting and enhancing cultural heritage, and the adaptive re-use of existing buildings. The Vision 2030 & Strategic Research Agenda of the Focus Area Cultural Heritage within the European Construction Technology Platform (ECTP) states: 'The interventions of the European Construction Sector in cultural heritage must take a knowledge-based and interdisciplinary approach for the sustainable protection of cultural heritage underpinned by the principles of safety, authenticity and compatibility to ensure minimal intervention to avoid damage to cultural heritage and to enable it to be protected from environmental and human causes of destruction. This includes in particular the implementation of ambitious

[*] There were 41 courses reported in the questionnaires in total. However, information on the four courses in Romania was not sufficient to determine their topics.

programmes of adaptive re-use and energy-efficient and sustainable retrofits of existing buildings. These imply the appropriate use of knowledge-based advanced technologies and the active participation of all stakeholders, practitioners, industry and SMEs.'

Authoritative reports assess that in addition to the 2.5 million important historic monuments in Europe there is a building stock requiring protection which is 10 times larger than this. It is estimated that approximately 80% of the buildings and structures of future cities have already been constructed. As a consequence of that, an increase of the activities of refurbishment and rehabilitation is expected. Today it is estimated that 40% of the total construction market in Europe involves building repair and maintenance, accounting for 7.5 million direct and indirect jobs. So the potential demand for graduates of such programmes is high.

### 4.4 Programmes in fields other than architectural conservation

A complete list of the programmes is given in Table 2 of Appendix 3. The responses to the questionnaire have exposed a fragmented field: of 13 reported programmes, 9 programmes are running and are described with sufficient detail to allow an attempt at analysis.

1. University of Udine, Italy

A doctoral programme in bibliographic, archival, documentary sciences and the preservation and restoration of archival and book heritage.

The programme is aimed at training scholars starting an academic career at universities and research institutes, or interested in careers in: libraries and archives, electronic publishing, advisory activity for digital libraries, particularly with regard to the construction and evaluation of electronic resources. They should be able to lead projects in the field of the restoration of books and paper, support companies active in the field of antiquarian trade of books, or engage in the reorganisation of private archives, owned by organisations, companies and families.

2. Department of Conservation at the Academy of Fine Arts in Krakow, Poland

A doctoral programme in conservation-restoration.

The programme has been established on the basis of the Polish National Act on Scientific Degrees of March 14, 2003 which introduced the title of doctor of art (painting, music, theatre, conservation). The title can be awarded 'on the basis of a solution of an artistic problem by a person capable of independent work and showing a good understanding of the field'. According to the resolution of the Central Commission for Degrees and Titles of 24 October, 2005 (amended on 10 December, 2008) concerning the definition of fields of science and fields of art and scientific and artistic disciplines, 'conservation and restoration of works of art' was established as a scientific discipline. Therefore, students finishing the programme will become 'doctors of conservation'. For the detailed programme see Box 4.

3. Department of Chemistry, University of Bologna, Italy.

A doctoral programme in science for conservation

As described in detail in Box 1, the programme was developed within the EPISCON project (2005 – 2009) – European PhD in Science for conservation – funded by the European Union's

Marie Curie programme. During the project, 16 international students with a master's degree in one of the natural sciences developed their PhDs in the field of science for conservation. The project was implemented by 10 university science departments and conservation institutions across Europe.

Therefore, the programme could be regarded as a unique pan-European initiative. It can only be hoped that it will continue at Bologna University as an interdisciplinary Doctoral School in Science for Conservation.

**Box 4**
**Doctoral studies in the field of conservation and restoration of works of art**
**Academy of Fine Arts in Krakow, Poland**

Three-year studies leading to a doctoral degree in conservation.

Core courses:

- Philosophy, history of art, sociology - 90 hours during the first year, a general course for the whole Academy of Fine Arts.

Specialist courses delivered within the Department of Conservation:

- Obligatory course on paintings and architectural sculpture conservation for 1st and 2nd year students, 120 hours in total.
- Obligatory course on technology for 1st, 2nd and 3rd year students, 120 hours in total.
- Each 1st, 2nd and 3rd year student has to choose a seminar of 60 hours either in the area of history of Polish art, or preventive conservation, or technology.
- Third-year students choose 60 hours of seminars in the area of painting or architectural sculpture.

Additional monograph lectures are delivered by outside experts.

It is estimated that the above training takes a third of a student's time whereas two-thirds is dedicated to supervised individual work.

The programme only started two years ago, therefore no doctoral thesis has been completed yet. The programme encourages cooperative ventures between museums or other heritage organisations: one of the topics of running doctoral projects concerns a collection of the Museum in Tarnowskie Gory, another concerns the objects safeguarded in the Auschwitz Concentration Camp Museum.

4. The University of Padua, in cooperation with the universities of Modena, Verona and Bologna, Italy.

The doctoral programme 'Study and Conservation of Archaeological and Architectural Heritage'.

The programme makes available two education paths: one in archaeological sciences, the other in science and technologies for archaeological and architectural heritage. The latter programme offers 230 hours of taught courses which are clearly aimed at interdisciplinarity and working across the 'science' and 'art' fields. 'Instrumental Analytical Techniques', 'Petrography Applied to Cultural Heritage' or 'Physics For Restoration' are examples of courses in science, whereas 'Archaeology and History of Greek and Roman Art' or 'Elements of Mediaeval Archaeology' in the humanities. Seventy hours are planned for the laboratory work which is done in the research laboratories of the University of Padua and the Polytechnic University of Milan. Students implement their research projects not only at the universities co-organising the programme but also at the University of Minho, Portugal, the

Polytechnic University of Catalonia, Spain and the Slovenian National Building and Civil Engineering Institute. Strong collaboration with regional conservation authorities – Superintendence for Historic, Artistic and Demo-ethno-anthropological Heritage of Veneto, Superintendence for Environmental and Architectural Heritage of Eastern Veneto, Superintendence for Environmental and Architectural Heritage of Venice, not only provides students with first-hand experience of real-world problems in the heritage field but broadens their future employment opportunities.

5. Doctoral School in Science, University of Florence, Italy

A doctoral programme in science for the conservation of cultural heritage.

The core taught courses comprise: 'Physical Chemistry in Large Surface Systems: Applications', 'Laser Spectroscopy for Cultural Heritage', 'Analysis of Archaeological Finds', 'Polymeric Materials for Cultural Heritage', 'Microbiology for Cultural Heritage', 'Advanced Laser Technologies for Cultural Heritage' and 'Mass Spectrometry and 14C Dating: Applications'. The lectures are accompanied by an extensive laboratory component: year 1 - 420 hours laboratory work, 96 hours lectures; year 2 - 480 and 64; year 3 - 450 and 32, respectively. The doctoral projects cover one or more of the following areas: optical spectroscopy and imaging methods for diagnostics of cultural heritage, elemental investigations of art materials by high energy radiation, chemical methods for the protection and restoration of cultural heritage, characterization, conservation and restoration of stone materials, alloys and metals, chemical methods, physical, mineralogical and geo-biological applied to archaeometry, biological and biochemical methods for cultural heritage.

6. The Polytechnic University of Valencia and The Complutense University of Madrid – Spain

The two universities offer two new programmes implementing the Bologna process:

- The Complutense University of Madrid, Faculty of Fine Arts - Doctoral Programme on Conservation, Restoration and Exhibition of Cultural Heritage – doctoral degree in conservation-restoration
- The Polytechnic University of Valencia, Faculty of Fine Arts - Science and Restoration of Historic and Artistic Heritage – doctoral degree mainly in conservation-restoration, but also in conservation science.

The doctoral studies include both an education and a research period. The research period is dedicated to researching and writing the PhD thesis under the supervision of a university professor or a scientific researcher from an official research institution. In this 3-4 year period, there is no training. However, to access the research period a student needs to complete the training period. The training component is described in Table 3 of Appendix 4.

7. Faculty of Arts at the University of Ljubljana and Faculty of Humanities at the University of Primorska, Slovenia in cooperation with the University of Zagreb, Croatia

Two doctoral programmes in the field of humanities, sociology, heritage management and museology contain elements of conservation science:

- Faculty of Arts at the University of Ljubljana 'Interdisciplinary doctoral degree course in humanities and sociology; field of study: heritology' - covers the areas of immovable and

movable cultural heritage protection, management of heritage resources, theory of conservation and management of museum collections.

- Faculty of Humanities at the University of Primorska in cooperation with the University of Zagreb 'Management and Presentation of Heritage' - the programme modules comprise the management, legal protection and presentation of heritage, conservation science, museology, archive science and heritage management with IT tools.

### 4.5 Programmes run jointly by several departments/institutions

Several education programmes leading to a doctoral degree are run jointly by several departments or institutions, reflecting the need of close interdisciplinary collaboration between various disciplines of science and conservation.

Three collaborative initiatives are interesting in various aspects:

1. Doctoral programme: 'Economics and Techniques for the Conservation of Architectural and Environmental Heritage', University of Nova Gorica, Slovenia in which a high-profile doctoral programme in heritage science is organised in co-operation with the foreign university - the IUAV University of Venice – and by choosing English as the language of the programme.
2. Danish research programme in the cultural heritage field in which capacities and resources of many national organisations are effectively pooled together under the umbrella of the Ministry of Cultural Affairs, among others by creating a formal Board of Management. The programme is described in detail in Box 5.
3. Doctoral programme in science for conservation at the University of Bologna which was prepared and verified based on several projects funded by the European Commission and has been implemented by a consortium of research and heritage organisations from across Europe (see Box 1).
4. Doctoral programme 'Study and Conservation of Archaeological and Architectural Heritage' organised by the University of Padua, in cooperation with the universities of Modena, Verona and Bologna, Italy. Students implement their research projects not only at the universities co-organising the programme but also at the University of Minho, Portugal, the Polytechnic University of Catalonia, Spain and the Slovenian National Building and Civil Engineering Institute. Additionally, strong collaboration with regional conservation authorities provides the students with first-hand experience of real-world problems in the heritage field and broadens their future employment opportunities.

**Box 5**
**Interdisciplinary research programme in the cultural heritage field**
**Danish Research School of Cultural Heritage**

| |
|---|
| The programme is a collaborative venture of several Danish institutions:<br>The Royal Danish Academy of Fine Arts, School of Conservation<br>The Royal School of Library and Information Science<br>The Royal Danish Academy of Fine Arts, School of Architecture<br>Aarhus School of Architecture<br>The National Museum of Denmark |

National Gallery of Denmark
The State and University Library
Dept. of Archaeology and Ethnology, University of Copenhagen
Department of Conservation, University of Gothenburg
Danish Museum of Art and Design
The Research Committee of the Danish Ministry of Culture
University of Copenhagen

The following areas of research are covered: architecture, archaeology, conservation, history of art, history, cultural history, cultural environment, history of books and media, history of literature and libraries, information science seen from an institutional and cultural policy perspective.

The course places emphasis on: theory of science, theory of culture and cultural heritage, cultural policy, value and evaluation basis of cultural institutions, relevant communication of culture to a modern public, museology, scientific information retrieval, research communication, communication of cultural heritage, e.g. through digitalisation.

## 5. Study and research for a doctoral degree other than education programmes leading to a doctoral degree

A significant number of institutions across Europe provide opportunities for study at a doctoral level in the area of conservation-restoration and conservation science. The information received in this survey is given in Appendix 6, grouping these opportunities according to two major areas in the preservation of physical heritage: the historic built environment (immoveable heritage) and objects or specimens in museums, galleries and elsewhere (moveable heritage). The table contents reflect the responses obtained in the questionnaires and as such are neither comprehensive nor definitive. In part, this lack of a coherent picture of doctoral study and research in heritage sciences in Europe is a result of the multidisciplinary nature of heritage science, which probably made it difficult for several countries to thoroughly quantify the sector in terms of institutions, students and topics of investigation. The survey exposed a fragmented and dispersed field lacking effective coordination of what is on offer educationally at the doctoral level, clear identification of research priorities and gaps to reduce duplication.

### 5.1 Specific national funding programmes

Greece

The State Scholarship Foundation has a funding programme for the Conservation of Antiquities and Works of Art, which provides funding for three students each year for postgraduate and/or doctoral studies, and a funding programme for Museum Studies, which provides funding for two students each year for postgraduate and/or doctoral studies.

Slovenia

The Ministry of Culture published between 2005 and 2009 open calls for scholarships and offered partial tuition fee funding in the field of art and humanities to support training in deficient professions which covered the following professions in the area of cultural heritage: conservator for comprehensive spatial and urban conservation of cultural heritage, conservator for landscape heritage, historical parks and gardens, conservator for building constructions and materials, conservation architect, restorer (for metal, paper, textiles), industrial archaeologist, expert in the digitalisation of museum objects, curator (only for

holders of scholarships at foreign universities or educational institutions), restorer of stone sculptures, frescoes, paintings and glasswork, promotion of heritage, manager for the promotion of cultural heritage, manager of culture.

Scholarships and partial tuition fee funding for post-graduate education are awarded for not longer than two years, whereby they may be granted for only one degree of studies in one call for competition. While receiving the above scholarship from the Ministry of Culture, the student may not be awarded another scholarship from the national budget of the Republic of Slovenia, nor vocational scholarship from the Ministry of Culture. While receiving the scholarship the holders must have the status of a full-time student and they may not be self-employed in the field of culture, employed or retired. A full-time student is a person whose primary activity is studying.

Spain

The Spanish Ministry of Foreign Affairs in cooperation with The Ministry of Culture, Fundación Caja Madrid and Fundación Rafael del Pino offers a funding programme for Artistic Studies in the Academy of Spain, in Rome, for Spanish and Latin-American Students. This programme includes:

- Grants for up to 32 months funded by the Ministry of Culture in architectural conservation, movable cultural heritage conservation, archaeology, cultural heritage research.

- Grants for up to 45 months funded by Fundación Caja Madrid in art history (sculpture, Renaissance and Baroque painting) and conservation (architecture, mural painting and marble sculpture).

UK

A specific programme dedicated to doctoral training in conservation-restoration and science for conservation was reported for the UK. A call for Collaborative Research Studentships (Doctoral studentships) in Science and Heritage was launched in 2007 with the aim to promote partnerships and research collaboration between academia and other bodies. The initiative was part of the broader Science and Heritage Programme co-funded by two agencies: the Arts and Humanities Research Council (AHRC) and the Engineering and Physical Sciences Research Council (EPSRC). 25 proposals for study were received and the financial value requested totalled €1,341,238.88 (£1,228,680). An additional €101,661.60 (£93,130) was promised from non-academic supervisors (museums, galleries, heritage institutions etc.). Ten PhD studentships were funded totalling €473,081.77 (£433,380), satisfying 37% of financial demand.

The studentships started in 2008, covering stipends and tuition fees for three years. The awards offer doctoral students the chance to conduct their research in collaboration with a non-academic body, and to gain experience of work outside the academic sphere. There is another opportunity to fund doctoral studies within the programme as it will also be supporting Interdisciplinary Research Grants. On these grants, there is provision for project students to carry out doctoral study, should the project justify such an approach.

The list of PhD projects supported by the programme is given in Table 2 of Appendix 5.

### 5.2 Doctoral training grants (studentships) available in the general framework of funding research

Doctoral research and study in European Union Member States is primarily available through general funding patterns such as doctoral training grants. A large variety of schemes and funding agencies were described for several countries and are listed in Appendix 7.

### 5.3 Professional backgrounds of doctoral students

There has been general agreement that the majority of doctoral students are recent graduates wishing to advance their knowledge following a university degree or Master's studies. The situation in Spain, where most grant programmes require a recent graduation (no later than four years), highlights this general tendency.

Attracting candidates from a professional conservation background wishing to develop their specific interests is far less frequent. Some students may be undertaking a job as research assistants in their respective institutions, and register for part-time doctoral studies and research.

### 5.4 Areas covered by doctoral projects and their role in European research

The survey has demonstrated that doctoral projects cover rich and diverse areas of scientific research at the most advanced frontier of the conservation field, producing valuable scientific and technological input into the professional practice. The survey has not confirmed pessimistic opinions often expressed by the conservation community that there is little link and coordination between university-based research and the needs of end-users – museums and heritage organisations. The majority of the doctoral projects analysed are examples of an excellent, end-user value research, demonstrating that applications of state-of-the-art diagnosing methods and equipment of natural and engineering sciences to conservation are almost limitless. A selection of topics of doctoral projects implemented or accomplished after 2003 is given in 5.

A further observation is that doctoral studies are a very important element in sustaining research. This is due to the strong interest and enthusiasm of students in their doctoral projects as well as additional funding coming from doctoral training funding schemes. The analysis of research papers published in 2009 in the premier journal of conservation, *Studies in Conservation,* revealed that of a total number of 14 papers authored by researchers from the European Union, 2 were parts of doctoral theses and a further 2 were an outcome of research carried out by doctoral students (see Box 6). Usually, several high-level research papers are published as a direct outcome of a doctoral project, both in conservation literature and peer-reviewed, main-stream science journals. The number and breadth of publications originating from one doctoral project 'Physico-chemical investigations of cellulose degradation processes induced by iron-gall inks in ancient manuscripts' implemented in the Department of Chemistry at the University of Warsaw is an example illustrating the benefit of doctoral projects to the conservation field (see Box 7).

**Box 6**
**Scientific papers published by doctoral students in 2009 in *Studies in Conservation***

Gabriele Guidi, Alessandro Spinetti, **Luca Carosso** and Carlo Atzeni, 'Digital three-dimensional modelling of Donatello's David by frequency-modulated laser radar', pp. 3-11 - *Doctoral research carried out at the Technology for Environment and Cultural Heritage Laboratory, the University of Florence, Italy*

**Morten Ryhl-Svendsen** and Geo Clausen, 'The effect of ventilation, filtration and passive sorption on indoor air quality in museum storage rooms', pp. 35-48 - *A part of the doctoral thesis accomplished at the School of Conservation at the Royal Danish Academy of Fine Arts, in cooperation with the International Centre of Indoor Environment and Energy at the Technical University of Denmark in 2007.*

Jerzy Kunicki-Goldifinger, Piotr Targowski, **Michalina Góra,** Paweł Karaszkiewicz and Piotr Dzierżanowski, 'Characterization of glass surface morphology by Optical Coherence Tomography', pp. 117-128 - *Doctoral research carried out at the Institute of Physics of the Nicolaus Copernicus University in Torun, Poland*

**Alexandra Schieweck** and Tunga Salthammer, 'Emissions from constructions and decoration materials for museum showcases', pp. 218-235 - *A part of the doctoral thesis accomplished at the Dresden Academy of Fine Arts, Germany in 2009.*
(doctoral students marked in bold)

**Box 7**
**Scientific papers published as an outcome of one doctoral project**

Doctoral project: 'Physico-chemical investigations of cellulose degradation processes induced by iron-gall inks in ancient manuscripts' by Barbara Wagner, Department of Chemistry, University of Warsaw, Poland, accomplished in 2002.

1. Wagner, B., Garboś, S., Bulska, E. and Hulanicki, A., 'Determination of iron and copper in old manuscripts by slurry sampling graphite furnace atomic absorption spectrometry and laser ablation inductively coupled plasma mass spectrometry', *Spectrochimica Acta Part B: Atomic Spectroscopy,* 54 (1999) 797-804.
2. Wagner, B., Bulska, E., Meisel, T. and Wegscheider, W., 'Use of Atomic Spectrometry for the Investigation of Ancient Manuscripts', *Journal of Analytical Atomic Spectrometry***,** 16 (2001), 417 – 420.
3. Bulska, E., Wagner, B. and Sawicki, M. G. 'Investigation of complexation and solid-liquid extraction of iron from paper by UV/VIS and atomic absorption spectrometry', *Microchimica acta* 136 (2001), 61-66.
4. Wagner, B., Bulska, E., Hulanicki, A., Heck, M. and Ortner, H.M., 'Topochemical investigations of ancient manuscripts', *Fresenius' journal of analytical chemistry* 369 (2001), 674-679.
5. Bulska, E. and Wagner, B., 'Investigation of iron-gall ink corrosion of ancient manuscript by non-destructive and microanalytical methods' and
6. Bulska, E., Wagner, B., Stahl, B., Heck, M., and Ortner, H.M., 'On the use of Mössbauer spectroscopy for quantification of Fe(II)/Fe(III) in ancient manuscripts', both papers in: *Art 2002: 7th International Conference on Non-destructive Testing and Microanalysis for the Diagnostics and Conservation of the Cultural and Environmental Heritage: 2-6 June 2002, Antwerp, Belgium: proceedings*.
7. Wagner, B., Bulska, E., Stahl, B., Heck, M. and Ortner, H.M. 'Analysis of Fe valence states in iron-gall inks from XVIth century manuscripts by $^{57}$Fe Mössbauer spectroscopy', *Analytica chimica acta* 527 (2004).
8. Bulska, E. and Wagner, B., 'On the use of laser ablation inductively coupled plasma mass spectrometry for the investigation of the written heritage'**,** *Journal of Analytical Atomic Spectrometry,* 19 (2004), 1325 – 1329.
9. Bulska, E. and Wagner, B. 'Investigation of a novel conservation procedure for historical documents', in: *Cultural heritage conservation and environmental impact assessment by non-destructive testing and micro-analysis*. A. A. Balkema (2005), 101-116.

### 5.5 Development of skills to enhance student's further career

The survey has revealed many possibilities of developing research and general skills by students undertaking doctoral research. In general, doctoral students can take any module within their hosting institution which would benefit their further careers, and obvious choices may include: "Teaching in Higher Education" courses, presentation skills, statistics, various computer courses and subject specific modules related to their PhD topic.

In the UK, institutions and departments are given funding from research councils (known as Roberts money) to provide students with a continuing programme of training and development throughout the period of doctoral study. Training and development in research skills are tailored to the needs of the individual students and of their research topic. However, all research students should develop several core generic skills during the course of the doctoral study (as set up by the framework):

- written communication skills appropriate for the academic context and beyond
- oral presentation skills, including giving research papers and discussing others' research findings
- designing and managing a project
- ICT skills, including appropriate word processing and other ICT skills (such as creating and using spreadsheets and databases) as relevant to the research topic
- bibliographical skills and contextualising practice-based research
- identifying and using web-based resources
- record-keeping and record management
- personal and career development, and broader employment-related skills (such as participating in workshops and conferences, or, if students undertake undergraduate teaching duties, relevant support and training).

### 5.6 Employment prospects

There are currently three main routes for PhD graduates to follow:

1. They leave the field entirely

2. They stay in academia and take up a teaching/researcher post

3. They take up a heritage science positions on offer

On the whole, the majority of students stay in academia with a small number taking up one of the limited heritage science positions on offer. Few leave the sector entirely.

It has been mentioned in one of the responses that doing a doctoral project in natural sciences at a science department which is just focussed on the conservation-restoration subject has an advantage of broadening employment prospects of a student after his or her doctoral degree. The graduates can look for employment as fully-educated chemists, physicists, biologists, or mineralogists, or they can look for further career as conservation scientists specialised in one particular aspect of the science for the conservation field.

In the UK, The Science and Heritage Programme funded by AHRC and EPSRC hopes to offer doctoral graduates a further option, with the introduction of the Post-doctoral Fellowships. This programme call encourages students to continue with their study following their doctoral degree and seeks to support outstanding early career researchers to develop an

independent research career in heritage science. Those looking to apply to this programme call should have up to, but no more than, the equivalent of five years' post-doctoral experience.

### 5.7 Are national opportunities for doctoral education appropriate?

Generally, responses from larger countries assessed the opportunities for doctoral education at their national levels as adequate in the sense of a broad range of organisations where talented young researchers can implement doctoral projects on diverse conservation subjects. However, responses from Italy and France voiced concern that currently there are no education programmes leading to a doctoral degree in the field of conservation-restoration or in science for conservation in their countries, the only exception being the field of conservation of architectural heritage.

In contrast, the definite lack of opportunities for doctoral training nationally was indicated by smaller countries like Malta, Latvia or Iceland. The obvious reasons are the small size of the population and consequently a very small size of the research field and a limited number of experts who can supervise the students. The response from Iceland pointed out that it was less expensive to send the few students abroad for training than supporting a very limited local education programme. Therefore, Icelandic citizens profit from access to higher education in the other Nordic countries (Sweden, Denmark, Norway or Finland), which is formally based on an agreement made in 1996. The response from Belgium pointed more broadly to the necessity of analysing the advance education opportunities in a European context as 'scholars are supposed to be mobile across Europe. Therefore, the existing schemes in Belgium should be considered in a framework of complementarity with the offers in other countries'.

A particularly broad response came from the UK, in which a 2006 report by the House of Lords Science and Technology Committee highlighted the need for a significant improvement within the area of heritage science. The report acknowledged a particular lack of funding and available resources within universities for PhD studies in conservation science and the need to redirect expertise within the science field into heritage and conservation science. In response to the recommendations of the report, the Science and Heritage Programme has been launched which has also created new opportunities for doctoral study by research in the field of conservation-restoration or science for conservation. Its Doctoral Studentships call, aiming at promoting partnerships and research collaborations between academia and other bodies, has proved extremely successful (see description above).

Furthermore, a potential advantage for the UK is that it is one of the few countries which provide significant public research funding to researchers in the arts and humanities. Therefore, the UK is better able to work across the 'science' and 'art' boundaries as researchers on both sides have access to significant research funding. While the bridging of this divide requires active and continuous effort, the UK at least has the possibility of bringing researchers from both sides together to focus on a subject of common interest to them.

### 5.8 Reasons for inadequate or lacking training opportunities at the doctoral level

Several reasons for inadequate training opportunities at the doctoral level were indentified in the survey:

- lack of good, modern materials and equipment both for conservation-restoration and for scientific research in the field of conservation (Bulgaria).
- lack of capacity and scientific equipment (Germany).
- lack of cooperation between the natural sciences, technical sciences and humanities, lack of educational institutions which have science for conservation as their core area of education and research (Slovenia).
- lack of priority given to the importance of conservation-restoration/conservation science in the higher education institutions and competent bodies. Another critical problem is a severe lack of resources (Malta).
- specialisation-focused doctoral studies (Slovenia).
- the relative small number of students and of employment in the field of conservation-restoration have hampered establishment of PhD level studies (France).
- students rather prefer training in natural science with a research topic applied to conservation than a dedicated PhD study (France).

The questionnaire itself has listed several **possible** reasons for inadequate doctoral training other than the small size of the research field: applied character of the research, the fact it spans the arts and sciences, the lack of educational organisations (higher education institutions or similar) which have science for conservation as their core area of education and research, an approach that doctoral-level training should be in mainstream scientific disciplines like chemistry or physics before young researchers enter the heritage field.

Interestingly and encouragingly, the UK response has refuted them claiming among others that:

- the fact that conservation-restoration or science for conservation span the arts and sciences have not been perceived to be a deterrent because once a student is accepted by a university to study at PhD level, the institution will know whether there is a PhD supervisor that can supervise the student's research and the student's entry qualifications will have been checked by the institution to ensure that they can cope with the arts and /or science emphasis of the research they propose to carry out.
- a university or research institution does not need to have science for conservation as its core area of education and research for it to supervise/conduct research at post-graduate level. A qualification at PhD level demonstrates that a graduate student has the skills to set out on the road of an independent research career.
- there is no obligation that doctoral-level training should be in mainstream scientific disciplines like chemistry or physics before young researchers enter the heritage field.

## 6. Long courses

A significant number of long courses have been identified in the survey. The information received is given in Appendix 8 and the courses are grouped according to four areas: general

conservation-restoration, conservation science, archaeological conservation and architectural conservation.

The long courses fall into two broad categories:

1. Third cycle level courses (according to the Bologna Process) - other than doctoral programmes – which are part of national educational frameworks.
2. Other long courses which do not provide participants with clear, legally recognised qualifications but just meet various educational needs to enhance professional backgrounds of the participants.

Italian specialisation schools are an important example for long courses in category 1. They provide third cycle level courses and end with a Specialisation Degree (120 ECTS points). They aim at training professionals working in the cultural heritage field in four main sectors of heritage preservation:

- archaeological heritage (13 schools) - *courses: museography and promotion of territory archaeological heritage (10 ECTS), diagnostic, conservation and restoration of cultural heritage (10 ECTS), cultural heritage law (5 ECTS).*
- architectural and landscape heritage (6 schools) - *courses: restoration (12 ECTS), materials and technologies (6 ECTS), systems and museography (6 ECTS).*
- historic artistic heritage (13 schools) - *courses: museography and museology (5-20 ECTS), conservation, diagnostic and restoration (5-20 ECTS), cultural heritage law (5-20 ECTS).*
- archive and library heritage (2 schools) - *courses: law (8-24 ECTS), science and technologies applied to cultural heritage (8-16 ECTS).*

Courses for 1st level and 2nd level Master degrees are further examples of specialisation courses available in the Italian education system. They usually last one year. The entry requirements are a Bachelor degree for 1st level Master degree courses or a Master's degree for 2nd level Master degree courses. Though sharing the 'Master' label with 'standard' two-year Master degree courses ('Laurea Magistrale'), the 'specialisation' Master's courses differ by a strong professional component and are undertaken by undergraduate or graduate students wishing to specialise in a specific field of application. Therefore, students are not only recent graduates (as is the case with the 'Laurea Magistrale' courses) but also people already working in the field, wishing to acquire further specific knowledge and competencies. Information on this category of courses is provided in Appendix 8.

Two further examples of long courses forming part of national education frameworks were reported in the survey:

- Spanish courses for a Master's in Conservation and Restoration Project Management: Collections and Heritage Ensembles (University of Barcelona), a Master's in Conservation and Restoration of Painting (University of Granada) and a Master's in Architectonic Restoration (University of Valladolid). The 'Master's' degree awarded by these three- semester courses should not be understood as an official Master's degree. Spanish universities have recently created an additional academic offer, composed of different kinds of post-graduate diplomas such as 'university expert', 'university specialist' (one year or less) or 'master' (two years). These courses are intended for

postgraduates wishing to complement their professional, scientific, technical or artistic academic training.

- French courses organised by several schools of architecture leading to specialisation degrees - Diplômes de spécialisation et d'approfondissement DSA.

Similarly to education programmes leading to a doctoral degree described earlier, long courses belonging to category 2 defined above are established predominantly in the area of broadly conceived conservation, rehabilitation and the use of built heritage and cultural landscapes.

The survey has identified three long courses in science for conservation. By way of example, the one-year course 'Modern Analytical Techniques in Conservation of Historic Objects', organised by the Faculty of Chemistry at the Jagiellonian University in Krakow, Poland, is described in detail in Box 8. It is targeted at conservators-restorers with a Master's-level diploma wishing to broaden their understanding of scientific methods in application to diagnosing heritage objects, and scientists interested in the heritage field.

**Box 8**
**Long course 'Modern Analytical Techniques in Conservation of Historic Objects', Faculty of Chemistry at the Jagiellonian University, Krakow, Poland**

The course was organised for the first time in 2008 due to a subsidy from the Ministry of Science and Higher Education. The second course started in October 2009.

The course lasts one year. The tuition fee is 3,500 PLN (875 €). The language of the course is Polish. Twenty four participants took part in the 2008 course. The teaching staff consist of academic lecturers from the Jagiellonian University, the Academy of Fine Arts, the University of Technology in Łódź, the Polish Academy of Sciences, the National Museum in Krakow, the Institute of Forensic Research, Krakow University of Economics, AGH-University of Science and Technology

The course consists of 165 hours with division into lectures (100 hours) and laboratory work (65 hours). The three subject areas are:

1. The Basics of Chemistry - 30 hours of lectures and 10 hours of laboratory work to refresh students' knowledge of the basics of chemistry which are necessary to understand issues presented in the practical part.
2. Science in Conservation - 45 hours of lectures. Topics: paper, textiles, metals, wood, glass, ceramics, enamel, binding media, pigments, stone as materials used in heritage objects; microbiological risks, storage conditions, methods of dating objects, durability of contemporary IT carriers, statistical elaboration of measurement data, analytical methods in forgery detection.
3. Modern Analytical Techniques in the Research of Historic Objects - 25 hours of lectures and 55 hours of laboratory work. Topics: qualitative and quantitative analysis of gases, infrared and Raman spectroscopies, techniques of accelerated aging of materials, laser cleaning and laser techniques in analysis, X-ray diffraction techniques, microscopic techniques, capillary electrophoresis in the analysis of inks, liquids and gel chromatography, viscosimetry, atomic spectrometry, VIS spectroscopy, measurements of colours, infrared photography, UV luminescence, spectral optical tomography.

## 7. Short courses

A significant number of short courses have been identified in the survey. The information received is given in Appendix 9 and the courses are grouped according to several areas: general conservation-restoration, conservation science, architectural conservation,

archaeological conservation, and other. Though the tables reflect the responses obtained in the questionnaires and as such are neither comprehensive nor definitive, the courses cover a rich and diverse range of topics from summer schools on cutting-edge applications of synchrotron radiation to heritage materials to courses for professional divers on first measures in the on-site conservation of underwater archaeological findings.

The survey has clearly demonstrated that short courses are the primary way in which new knowledge and practical skills, especially the findings of the current research projects, can be effectively presented and disseminated to professionals working in the field. Indeed, short courses are targeted predominantly at cultural-heritage stakeholders: curators of historic buildings and collections, public policymakers and heritage organisations at various levels – local, regional or national, conservation practitioners and enterprises engaged in diagnosing conserving, and protecting heritage, though obviously teaching staff and students of the departments working on the conservation subjects also participate.

Lack of time is the principal barrier in undertaking longer courses by conservation practitioners. The response from Germany pointed out that many interested professionals do not attend an excellent nationwide seven-week course on the preservation of monuments and development of existing assets run by the Technical University of Dresden and Denkmal Akademie, 'not only because of the attendance fee but also for the time'.

It should not be overlooked that reputable, well-established companies, producers of conservation materials and equipment, or providers of high-value added services in the heritage sector, are capable of providing a high-level training and support service to their customers, including project-specific customised solutions for the tasks at hand, when appropriate. An interesting remark was made by a practising conservator in Poland: as formal education in academic conservation departments are considerably focused on traditional conservation areas like paintings, stone or polychrome sculpture and on developing artistic skills, practitioners learn more about state-of-the-art technologies for the restoration of historic facades, which constitutes the bulk of their commissions, during three-day courses organised by a reputable company selling materials for building conservation than during their entire academic study.

## 8. Other training activities

The information received within this survey has grouped the opportunities for advanced training according to three principal categories: study and research leading to a doctoral degree, long courses not leading to a doctoral degree and short courses.

However, the responses to the questionnaire reported on further educational activities broadly falling within the 'advanced education' category which did not fit the general scheme. The information is described in this part of the report.

### 8.1 Internships at cultural heritage institutions

Royal Institute for Cultural Heritage (IRPA), Belgium

Every year, the Royal Institute for Cultural Heritage offers eight-month internships for post-graduates in its conservation workshops, laboratories or documents department. IRPA has a long experience in training young professionals in conservation and research. The first interns were accepted in 1949, one year after the founding of the Institute. Since then, the

training programme has evolved in response to the changing needs of the conservation and conservation science communities. In the field of conservation, the increasing number of dedicated university-level courses in Belgium and abroad have satisfied the need for long-term training. Post-graduate internships represent the ideal means to consolidate and improve practical skills and theoretical knowledge of a newly-qualified conservator or scientist, prior to his or her entry into the professional world.

It is possible to do an internship in each of IRPA's three departments:

**Conservation-Restoration** – in one of the following studios: paintings, wall paintings, stone sculpture, polychrome wood sculpture, textiles, metals, glass or decorative finishes on historic buildings. The interns carry out conservation-restoration projects at the Institute and on site in churches and museums. Prior to any conservation treatment, interns thoroughly examine and document the art object and undertake technical and art historical research, including X-ray radiography, infrared reflectography, ultraviolet fluorescence examination, binocular microscopy and sample analysis. Guided by the head of a studio, the interns learn to develop their own practical and research projects and gradually become autonomous in their work.

**Laboratories** - interns specialise in one of the following areas: paper analysis, textiles analysis, monuments, paint layer analysis, dating techniques (radiocarbon 14 dating, dendrochronology). They carry out scientific analyses related to historic techniques and materials or materials used in conservation. Scientific or applied research projects are possible, or a combination of both. In case of applied research projects, interns are required to prepare at least one paper for publication in an international journal.

**Documentation** - interns work in the photographic library. They learn how to use the archiving system, participate in the inventory work and research, and help to manage the reading room and public service desk.

To complement their practical training, interns attend a series of lectures and visits related to conservation practice, materials and techniques of works of art in Belgium and analytical research. The lectures are given by members of staff in their particular fields of expertise as well as by outside speakers. The programme is revised and adapted each year. At the end of the internship, interns are required to submit a detailed written report. They are also expected to give an illustrated oral presentation of their most interesting project(s) to staff members.

### 8.2 Consultations by experts on specific problems

Bulgaria

Specialists at the Central Laboratory for Conservation and Restoration, the National Museum of History, Sofia, provide short, individual training on a very concrete subject for colleagues that work at conservation laboratories in the country’s museums. The scheme has recently been expanded to the Republic of Macedonia.

Slovenia

The National Museum of Slovenia enables additional training activities to conservators and restorers from other museums by providing consultation, organising workshops and mentoring expert activities.

### 8.3 Distant learning opportunities

Germany

The primary aim of the renowned Hornemann-Institute, a part of the HAWK University of Applied Sciences and Arts Hildesheim/Holzminden/Göttingen (www.hornemann-institut.de), is world-wide knowledge transfer. The institute disseminates current scientific results within the scope of conservation and restoration to fit the needs of international specialists, mainly by e-publications or by internet-based courses. Examples of areas covered by the courses are:

- damage of cultural assets by salts.
- microbial attack on cultural assets.
- investigation of transparent coatings on furniture and wooden objects.
- documental photography.
- restoration theories and methods from the mid-20th century until today.
- conservation of globes.

UK

A number of courses are offered with a distance learning option e.g. MA Preventive Conservation at Northumbria University; MA Conservation science at De Montfort University.

The Open University also offers distance learning within Heritage studies:

Courses: 'Heritage, Whose Heritage?' and 'Understanding Global Heritage' with applications for postgraduate research welcome.

This course is a brief introduction to the key issues affecting heritage decision making. For example, who decides what should be preserved from the past as our heritage? Who is this heritage for and how should it be presented and explained? It teaches students how to engage actively with heritage and have an impact on it. This course enables students to take a critical look at the heritage industry.

See: http://www.open.ac.uk/Arts/heritage-studies/index.shtml

International Academic Projects Ltd (IAP) offer: 'Chemistry for Conservators' - a four month distance learning course. See: http://www.academicprojects.co.uk/

This course provides an introduction for people with little or no chemistry background. All students are assessed initially by questionnaire. The syllabus of chemistry is centred around major conservation issues: e.g. types of materials, the environment, cleaning, and deterioration. Using a combination of course literature, relevant experiments and assessed study units, the chemical principles needed to understand conservation practice are explained. The course provides an excellent background to many training courses in conservation (several conservation training establishments recommend this course to potential students with inadequate chemistry background). Taking this course should enable students to gain greater insight into their everyday work.

## 9. European-level opportunities

The survey has been focussed primarily on the national frameworks for advanced education in conservation-restoration and science for conservation in European Union Member States. Therefore, no information is provided in this report on European opportunities – the Marie Curie programme, European Research Council grants, Grundtvig programme and European Commission Advanced Training Courses. Such information is effectively disseminated by the European Commission and can be found more easily than information on national opportunities available in the respective Member States.

However, a particularly interesting category of high-level short courses needs to be briefly described. These are international knowledge exchange workshops organised at the end of research projects funded within the European Commission Framework Programmes. The workshops have become an almost obligatory tool for the promotion and dissemination of novel results, materials, diagnostic methods and technologies in the professional community engaged in the care and protection of cultural heritage. Descriptions of selected workshops are given in Table 6 in Appendix 9. They usually combine lectures by renowned experts in the field and also specialists invited from outside the organisations implementing the project, hands-on training and panel discussions as illustrated by the recently finished PROPAINT project in Box 9.

**Box 9**
**Final workshop of the European Commission PROPAINT project**

PROPAINT Project 'Improved protection of paintings during exhibition, storage and transit', 2007-2010, supported by the European Commission 6th Framework Programme, http://propaint.nilu.no

National Museum in Krakow, Poland, November 20-21, 2009

Approximately 100 participants, registration fee 75 €

Programme – Seminar (day 1)

Aim, Challenges and Main Results from the PROPAINT Project, *Elin Dahlin, Norwegian Institute for Air Research, NO*

Development and Use of Microclimate Frames, *Jørgen Wadum, National Art Museum, DK*

Strategy for Protection of Paintings in Real-Life Museum Conditions, *Janusz Czop, National Museum in Krakow, PL*

The Importance of Monitoring the Museum Environment, *Stephen Hackney, Tate, UK*

Dosimetry for Evaluation of Environmental Conditions in Museums, *Marianne Odlyha, Department of Biological Sciences, Birkbeck, University of London, UK, Peter Mottner, Fraunhofer Institute for Silicate Research, Bronnbach Branch, DE, Terje Grøntoft, Norwegian Institute for Air Research, NO*

The Degradation of Varnishes, *Maria Perla Colombini, Department of Chemistry and Industrial Chemistry, University of Pisa, IT*

The Conservation of Paintings between Aesthetical and Technical Choices, *Marco Ciatti, The Opificio delle Pietre Dure, Department of Restoration of Movable Paintings, IT*

Criteria for Best Design of Microclimate Frames, *Mikkel Scharff, Royal Danish Academy of Fine Arts, The School of Conservation, DK*

The Experience of Being an SME Producing Microclimate Frames, *Guillermo Andrade, SIT Transportes Internacionales, ES*

Contribution from the PROPAINT Project to Environmental Standards, *David Thickett, English Heritage, UK*

Policy for the Preventive Conservation of Paintings – The Importance of Using Microclimate frames, *Johanna Leissner, The Fraunhofer Gesellschaft, DE*

End User Panel Discussion

Programme – Workshop (day 2)
Four hours of presentations, demonstrations, discussions and interactive activities about the evaluation of the environment in and design of microclimate frames for paintings. Visit to the PROPAINT test sites in the National Museum in Krakow with the paintings in microclimate frames.

# 10. Conclusions

## 10.1 Study and research for a doctoral degree

*National frameworks*

The survey has revealed many institutions offering a diverse range of opportunities for study and research for a doctoral degree. These are: higher educational institutions, research organisations at various levels, museums, heritage organisations. Many provide a research environment of exceptional quality for a young researcher interested in a specific subject in the field of science-led conservation. At the same time, the survey has exposed a fragmented and dispersed field lacking national frameworks which would coordinate the educational opportunities at the doctoral level more effectively, identify research priorities and gaps, reduce duplication.

For example, a broad offer of study in the area of architectural, urban, environmental conservation at university departments of architecture is in contrast to the limited number of opportunities offered in main-stream conservation or conservation science.

The fragmentation of the field also makes it difficult for early stage researchers, usually fresh graduates in various fields of science and conservation, to obtain information on the available opportunities in the field and to find his or her way into the system. The very fact that experts collecting information were often unable to describe what was on offer at higher education institutions or other organisations for study at the doctoral level in each given country, or provide examples of doctoral dissertations focussing on conservation subjects, illustrates the lack of coordination and collaboration in the national systems.

*Organisation*

The NET-HERITAGE survey revealed two basic approaches to training students at the doctoral level:

- one is basing the education at the doctoral level on research work of a student with very limited training component mainly in general skills.
- the other puts emphasis on a strong taught component, usually relying on a three-year education cycle.

The two systems produce professionals of diverse backgrounds:

- it may be perceived that the first approach is particularly suitable for training researchers capable of providing high-quality, frontier research, especially related to the application of natural sciences or engineering to more effective preservation and conservation of cultural heritage.

- the other approach is particularly suitable in training professionals, capable of managing heritage resources or entering the high-level administrative and service sector.

One of the important conclusions coming out of the survey is that doctoral studies are a very important element in sustaining research. This is due to the strong interest and enthusiasm of students in their doctoral projects. Furthermore, research groups in the relatively small field of conservation-restoration and conservation science, in which continuous funding from general research grants is difficult, find it easier to continue research when they run doctoral projects supported for doctoral training funding schemes.

*The meaning of doctoral degree*

This survey has revealed that present doctoral degrees in European Union Member States can mean various qualifications:

- an outcome of a multi-year research project leading to knowledge at the most advanced frontier of the field and specialised skills.
- an outcome of an advance study course – the third level in the Bologna framework.
- a degree pointing to a highly competent artist-restorer.

*Funding*

The survey has identified several paths of funding PhD projects.

Four countries – Greece, Slovenia, Spain and UK - have indicated specific PhD funding programmes. The Greek and Spanish programmes have the advantage of being permanent ones, providing limited by continuous opportunities for supporting young researchers interested in the area.

In general, however, funding and supporting doctoral study and research is awarded within general research funding patterns in which four principal funding schemes can be identified:

- studentships awarded to individual students submitting the proposals, usually through the respective research institution, to a funding agency in an open competition.
- doctoral training grants awarded to universities or other research organisations which select projects they wish to support.
- project studentships which can be placed in a grant application; consequently PhD projects are closely associated with research proposals.
- various studentships or doctoral training grants which foster collaboration between higher education institutions and non-academic organisations and businesses.

Moreover, most higher education institutions operate their own scholarship schemes. Sometimes foundations and companies sponsor postgraduate students through an institution or directly.

*Collaboration*

The survey has revealed that the majority of doctoral studies were based on collaboration between heritage organisations and higher education institutions, which is essential to maintain high-level skills in the sector by combining the practical knowledge of heritage issues with scientific expertise and equipment held at universities. The key aspect was

making sites and artefacts available for research to attract university-based scientists to the field, which on the other hand advances the conservation profession in general. This is very encouraging.

### 10.2 Long courses

In Italy, France and Spain, a number of long courses - other than doctoral courses – are organised as part of the national educational frameworks. They provide third cycle level training in many areas of the heritage field and end with various recognised specialisation degrees.

Other long courses which do not provide participants with clear, legally recognised qualifications are available predominantly in the area of conservation, rehabilitation and use of built heritage and cultural landscapes.

### 10.3 Short courses

The survey has revealed a large number of short courses across Europe which cover a rich and diverse range of topics from cutting-edge applications of science to conservation problems to practical conservation issues.

The survey has clearly demonstrated that short courses are the primary way in which new knowledge and practical skills, especially the findings of the current research projects, can be effectively presented and disseminated to professionals working in the field. A particularly interesting category of high-level short courses are international knowledge exchange workshops organised at the end of research projects funded within the European Commission Framework Programmes.

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**Bibliography**


Auer, T., 'From "diversity" to "diversity in harmony" in European conservation education', in *J. Bridgland (ed.) ICOM Committee for Conservation, 15th Triennial Conference, New Delhi: Preprints*, Allied Publishers PVT. Ltd, New Delhi (2008) 60-65.

*The Bologna declaration on the European space for higher education: an explanation,* 2000, available at: http://ec.europa.eu/education/policies/educ/bologna/bologna.pdf

*Clarification of Conservation/Restoration Education at University Level or Recognised Equivalent*, European Network for Conservation Restoration Education ENCoRE, 2001, available at: http://www.encore-edu.org/encore/encoredocs/cp.pdf

*Defining Common Standards for Training in Cultural Heritage Conservation-Restoration: A Handbook*, the Leonardo da Vinci project 'European Conservation Practitioners License (ECPL)', available at: http://www.ecpl-project.eu

*ECCO Professional Guidelines,* European Confederation of Conservator-Restorers' Organisations, 2002, available at:
http://www.ecco-eu.org/about-e.c.c.o./professional-guidelines-3.html

*The European Qualifications Framework for Lifelong Learning (EQF),* Recommendation of the European Parliament and of the Council of 28 April 2008, available at:
http://ec.europa.eu/education/policies/educ/eqf/eqf08_en.pdf

*Heritage and Science*, a report published by Science and Technology Committee of the House of Lords, UK, 2006 , available at:
http://www.parliament.uk/parliamentary_committees/lords_s_t_select/heritage.cfm

Mazzeo, R., and Eshoj, B., 'Education scientists: the EPISCON project – European PhD in science for conservation', in *J. Bridgland (ed.) ICOM Committee for Conservation, 15th Triennial Conference, New Delhi: Preprints*, Allied Publishers PVT. Ltd, New Delhi (2008) 1086-1093.

*Realising the European Higher Education Area,* Communiqué of the Conference of Ministers responsible for Higher Education in Berlin on 19 September 2003, available at:
*http://www.bologna-berlin2003.de/pdf/Communique1.pdf*

*University Postgraduate Curricula for Conservation Scientists,* the Bologna document, 1999, available at:
http://www.episcon.scienze.unibo.it/episcon/bologna-document

*Vision 2030 & Strategic Research Agenda of the Focus Area Cultural Heritage within the European Construction Technology Platform (ECTP),* European Construction Technology Platform (ECTP), 2008, available at:
http://www.ectp.org/documentation/FACH-Vision&SRA-V3-200803.pdf

# Appendix 1

Members of the Panel of Experts of WP5

| Name | Experience |
|---|---|
| Dr Martina Caruana | The Chief Officer of Heritage Malta's Conservation Division and Institute of Conservation and Management of Cultural Heritage (ICMCH). Coordinator of two Master degree programmes - the MA in Cultural Heritage Management and the Master of Conservation in Applied Conservation Studies as well as of the Leonardo da Vinci EU project 'European Conservators Practitioners License (ECPL)'. Chairperson of Heritage Malta's Research Strategy Committee. |
| Professor May Cassar | Director of the Centre for Sustainable Heritage - University College of London (UCL), Director of the Heritage and Science Programme (2008-2012), advised and taught internationally in the field of heritage science and conservation - among others Specialist Advisor to the House of Lords Science and Technology Committee during its Heritage and Science Inquiry in 2006, member of the European Commission's External Advisory Panel for the 5th Framework Key Action 'City of Tomorrow and Cultural Heritage' and for the 7th Framework Programme 'Environment (including Climate Change)' area, organised a number of seminal conferences designed to break down the barriers between disciplines. |
| Professor Annamaria Giovagnoli | Deputy Associate Director of the School of Restoration, Scientific Area, of the Central Institute for Restoration (ISCR) – Rome, the leading Italian training institution in the field of restoration of tangible cultural heritage. Director of Scientific Laboratories of Centro Conservazione e Restauro 'La Venaria Reale' Turin. Long teaching experience in restoration chemistry at several Italian universities. |
| Dr Roman Kozłowski | Associate Professor at the Institute of Surface Chemistry, Polish Academy of Sciences in Krakow. Principal investigator and coordinator in many national and international research projects in heritage science, organiser of advanced training activities aiming at the transfer of research results into the conservation sector, especially enterprises. |
| Professor René Larsen | Rector of the School of Conservation of the Royal Danish Academy of Fine Arts. Conservator and scientist, coordinator of many EC research projects. Co-founder and chairman of the Board of the European Network for Conservation – Restoration Education 'ENCoRE'. Coordinator of a European Commission Advanced Study Course on the deterioration of collagen-based historical materials. |
| Professor Rocco Mazzeo | Head of the Microchemistry and Microscopy Art Diagnostic Laboratory, University of Bologna – the Ravenna Campus. Coordinator of the EC Marie Curie project EPISCON 'European PhD in Science for Conservation'. Coordinator of a concluded EC project aiming at the development of guidelines for post graduated education and training in conservation science. Participant of a Leonardo da Vinci project CURRIAC 'Vocational Training Curricula for Conservation Scientists'. |

## Appendix 2

Collaborators who collected information at the national levels

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|---|---|---|
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| | Emilio Cano | ecano@cenim.csic.es |
| UK | Polly Webb | P.Webb@ahrc.ac.uk |

# Appendix 3

Education programmes leading to a doctoral degree in the field of conservation-restoration or conservation science.

**Table 1 Education programmes leading to a doctoral degree in the field of built heritage (architectural conservation).**

| Country | University/Academy/School | Name of the doctoral programme |
|---|---|---|
| Belgium | Raymond Lemaire International Centre for Conservation, Faculty of Engineering, Catholic University of Leuven | Building Materials and Conservation Techniques |
| France | École nationale supérieure d'architecture de Paris-Belleville | Among 19 National Schools of Architecture in France 9 are members of accredited doctoral programmes and have the authority to grant PhD in architecture by their own or in partnership with universities. These schools provide training in four main specialties:<br>- archaeological heritage and remediation<br>- material and technique<br>- city planning and territory<br>- humanities and social sciences. |
| | École nationale supérieure d'architecture de Paris-La Vilette | |
| | École nationale supérieure d'architecture de Paris-Malaquais | |
| | École nationale supérieure d'architecture de Grenoble | |
| | École nationale supérieure d'architecture de Lyon | |
| | École nationale supérieure d'architecture de Marseille | |
| | École nationale supérieure d'architecture de Montpelier | |
| | École nationale supérieure d'architecture de Nantes | |
| | École nationale supérieure d'architecture de Toulouse | |
| Greece | School of Architecture, National Technical University of Athens | Doctoral Degree in Protection of Monuments, Sites and Complexes, in cooperation with School of Chemical Engineering, School of Civil Engineering and School of Rural and Surveying Engineering |

| | | |
|---|---|---|
| | School of Architecture, Aristotle University of Thessaloniki | Doctoral Degree in Protection, Conservation and Restoration of Cultural Monuments, in co-operation with the School of Civil Engineering, School of Mechanical Engineering, School of Chemical Engineering, School of Electrical and Computing Engineering, School of Rural and Surveying Engineering and the Faculty of Engineering |
| | School of Architecture, Aristotle University of Thessaloniki | Doctoral Degree in Museology, in co-operation with the Faculty of Education of the School of Mechanical Engineering, and the Faculty of Education of the University of Western Macedonia |
| Italy | Università degli Studi di Chieti | History, Conservation and Architecture Representation |
| | Università degli Studi di Ferrara | Architecture Technology - materials and traditional construction techniques for restoration, in co-operation with Università degli Studi di Venezia IUAV and Università degli Studi di Bologna |
| | IMT Lucca Institute for Advanced Studies | Management and Development of Cultural Heritage |
| | Politecnico di Milano | Preservation of Architectural Heritage |
| | Politecnico di Milano | Architecture, Urban Design, Conservation of Housing and Landscape |
| | Università degli Studi di Napoli Federico II | Conservation of Architectural Heritage, in co-operation with Università degli Studi di Palermo |
| | Università degli Studi di Palermo | Recovery and Fruition Historical Contexts |
| | Università Mediterranea di Reggio Calabria | Conservation of Architectural and Environmental Heritage |
| | Università degli Studi di Roma Sapienza | History and Restoration of Architecture |
| | Politecnico di Torino | Cultural Heritage |
| Slovenia | University of Nova Gorica | Economics study programme in Venice in co-operation with the IUAV University of Venice and Techniques for the Conservation of the Architectural and Environmental Heritage, post-graduate |

**Table 2 Education programmes leading to a doctoral degree in the field of conservation-restoration or science for conservation, other than architectural conservation.**

| Country | University/Academy/School | Name of the doctoral programme | Areas in engineering, natural sciences or conservation-restoration covered by the programme | Duration in years |
|---|---|---|---|---|
| Bulgaria | Chair of Restoration, Faculty of Applied Arts, National Academy of Arts in Sofia | | Physics, chemistry, engineering, conservation-restoration of books and graphic documents, glass and ceramics, metals and paintings | 3 |
| | Inter-university Centre for Archaeometry, Faculty of Chemistry, University of Sofia, | | | |
| Greece | School of History and Archaeology, the National and Kapodistrian University of Athens | Doctoral degree in Museum Studies, in co-operation with School of Geology and with the Department of Conservation of Antiquities and Works of Art, School of Graphic and Artistic Studies of the Technological Institute of Athens | | |
| | Department of Cultural Technology and Communication, School of Social Sciences, University of the Aegean | Doctoral Degree in Cultural Technology and Communication | | |
| Italy | Università degli Studi di Udine | Bibliographic, Archival, Documentary Sciences and the Preservation and Restoration of Archival and Book Heritage | Documentation, technical examination of objects, theory and history of conservation-restoration, for books and graphic documents | 3 |
| | Chemistry Department, University of Bologna | Doctoral programme in science for conservation | Physics, chemistry, biology, geology, material sciences, information technology, technical documentation of objects, authentication and archaeometry, condition survey, preventive conservation, theory and history of conservation-restoration | 3 |
| | University of Padua, in cooperation with the Universities of Modena, Verona and Bologna, Italy. | Doctoral programme 'Study and Conservation of Archaeological and Architectural Heritage' with two education paths: archaeological sciences, or science and technologies for the | Physics, chemistry, geology, material sciences, information technology, technical documentation of objects, authentication and archaeometry, condition survey | 3 |

| | | | | |
|---|---|---|---|---|
| | | archaeological and architectural heritage. | | |
| | Doctoral School in Science, University of Florence | Doctoral programme in science for the conservation of cultural heritage. | Physics, chemistry, biology, geology, material sciences, information technology, technical documentation of objects, authentication and archaeometry, condition survey, preventive conservation, theory and history of conservation-restoration | 3 |
| Poland | Department of Conservation, Academy of Fine Arts in Krakow | Doctoral degrees in conservation | Documentation, conservation-restoration for books and graphic materials, buildings, modern materials and contemporary art, murals, mosaics and rock art, paintings, photographic materials, stone, brick, plaster- and stuccowork, wood furniture and lacquer | 3 |
| Slovenia | Faculty of Arts of the University of Ljubljana | Interdisciplinary doctoral degree course in humanities and sociology. | Heritage science – museology and conservation science | 3 |
| | Faculty of Humanities of the University of Primorska | Management and Presentation of Heritage (in the process of accreditation), in co-operation with the University of Zagreb | Conservation science and heritage management, museology and presentation of heritage, archive science and heritage management with IT tools, legal protection of heritage | 3 |
| Spain | Department of Conservation and Restoration of Cultural Assets, Faculty of Fine Arts of the Universidad Politécnica de Valencia | Science and Restoration of Historic and Artistic Heritage | Books and graphic documents, metals, modern materials and contemporary art, murals mosaics and rock art, paintings, photographic materials, stone, brick, plaster- and stuccowork, wet, organic and archaeological materials, material sciences, documentation, preventive conservation, conservation and restoration treatments | |
| | Department of Conservation and Restoration of Cultural Assets, Faculty of Fine Arts Universidad Complutense de Madrid | Doctoral Programme on Conservation, Restoration and Exhibition of Cultural Heritage | Books and graphic documents, metals, modern materials and contemporary art, paintings, stone, brick, plaster- and stuccowork, material sciences, documentation, technical examination of objects, preventive conservation, conservation and restoration treatments, theory and history of conservation-restoration | |

# Appendix 4

Structure of the teaching components of several education programmes leading to a doctoral degree.

**Table 1 List of core courses given during the training component of the doctoral programme in science for conservation, Chemistry Department, University of Bologna, Italy.**

| Course title | Course hours | |
|---|---|---|
| | frontal lessons | laboratory |
| Principles of conservation/restoration | 12 | 8 |
| Introduction to the conservation community | 6 | - |
| Heritage legislation | 6 | - |
| Historic contemporary materials and technologies | 36 | 24 |
| Overview of history of art | 6 | - |
| Principle of collection and site management | 6 | 8 |
| Scientific methods of examining cultural property | 44 | 18 |
| Environmental impact on materials, deterioration and ageing | 30 | 16 |
| Preventive conservation | 24 | 16 |
| Documentation of cultural property | 18 | 12 |
| Processes in conservation | 36 | 24 |

**Table 2 Structure of the specialisation course 'Techniques and Materials in Conservation', doctoral programme 'Economics and Techniques for the Conservation of the Architectural and Environmental Heritage', University of Nova Gorica, Slovenia**

| Year/term | Topic of the course | required/ elective | lectures | seminars | individual | ECTS points |
|---|---|---|---|---|---|---|
| 1/1 common to both specialisation courses | History and theory of conservation | required | 12 | 12 | 26 | 6 |
| | Historic, artistic and economic criteria of cultural heritage | | 12 | 12 | 26 | |
| | General legislation in the field of cultural heritage and cultural activities | | 12 | 12 | 26 | |
| | Territorial restoration and conservation | elective | 12 | 12 | 26 | 6 |
| | Sociology of culture and history of the city | | | | | |
| | History of art – cataloguing and informatics | | 12 | 12 | 26 | |
| | History and techniques of decorative and applied art | | | | | |
| | History of modern and contemporary architecture | | 12 | 12 | 26 | |
| Year 1, term 1, total hours and ECTS points | | | 72 | 72 | 156 | 12 |
| | | | | | | |
| 1/2 specific to the specialisation course | History of modern and contemporary architecture | required | 12 | 12 | 26 | 4 |
| | Tests on materials and structures | | 12 | 12 | 26 | 5 |
| | Chemistry and physics of building materials | | 12 | 12 | 26 | 5 |
| | Building thermophysics | | 12 | 12 | 26 | 5 |
| | Cultural landscape | | 12 | 12 | 26 | 3 |
| | Realisation of a preservation and restoration plan | | 10 | 30 | 60 | 4 |
| | History, technology and sustainability of construction | | 25 | 10 | 65 | 4 |
| | Building techniques and technical systems | | 25 | 10 | 65 | 4 |
| | Evaluation methods | | 25 | 10 | 65 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Year 1, term 2, total hours and ECTS points | | | 142 | 233 | 825 | 48 |
| | | | | | | |
| entire year 1 | Individual project work* I | required | - | - | 400 | 16 |
| | Individual research work** I | | - | - | 100 | 4 |
| | | | | | | |
| **Entire Year 1, total hours and ECTS points** | | | **214** | **305** | **1481** | **80** |
| Year/term | Topic of the course | required/ elective | lectures | seminars | individual | ECTS points |
| entire year 2 | Modern trends in the conservation of cultural heritage I | required | 70 | 20 | 160 | 10 |
| | Individual project work* II | | - | 30 | 970 | 40 |
| | Individual research work** II | | - | - | 250 | 10 |
| | | | | | | |
| **Entire Year 2, total hours and ECTS points** | | | **70** | **50** | **1380** | **60** |
| | | | | | | |
| entire year 3 | Modern trends in the conservation of cultural heritage II | required | 20 | 70 | 160 | 10 |
| | Individual project work* III | | - | 30 | 970 | 10 |
| | Individual research work** III | | - | - | 250 | 10 |
| | Doctoral thesis | | - | - | - | 30 |
| | | | | | | |
| **Entire Year 3, total hours and ECTS points** | | | **20** | **100** | **1380** | **60** |

* the project work can be carried out in Studio Assoc. C.R.R. Palazzo Cappello and International Academy for Environmental Science and International Centre for Art Economics with which organisations contracts have been signed.

** the research work is carried out at Slovenian and foreign universities and research institutes. For example, during the 2005/2006 academic year at the cultural heritage protection institute in Venice and at the following French organisation: Musée de la Mode, Ville de Marseille and Agence Régionale du Patrimoine-Provence-Alpes-Cote d'Azur.

**Table 3 Training component in the education programmes leading to a doctoral degree in Spain**

| **Training component in programmes implementing the Bologna process in Spain** | | |
|---|---|---|
| In Spain, the official university education is divided into three cycles**:** Degree (240 ECTS), Master's (one year – 60 ECTS or two years - 120 ECTS) and Doctorate. The doctoral studies include a period of education and a period of research, the latter including preparation and defence of a Doctoral Thesis. To start the research period, a student needs to complete a training period. There are two types of Master's: (1) A Master's focused on training a specialist in a certain profession, and (2) a research-based Master, the awarding of which allows the student to move on to the doctoral research. However, in most cases, the Universities offer the 'dual' Masters: there is a common training for the both options. There is no fixed time for completing the research period. The training period lasts one year or two years. | | |
| **University** | **Title of the training programme** | **Training programme** |
| Department of Conservation and Restoration of Cultural Assets, Faculty of Fine Arts of the Universidad Politécnica de Valencia | Science and Restoration of Historic and Artistic Heritage | Admission to the doctorate programme requires 60 – 120 credits from the official Master Degree in Science and Conservation in Cultural Heritage<br><br>FIRST YEAR (60 credits)<br>Required subject - Physical-chemical principles of non-pictorial materials (12 credits)<br>Elective subjects - 48 credits between:<br>Conservation- restoration of gilding and polychromy (3 credits)<br>Textile conservation (12 credits)<br>Special techniques in conservation and restoration (9 credits)<br>Modelling in sculptures and architectonic restoration (3 credits)<br>Projects I: conservation and restoration of sculptures and archaeological materials (15 credits)<br>Projects I: conservation and restoration of easel paintings and altarpieces (15 credits)<br>Projects I: conservation and restoration of wall paintings (15 credits)<br>Projects I: conservation and restoration of sculptures and archaeological materials (36 credits)<br>Projects I: conservation and restoration of easel paintings and altarpieces (36 credits)<br>Projects I: conservation and restoration of wall paintings (36 credits)<br><br>SECOND YEAR (60 credits)<br>Required subjects - 9 credits between:<br>Radiography applied to conservation and restoration of cultural heritage (3 credits)<br>Colorimetry applied to conservation and restoration of cultural heritage (3 credits)<br>Health and safety at work. Labour hazards for the conservator (3 credits)<br>Inpainting and lacuna treatment in artworks (3 credits)<br>Specific techniques and chemical analysis of artworks (3 credits)<br>Contemporary theory of conservation (3 credits) |

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| | | Elective subjects:<br>Specialisation in Conservation and Restoration of Easel Painting and Altarpiece<br><br>Chimica degli inquinanti atmosferici e le relative interazioni con le opere d'arte esposte all'apero ed in interno (2 credits); Chimica del materiali constitutivi sia di pintura su tela e tavola sia di picture murali (leganti, vernici e adhesivo naturali e sintetici; organici e minerali) (2 credits); Conservation and restoration of contemporary painting (3 credits); Study of mechanical properties of painting materials (3 credits); Stratigraphic study of painting (3 credits); History of dyes and artistic varnishes (3 credits); Iconography applied to conservation and restoration of cultural heritage (3 credits); Synthetic materials applied to easel painting treatments (3 credits); Principles and techniques for wood identification (3 credits); Problems and treatments of easel painting supports (3 credits); Sistemas de registro aplicados a la restauración (3 credits); Tratamientos de estabilización y refuerzo del soporte en pintura sobre tabla.<br><br>Specialisation in Conservation and Restoration of Wall Painting<br><br>Biodeterioration and preventive conservation. Prehistoric rock art in Valencia (2 credits); Chimica degli inquinanti atmosferici e le relative interazioni con le opere d'arte esposte all'apero ed in interno (2 credits); Chimica del materiali constitutivi sia di pintura su tela e tavola sia di picture murali (leganti, vernici e adhesivo naturali e sintetici; organici e minerali) (2 credits); Stratigraphic study of painting (3 credits); History of wall painting conservation in Russia (2 credits); History of dyes and artistic varnishes (3 credits); Iconography applied to conservation and restoration of cultural heritage (3 credits); New materials in contemporary wall painting. Interaction with conservation treatments (3 credits); Materials, techniques and conservation of pre-hispanic wall painting (2 credits); Wall painting under the magnifier. Critical review of consolidation techniques and materials (2 credits); Wall painting under the magnifier. Critical review of cleaning techniques and materials (2 credits); Wall painting conservation (3 credits); Critical review of traditional methodologies in wall painting lifting (2 credits); Sistemas de registro aplicados a la restauración (3 credits)<br><br>Specialty in Conservation and Restoration of Sculpture and Archaeological materials<br><br>Biodeterioration and preventive conservation. Prehistoric rock art in Valencia (2 credits); Chimica degli inquinanti atmosferici e le relative interazioni con le opere d'arte esposte all'apero ed in interno (2 credits); Chimica del materiali constitutivi sia di pintura su tela e tavola sia di picture murali (leganti, vernici e adhesivo naturali e sintetici; organici e minerali) (2 credits); In situ conservation and extraction of archaeological materials (3 credits); Conservation and restoration of glass (3 credits); Conservation and restoration of archaeological textiles, skin and other materials (2 credits);<br><br>Modelling in sculpture and architectonic restoration (3 credits); Stratigraphic study of painting (3 credits); Iconography applied to conservation and restoration of cultural heritage (3 credits); Sculpture replica (3 credits); Materials, techniques and conservation of pre-hispanic wall painting (2 credits); Sistemas de registro aplicados a la restauración (3 credits); Principles and techniques for wood identification (2 credits); Polychrome sculpture restoration (3 credits) |

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|---|---|---|
| Department of Conservation and Restoration of Cultural Assets, Faculty of Fine Arts of the Universidad Complutense de Madrid | Doctoral Programme on Conservation, Restoration and Exhibition of Cultural Heritage | Yearly course (60 ECTS)<br>1st semester: theory<br>2nd semester: theory and practice in cultural heritage institutions / Final Project<br>Module I - Heritage and museology concepts; Preventive conservation; Conservation, restoration and exhibition projects.<br>Module II - Conservation and restoration criteria; Strategic planning and legal framework in the private company; Cultural heritage documentation<br>Module II - Concepts in museography, exhibition and preventive conservation; Temporary exhibitions and preventive conservation<br>Module III - Technology and use of cultural heritage; Conservation science; Structure of cultural heritage |

# Appendix 5

## Topics of doctoral projects

**Table 1 List of the research projects in the doctoral programme in science for conservation, Chemistry Department, University of Bologna, Italy**

| Hosting Institution | PhD research project |
|---|---|
| University of Bologna | Alternative sample preparation methods using ATR-MIR and FTIR spectroscopy for the study of cultural heritage materials |
| | Environment/heritage material interactions: evaluation of the impact of multi-pollutants and microclimate on modern and contemporary built heritage |
| School of Conservation in Copenhagen | Archaeological Baltic Amber: degradation mechanisms and conservation measures |
| | Understanding plastic surfaces: evaluating methods for cleaning art objects comprised of or containing new or degraded plastics |
| ELTE University of Budapest | Mineralogical and chemical changes caused by surface and subsurface weathering of building stone. Problems encountered in preserving monuments in the Székeshehérvár ruin garden |
| University of Thessaloniki | Study of material and technology of mosaics' substrates |
| | Parameters influencing the quality of lime based mortars used in repairing monuments and historical buildings |
| University of Oviedo | Durability of crystalline monumental stones in terms of their pore-space structure and hydraulic properties |
| | Durability of treated monumental stones with different salt content |
| University of Iasi | On the degradation mechanisms under the influence of pedological factors through the study of archaeological bronze patina |
| | Modern materials and procedures for old polychrome wood treatment |
| University of Perugia | New methodologies for in-situ non invasive studies of artworks materials |

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| Instituut Collectie Nederlanden | The effect of vibrations on the condition of sensitive paintings: mechanical modelling |
| Hungarian National Museum in Budapest | Preservation and conservation of building stones from excavation context. Case study of the Roman villa from Nagyharsány |
| Istituto per la Conservazione e ValorizzazionedeiBeniCulturali CNR, Florence | Biofilms on exposed monumental stones: mechanism of their formation and development of new control methods |

**Table 2 Details of Collaborative Research PhD Studentships awarded in 2008 under the Science and Heritage Programme, UK (downloadable posters covering details of the research undertaken in each project are available at www.heritagescience.ac.uk)**

| **Hosting Institution** | **PhD research project** |
|---|---|
| University of Edinburgh, in partnership with National Museums Scotland | Deterioration and Conservation of Historic Concrete Structures: the National Museum of Flight, Military Airfield at East Fortune |
| University of Edinburgh, in partnership with National Museums Scotland and Glasgow Museums | Historic Dye Analysis: Method Development and New Applications in Cultural Heritage |
| University of Reading, in partnership with English Heritage | In Situ Preservation of Wetland Heritage: Hydrological and Chemical Change in the Burial Environment of the Somerset Levels, UK |
| University of Manchester, in partnership with The British Museum | Interventive Conservation of Black-Dyed Organic Materials: The Problem of Metal-polyphenol Complexes |
| University of Manchester, in partnership with Historic Royal Palaces | Investigation into Structural Analysis and Associated Conservation Support Strategy in the Display of Large Historic Tapestries |
| Centre for Sustainable Heritage, University College London, in partnership with The National Archives | Lifetime of Colour Photographs in Mixed Archival Collections |

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| Nottingham Trent University in partnership with English Heritage | Non-invasive Methods for In Situ Assessing and Monitoring the Vulnerability of Rock Art Monuments |
| University of East Anglia, in partnership with English Heritage | Preparing Historic Collections for Climate Change |
| University of Bradford (Archaeological Sciences), in partnership with National Museums Liverpool | Sustainable Radiography for Cultural Materials in the 21st Century: Optimising Filmless Capture Techniques |
| University of York in partnership with York Minster | Weathering and Decay in Historical Magnesian Limestone: Application of X-Ray Techniques to Inform Cathedral Conservation in the 21st Century |

**Table 3 Examples of the topics of doctoral theses on restoration-conservation subjects completed in the period since 2003**

| **Country** | **Institution** | **PhD research project** |
|---|---|---|
| Denmark | School of Conservation at the Royal Danish Academy of Fine Arts, in cooperation with the International Centre of Indoor Environment and Energy at the Technical University of Denmark | Air quality in museum storage buildings. The effect of ventilation, filtration and passive sorption on indoor air pollution in archives and storage rooms. |
| France | Centre de de Recherche et de Restauration des Musées de France | Elaboration de nouvelles technologies analytiques pour la caractérisation des lipides et des protéines d'origine archéologique |
| | | Propriétés physico-chimiques des poudres de maquillage antique |
| | | Etude de la polychromie des reliefs sur terre crue de la Huaca de La Luna, Truquillo, Pérou |
| | Laboratoire de Recherche des Monuments Historiques | Etude et développement de la Spectroscopie d'Emission Optique sur plasma induit par laser pour la réalisation d'analyses de terrain : application aux objets du patrimoine – *in collaboration with Commissariat à l'Energie Atomique Saclay - Laboratoire de Réactivité des Surfaces et des Interfaces du CEA* |

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|---|---|---|
| | | *Saclay and Laboratoire de Dynamique, Interactions et Reactivité (Université Pierre et Marie Curie (Paris 6) - CNRS (UMR 7075))* |
| | | Karomama, Divine Adoratrice d'Amon : son histoire, sa restauration, l'étude en laboratoire |
| | Centre Interrégional de Conservation et Restauration du Patrimoine | Altérations chromatiques des pigments au plomb dans les oeuvres du Patrimoine: étude expérimentale des altérations observées sur les peintures murales – *in collaboration with Université d'Aix-Marseille III* |
| Germany | Otto-Friedrich-Universität, Bamberg | Metallene Grabplatten aus Franken und Thüringen aus dem 15. bis 18. Jahrhundert (Metal Tomb Slabs from Franconia and Thuringia of the 15th and 18th century) |
| | Technische Universität München | The Decorative Architectural Surfaces of Petra |
| | Hochschule für Bildende Künste Dresden | Fine Art Materials in Vigani´s Cabinet, 1704, of Queens´ College, Cambridge |
| | | Airborne Pollutants in Museum Showcases: Material, Emissions, Influences, Impact on Artworks |
| | Staatliche Akademie der Bildenden Künste Stuttgart | Practical and Theoretical Knowledge in Conservation: Working in Paper and Water |
| | | Zwischen Konservieren, Restaurieren und Konstruieren. Restaurierauffassung zu Beginn des 20. Jahrhunderts im badischen Raum: die Gebrüder Mezger |
| | | Einflussgrößen auf den Farbeindruck von pudernden Malschichten beim Konsolidieren mit Aerosolen |
| | | Plasmareduktion, Möglichkeiten und Grenzen einer neuen Methode bei der Metallkonservierung |
| | Fachhochschule Hildesheim | Baugeschichtliche und denkmalpflegerische Problematik der Umnutzung von Sakralbauten (Problems in the aspect of building history and preservation by conversion of religious buildings) |
| | | Denkmalpflegerische Problematik des Nikolaifriedhofes in Hannover (Problems in the aspect of preservation of the Nikolai cemetery in Hannover) |
| | | "Proviantböden" Wolfenbüttel (1659-1662) – Bestandsaufnahme - Analyse, Nutzungskonzept |

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| | | (“Proviantböden" Wolfenbüttel (1659-1662) - Survey - Analysis - Utilisation concept) |
| | Hanover? | Die giebelständigen „Ackerbürgerhäuser“ der Stadt Bad Münder von 1647 bis ins 19. Jahrhundert, (Ackerbürgerhäuser – houses with gables facing the street - in the town of Bad Münder form 1647 until the 19th century) |
| Italy | University of Padova | Geochemical tracers in copper deposits and ancient artefacts: a database for provenance |
| | | Archaeometrical study of pottery from Tayma (Saudi Arabia) |
| | | Archaeometrical investigations on mortars and paintings at Pompeii and experiments for the determination of the painting technique |
| Latvia | Riga Technical University, Faculty of Architecture and Urban Planning | Architecture of Religious Buildings of Kurzeme and Zemgale |
| | Art Academy of Latvia | Painted Glass in Latvia |
| | University of Latvia, Faculty of History and Philosophy | Protection of Architectural Monuments in Latvia from the 2nd half of the 19th Century till 1940 |
| Poland | Academy of Fine Arts in Krakow, Faculty of Conservation and Restoration of Works of Art | Stamped brocades in the Gothic painting and sculpture from the Malopolska area |
| | | Conservation of large baroque mural paintings |
| | | Scientific and conservation issues of pattern paintings on wood in the wooden churches of the Malopolska area from the turn of the 15th and 16th centuries |
| | Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences | Acoustic emission of wood in historic objects induced by climate fluctuations |
| | | Hydration of natural cements |
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| | Faculty of Chemistry, Jagiellonian University, Laboratory for Research on Durability and Degradation of Paper | Method of accelerated ageing of paper in closed vessels. Volatile degradation products. |
| | | Kinetic of cellulose degradation in the range of increased temperature |
| | | Studies on the degradation mechanism of paper by using vibrational spectroscopy |
| | Faculty of Chemistry, University of Warsaw | Physico-chemical investigations of cellulose degradation processes induced by iron-gall inks in ancient manuscripts |
| | | Application of high-performance separation analytical techniques to the research of binders and dyes in archaeological objects |
| | Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences in Gdańsk | Use of LIF and LIPSD spectroscopic techniques to diagnose laser renovation of historic paper objects |
| | | Laser cleaning of historic paper surfaces |
| | Academy of Fine Art in Warsaw, Faculty of Conservation and Renovation of Works of Art | Japanese techniques of lining. Possibility of their application and modification in the conservation of paintings on silk and silk textiles |
| | | Technique and technology of Apulian and Sicilian sepulchral ceramics from 4th to 2nd centuries BC. Investigations of historic objects from collections of the National Museum in Warsaw |
| | | Computer reconstruction. Introduction of the computer technique to the conservation of works of art on paper |
| | | Strategy of taking conservation decisions in the process of identification and conservation of historical traces of scripture (text) removal in manuscripts (1st -15th centuries) on an example of conservation-restoration of the Rathmann Sakramentary from the 'Hildesheim's Treasures' collection |
| | | Egg tempera as a technique in easel paintings according to old archival sources and artistic output of selected contemporary artists |
| | | Lining silk historic objects on synthetic supports with the use of acrylic glues |

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| | Nicolaus Copernicus University, Faculty of Fine Art | Tibetan books in Polish collections: investigations and conservation problems |
| | | Painting materials and technique in oil paintings by Aleksander Gierymski. |
| | | Selection of resin solvents of optimal properties for strengthening wooden polychrome sculpture |
| | | Technological and conservation problems in paintings by Aleksander Kobzdej |
| | | Oil paintings by Józef Pankiewicz - materials and technique |
| | | Conservation problems of metal Gothic tomb plates |
| | | Properties of 19th and 20th century printed papers deacidified with selected mass methods |
| | | Study on the efficiency of some corrosion inhibitors in the inhibition of archaeological copper, brass and bronze artifacts |
| | | Conservation of contemporary painting with metal elements in the substrate |
| | | Gilded painting frames. Technological and conservation problems |
| | | Conservation problems of historic maps coloured with verdigris |
| | | Leather wall hangings – comparative characteristics of cracking in painting layers and their conservation problems |
| Romania | | Historical evolution of the main icon workshops from Romanian territory – materials and techniques |
| | National Art University of Bucharest | Mural painting in the north of Moldavia – aesthetic modifications and restoration |
| | National Institute of R&D for Optoelectronics | Contributions to the improvement of laser techniques and methodologies used for the treatment of surfaces of scientific artwork objects |

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| Slovenia | | Characterisation and stability of colour layers on art objects |
| | | Method of determining the state of conservation and endangerment of outdoor mural paintings in Slovenia on a selected segment |
| | | Numerical analysis and experimental tests on dynamic behaviour of GFRP pultruded elements for conservation of the architectural and environmental heritage |
| | | Reconstruction interventions in historic urban settlements in Slovenia |
| | | Style and technique of medieval mural paintings in Slovenia |
| Spain | Universidad Complutense de Madrid, Faculty of Geology | Procesos y formas de deteriorotérmico en piedra natural del patrimonio arquitectónico (Types and processes of thermal deterioration in natural stone of built heritage) |

# Appendix 6

## Opportunities for study and research for a doctoral degree other than education programmes leading to a doctoral degree

**Table 1 Opportunities for study and research at a doctoral level – architectural, urban and historic environment conservation**

| Country | Institution | Area of study and research (if provided) |
|---|---|---|
| Latvia | Riga Technical University, Faculty of Architecture and Urban Planning | |
| Poland | Faculty of Architecture, Krakow University of Technology, Institute of Architecture History and Conservation | |
| | Faculty of Architecture, University of Technology in Gliwice | |
| | Faculty of Architecture, Warsaw University of Technology | |
| | Wroclaw University of Technology, Institute of Architecture Conservation and Revalorisation | |
| Slovenia | University of Ljubljana, Biotechnical Faculty, Department of Landscape Architecture | |
| | University of Ljubljana, Faculty of Architecture | |
| | University of Ljubljana, Faculty of Civil Engineering and Geodesy, Chair of Material and Construction Testing | |
| UK | Anglia Ruskin University | conservation of buildings |
| | Aberdeen (Robert Gordon University) – School of Architecture and Built Environment | |
| | Bath University - Department of Architecture & Civil Engineering | conservation of historic buildings |
| | Bournemouth University, School of Conservation Sciences | building conservation |
| | Birmingham University and The Ironbridge Institute | built heritage and conservation, historic environment conservation, heritage management |
| | Bristol University - Centre for the Historic Environment | |
| | University of Dundee - School of Social & Environmental Sciences | European urban conservation and international urban conservation |
| | Edinburgh College of Art - Scottish Centre for Conservation Studies, School of Architecture | |

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|---|---|---|
| | Exeter University - Centre for Ecology and Conservation | |
| | Kingston University - Faculty of Art, Design & Architecture | historic building conservation |
| | Liverpool University - Architecture | |
| | Architectural Association, London | conservation; sustainable environmental design |
| | Oxford Brookes University - School of the Built Environment | historic conservation |
| | Plymouth University | architectural conservation |
| | University of Portsmouth - School of Environmental Design and Management | historic building conservation |
| | Queens University Belfast - Centre for Built Environment | |
| | Robert Gordon University - The Scott Sutherland School of Architecture and Built Environment | |
| | University of Central Lancashire - School of Built and Natural Environment | building heritage & conservation |
| | University of the West of England - Faculty of the Built Environment | |

**Table 2 Opportunities for study and research at a doctoral level, areas other than architectural, urban and historic environment conservation**

| Country | Institution | Area of study and research (if provided) |
|---|---|---|
| Bulgaria | National Academy of Arts, Faculty of Applied Arts, Chair of Restoration | |
| | Kliment Ohridski University of Sofia, Faculty of Chemistry, Inter-university Center of Archaeometry | |
| France | Centre de de Recherche et de Restauration des Musées de France (C2RMF) | |
| | Laboratoire de Recherche des Monuments Historiques (LRMH) | |
| | Centre Interrégional de Conservation et Restauration du Patrimoine (CICRP) | |
| | Université Paris 1 Panthéon – Sorbonne, UFR 03 Histoire de l'art et archéologie | considering development of the doctoral study in conservation-restoration of cultural heritage, preventive conservation |
| | L'Institut National du Patrimoine, Département des Restaurateurs | considering development of the doctoral study |
| Germany | Hochschule für Bildende Künste Dresden (Academy of Fine Arts, Dresden) | |
| | Staatliche Akademie der bildenden Künste Stuttgart (State Academy of Art and Design, Stuttgart) | |
| | Technische Universität, München (Technical University, Munich) | |
| | Otto-Friedrich-Universität, Bamberg (Otto Friedrich University, Bamberg) | cultural heritage |
| | Europa-UniversitätViadrina, Frankfurt an der Oder (European University Viadrina, Frankfurt an der Oder) | |
| | TU Berlin (Technical University, Berlin) | |
| | Technical University Cottbus | World Heritage Studies |
| | Fachhochschule (FH) Köln, FH Erfurt, HTW Berlin, FH Potsdam, FH Hildesheim in cooperation with a university | |
| Greece | National Technical University of Athens | |
| | National Technical University of Athens | |
| | Aristotle University of Thessaloniki | |
| | University of the Aegean | |
| | University of Ioannina | |
| Latvia | Art Academy of Latvia | |

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|---|---|---|
| | University of Latvia, Faculty of History and Philosophy | |
| | Institute of Latvian History at the University of Latvia | |
| Poland | Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences in Gdańsk | |
| | Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences in Krakow | |
| | Faculty of Chemistry, Jagiellonian University, Laboratory for Research on Durability and Degradation of Paper | |
| | Faculty of Chemistry, University of Wrocław | |
| | Faculty of Chemistry, University of Warsaw | |
| | Faculty of Fine Arts, Nicolaus Copernicus University in Torun | |
| | Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University in Torun | |
| | Academy of Fine Art in Warsaw, Faculty of Conservation and Restoration of Works of Art | |
| | Academy of Fine Arts in Krakow, Faculty of Conservation and Restoration of Works of Art | Remark: two years ago the Faculty opened a specific doctoral programme (see Box 4). Before it was possible to undertake individual study for a PhD at the Faculty. |
| Slovenia | University of Ljubljana, Academy of Fine Arts and Design, Department of Restoration | |
| | University of Ljubljana, Faculty of Chemistry and Chemical Technology, Chair of Analytical Chemistry | |
| | University of Ljubljana, Faculty of Arts, Department of Archaeology, Department of Ethnology and Cultural Anthropology, Department of History of Art | |
| Spain | Universidad Politécnica de Valencia | programme in conservation |
| | Universidad Complutense de Madrid | programme in conservation |
| UK | University of Bangor | Heritage |
| | Bradford University - Bradford Conservation and Radiographic Services | |
| | Buckingham Chilterns University | furniture conservation and restoration |
| | Camberwell College of Art | Conservation |
| | Cambridge University, Hamilton Kerr Institute | Conservation |
| | Cardiff University, Department of Archaeology and Conservation | Conservation |
| | Durham University | Conservation |

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|---|---|---|
| | Edinburgh University - Centre for Materials Science and Engineering | |
| | Exeter University - Centre for Ecology and Conservation | |
| | Leicester University - School of Archaeology and Ancient History | |
| | Lincoln University – School of Natural & Applied Sciences | heritage science |
| | City and Guilds of London Art School | conservation |
| | Courtauld Institute of Art | conservation and technology research |
| | London Metropolitan University | conservation and restoration |
| | Royal College of Arts/Victoria & Albert Museum | conservation |
| | University College London, Centre for Sustainable Heritage, Institute of Archaeology | |
| | University of the Arts, Camberwell College of Arts | conservation |
| | University of Manchester - School of Materials | |
| | University of Newcastle, International Centre for Cultural and Heritage Studies | |
| | Northumbria University | conservation |
| | University of Reading - School of Human and Environmental Science | |
| | University of East Anglia - The School of Environmental Sciences | |
| | West Dean College, University of Sussex | conservation studies |
| | York University - Centre for Conservation Studies and Centre for Heritage Policy | |

# Appendix 7

## List of doctoral training grants (studentships) available in the general framework of funding research

1. Bulgaria

PhD students receive tax-free grants for a three-year doctorial training which amounts to two-minimal wages for Bulgaria.

2. France

*Grants of the Ministry of Higher Education and Research (MESR)*

- State-funded doctoral grants (http://edges.sup.adc.education.fr/presentation.html)

Doctoral grants provided by MESR are the main financial support provided nationally for PhD-level research projects. This funding process enables French universities and other higher education institutions to offer new recruitment opportunities to the best postgraduate students, holding a Master degree. Each individual funding support relies on a three-year grant associated with a contract within a French higher education institution and/or a Doctoral School.

- CIFRE grants (Conventions industrielles de formation par la recherché - industrial contracts for research education)

CIFRE grants support enterprises established on the French law which employs a PhD student in the framework of a research collaboration with a public laboratory during three years. The grants are fully funded by MESR and are implemented by l'Association Nationale de la Recherché et de la Technologie – ANRT (National Association for Research and Technology/ http://www.anrt.asso.fr).

*Grants of the Ministry of Culture and Communication*

In 2010, grants for about 200 PhD students working in the field of architecture will be made available.

*Grants of the research organisations*

The research organisations such as (Centre National de la Recherche Scientifique - CNRS, Commissariat à l'Energie Atomique - CEA, funding agencies such as L'Agence Nationale de la Recherche – ANR or L'Agence de l'Environnement et de la Maîtrise de l'Energie -ADEM) have the possibility to allocate three-year grants to PhD students.

For example of CNRS see http://www.sg.cnrs.fr/drh/emploi-nonperm/formation.htm

*Other sources of funding*

They comprise the Ministry of Foreign and European Affairs, grants from foundations and private enterprises

3. Germany

Several agencies and foundations support PhD projects:

- Deutsche Forschungsgemeinschaft, DFG (German Research Foundation)
- Deutsche Bundesstiftung Umwelt, DBU (German Federal Foundation Environment)
- Stiftungen der politischen Parteien (Adenauer Stiftung etc.) (all foundations of political parties)
- Studienstiftung des deutschen Volkes (German National Academic Foundation)
- Gerda-Henkel Stiftung (Foundation Gerda-Henkel)

4. Poland

*Ministry of Science and Higher Education* offers, within its general funding scheme, research grants for young scientists to accomplish their doctoral projects; at the end each grant recipient should demonstrate a finished

doctoral dissertation submitted to a formal review procedure. Duration of the projects is up to 30 months during which the Ministry provides a studentship to a young researcher and contributes to the research costs planned for in the application..

*Foundation for Polish Science*, which is an independent and non-profit organisation, makes available research grants and scholarships (750 Euro/month) within its programme VENTURE addressed to young scientists having research positions as well as to doctoral students. The programme focuses on the research leading to results important for the national economy, especially involving collaboration between the research sector and enterprises. Duration of the projects is between one and three years. So far, no project has been funded in the conservation-restoration or conservation science fields.

Doctoral studentships offered by higher education and research institutions within their doctoral courses are by far the most frequent and popular way to support doctoral students. However, it is under a condition that the recipients are engaged in research important for their hosting institutions. The studentships are usually awarded for three years but can be extended to four years.

5. Slovenia

*Ministry of Higher Education, Science and Technology* makes available general, post-graduate funding in the form of co-financing of tuition fees for the post-graduate students.

*Early Stage Researchers programme of the Slovenian Research Agency (ARRS)* funds the early-stage researchers' training in research organisations. The early stage researchers participate in the fundamental or applied research while being employed for a definite period of time which may not last longer than four years and six months for the PhD studies. ARRS provides the funds for their salaries, social contributions, material and non-material costs of the research work and post-graduate studies. The funds for the early stage researchers' training are awarded for a definite period of time,

*Ad futura programmes* are intended for education and scientific cooperation of Slovenian citizens abroad. Through calls for applications, they support financially the international mobility of researchers, including foreign researchers coming to Slovenia, Slovenian researchers going abroad and returning to Slovenia as well as the cooperation of Slovenian post-graduate and senior researchers in Slovenia.

6. Spain

Spain has several national and regional funding programmes for doctoral training, consisting in a four-year grant or research contract, and are open for applications in any area of research.

*The Ministry of Science and Innovation (MICINN)* offers two main programmes, the FPI and the FPU programmes, which consist of two years of scholarship + two years of contract. The FPI grants are associated to the research projects funded by the Ministry within the R&D National Plan while the FPU programme is directed to individual candidates within a research group.

*The Spanish National Research Council (CSIC)* has its own programme for doctoral training (JAE Programme).

Also Autonomous Regions and some Universities offer equivalent grant programmes.

7. UK

*Programmes of the Arts and Humanities Research Council*

- Block Grant Partnerships (BGPs)

Funding awards are made to Research Organisations (ROs) for an allocation of five years worth of postgraduate studentships in specific subject areas and schemes which include the conservation-restoration and science for conservation areas. The competition runs every fourth year of the five-year cycle.

The studentship places are advertised by the RO on an annual basis (these may vary from year to year depending on their allocation). The organisation will shortlist candidates based on open competition and shortlisted students will be nominated to the AHRC and must meet their eligibility criteria. AHRC plays no part in the assessment and selection of students.

- Open Studentship competition

The Studentship competition provides postgraduate students studying at Research Organisations (ROs) in the UK with the opportunity to submit an individual proposal for a studentship in one of the studentship schemes at an organisation that does not hold a BGP and will operate in a similar way to the current open competition. Allowing this extra funding recognises that ROs with a historically smaller award profile with the AHRC (ie those unable to secure BGP funding) are still able to offer excellent postgraduate provision.

Awards within the both above schemes are available for arts and humanities students to undertake Master's-level study or doctoral study at a Research Organisation in the United Kingdom. The Studentship Doctoral scheme under this competition provides studentships to enable students to undertake and complete a doctoral degree in any area of the AHRC's subject domain, including conservation-restoration and science for conservation. Studentships will normally be for up to three years for full-time study, or up to five years for part-time study. Distance learning study is not supported in the doctoral scheme.

- Collaborative Doctoral Studentships

These awards (also known as CASE awards) are intended to encourage and develop collaboration and partnerships between Higher Education Institution (HEI) departments and non-academic organisations and businesses. These awards provide opportunities for doctoral students to gain first hand experience of work outside an academic environment. The support provided by both an academic and non-academic supervisor enhances the employment-related skills and training a research student gains during the course of their award.

The scheme is run on an annual basis. Within the 2009 round, there were 8 funded awards broadly based within the conservation-restoration and science for conservation sector from 2009. For further information see:

http://www.ahrc.ac.uk/FundingOpportunities/Pages/CollaborativeDoctoralAwards.aspx

In all cases, funding goes directly to the Research Organisation and is distributed to the student within the organisation. EU students are eligible for a 'fees only' award but may also be able to claim for additional support towards the costs of fieldwork or study visits. For doctoral students, an annual contribution will be made to organisations to enable provision of generic skills training.

- Funding through the Large Research Grants scheme.

Funding for doctoral students is also available through the Council's scheme of research grants, where funding is provided to support large-scale collaborative research projects. Academic members of staff applying for such grants may include in their costing support for up to two doctoral students whose work will be closely related to the research project.

Applications for funding can be submitted at any time (open deadline scheme) and assessment takes approximately 30 weeks. A full time studentship award attached to a Research Grant lasts for a period of three years. A part-time studentship award lasts for a maximum of five years and comprises the payment of fees and maintenance on a pro rata basis of up to 60% of the appropriate amount. The dates of any studentship attached to an AHRC funded Research Grant project must fall within the period of the Research Grant award.

For further information see:

http://www.ahrc.ac.uk/FundingOpportunities/Pages/RG-StandardRoute.aspx

*Programme of the Economic and Social Research Council (ESRC)*

ESRC funds research and training in social and economic issues. Although students within the conservation-restoration and science for conservation sector may apply, numbers tend to be low due to the subject area covered by the Council. The studentships include:

- The Proposal (Open) Competition

The Competition is held annually by the ESRC. The open competition allows research organisations (ROs) to put forward the equivalent of one candidate for each recognised outlet (school or department) they host. Students and supervisors are required to submit a completed application via their University's central registry. Duration of funding: three-year award for PhD study.

- Nomination (Quota) Awards

these are studentships that have already been allocated directly to a department/school and require filling. Students interested in applying should speak directly to the department where they wish to study who are then able to nominate the student to ESRC for funding. Students may only apply for either the Proposal (Open) competition or the Nomination (Quota) award, but not for both.

- CASE Studentships

They are intended to encourage and develop collaboration and partnerships between Higher Education Institution (HEI) departments and non-academic organisations and businesses. The scheme is run on an annual basis and awards are made directly to university departments who will advertise for and nominate students to take up the awards to carry out the projects. Example of a 2008 CASE studentship Dr Paul Richard Courtney: University of Gloucestershire and The National Trust - 'Investigating the economic impacts of the restoration and adaptive re-use of historic buildings'

The ESRC provides studentships for the support of full-time or part-time postgraduate courses, with students able to apply for a 1+3 (masters linked into a PhD) or a +3 (PhD studies only). Through these studentships, the ESRC aims to respond to the needs of the academic community, government, business and industry and to contribute to high quality research through the development of professional social scientists trained in state-of-the-art social science methodologies and methods. ESRC studentships can cover tuition fees, maintenance allowance and other expenses, depending on the student's situation, circumstances and type of award. Duration of funding varies: up to three years full time, and five years part-time

*Programme of the Engineering and Physical Sciences Research Council (EPSRC)*

EPSRC is the main UK government agency for funding research and training in engineering and the physical sciences, investing more than £800 million a year in a broad range of subjects – from mathematics to materials science, and from information technology to structural engineering. Although students within the conservation-restoration and science for conservation sector may apply, numbers tend to be low due to the subject area covered by the Council.

EPSRC fund PhDs and Masters at universities via training grants that go direct to ROs. Students are required to contact the RO if they are interested in receiving funding.

PhD funding is available through the following funding patterns:

- Centres for Doctoral Training- Students at EPSRC-funded centres carry out a PhD-level research project together with taught coursework in a supportive and exciting environment.
- Doctoral Training Accounts - a four-year doctoral training grant offered each year to universities.
- Collaborative Training Accounts (CTAs) provide support for a variety of schemes that link postgraduate research and training activities with the workplace. Awards generally last four years, and provide flexible funding for training activities in partnership with private and public sector organisations.

*Programme of the Natural Environment Research Council (NERC)*

NERC funds world-class science in universities and research centres that increases knowledge and understanding of the natural world and environmental sciences. NERC provides funding for research in the area of Science-based Archaeology (SBA).

The following doctoral funding is available:

- Research Studentships

They enable doctoral students to receive training in research methods and to undertake a programme of research in a specific scientific area under the guidance of one or more named supervisor. They are usually allocated to NERC research centres and Higher Education Institutes per year based on the performance of the departments over the previous years. A list of the institutions with studentships to award in the coming year is posted on the NERC website and students are required to contact the department or research centre where they wish to study. Funding duration: for a period of three and a half years

- CASE awards

Co-operative Awards in Science & Engineering, or CASE studentships encourage research students to gain additional experience outside academia. CASE awards involve the joint supervision of the student by a member of staff of an academic institution and a scientist from industry, business, commerce or a public sector research institute.

- Research Grants

The grants may also include funding for a project student. The student's research project will be closely associated with the work carried out in the grant, but in all other respects the department must make the same level of provision for training and supervision that would be expected for any other research student.

*Other available funding including private and charity based:*

- Queen Elizabeth Scholarship Trust

This Trust offers scholarships to fund further study, training and practical experience for craftsmen and women (including conservators) who want to improve their craft and trade skills. Further information can be found at the Trust's website

- The National Association of Decorative & Fine Arts Societies (NADFAS)

It is an arts-based charity who supports students to study at selected partner institutions or ROs. The charity works closely with the institutions who then decide on the most appropriate recipients. Students apply for funding through the specialist institution.

Most *UK higher education institutions* operate their own scholarship and award schemes, these will vary between institutions. Some will offer full-fee studentships plus a maintenance grant. Often scholarship schemes are set up to commemorate the contributions of a past student or from money made available by a benefactor. They aim to attract high-quality students to undertake research at their organisation.

Other ROs provide smaller bursaries to alleviate financial hardship and some offer prizes, which can range from £20 up to £3,000. These are usually awarded for excellence in teaching or research, or for an essay or project.

Sometimes companies sponsor postgraduate students through an institution. Such opportunities are often advertised in the press but they may also be run on an ongoing basis with a particular institution.

# Appendix 8

Long courses

**Table1 Long courses in the conservation restoration – general**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| Germany | Staatliche Akademie der Bildenden Künste, Stuttgart - State Academy of Art and Design | Conservation of New Media and Digital Information | The course is application-oriented, it gives an overall and holistic introduction into the field of media conservation and facilitates networking and exchange between science and practice. Tuition fee 3000Euro/year. Around 10-15 participants. | 2 years |
| Italy | Università degli Studi di Bologna<br>Università degli Studi di Firenze<br>Università degli Studi di Genova<br>Università degli Studi di Macerata<br>Università degli Studi di Milano<br>Università Cattolica del Sacro Cuore<br>Università degli Studi di Napoli Federico II<br>Università degli Studi Suor Orsola Benincasa (NA)<br>Università degli Studi di Parma<br>Università degli Studi di Pisa<br>Università degli Studi di Roma 'Sapienza'<br>Università degli Studi di Siena<br>Università degli Studi della Tuscia | Specialization schools in Historical-Artistic Heritage | The courses are mainly addressed to art historians with focus on developing skills:<br>- in protection and promotion of cultural heritage<br>- in conservation of historical-artistic heritage through modern methods of museum and management of cultural events<br>- in legal, administrative, economical aspects of managing and conserving historical-artistic heritage | 2 years |

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| | Università degli Studi di Cassino<br>Università degli Studi di Roma Sapienza | Specialization School in Archive and Library Heritage | The courses deal with all important aspects of the field: methodological and practical topics of archives and libraries, safeguard of the historical heritage, management of modern media collections. | 2 years |
| Romania | National Art University in Bucharest<br>Art and Design University in Cluj-Napoca<br>Art University in Iasi<br>Restoration Department, Faculty of Theology in Bucharest | | All four institutions organize annual regular courses. The core course taught concerns mural painting restoration. Stone, paper, and wood restoration-conservation fields are being developed within the courses. | 1 year |
| Spain | Universidad de Barcelona | Master in Conservation and Restoration Project Management: Collections and Heritage Ensembles | Number of places available - 30<br>The core courses taught are: comprehensive study applied to medieval collections, comprehensive study applied to modern art collections, 20th century architecture, Barcelona: sculpture and public space, 20$^{th}$ century sculpture, sculpture groups and public space, iconology, research in conservation and restoration | 3 semesters |
| | Facultad de Bellas Artes, Universidad de Granada | Master in Conservation and Restoration of Painting | The course covers the following areas: easel painting conservation and restoration, introduction to iconography, artist´s materials analysis, authentication analysis, legal protection of cultural heritage, computer science applied to painting conservation, safety and health at work in easel painting conservation, the altarpiece and its conservation | |
| Slovenia | The Academy of Fine Arts and Design of the University of Ljubljana | The post-graduate (‘old’) master's course entitled Restoration | The total duration of the course comprises 450 hours and deals with the problems and methods of conservation and presentation of objects and monuments of cultural heritage. Special attention is focused on the correct diagnosis of their degradation and the procedures necessary to avoid it as well as on preventive actions, examination of new materials and | 2 years |

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| | | | technological innovation in the conservation-restoration. | |
| | Famul Stuart School of Applied Arts Ljubljana | | The course focuses on learning various techniques and practical skills which restorers use in their work. During the first two years of the course, the students gain artistic, technical and craft skills and practical experiences using a wide range of approaches. In the third year of the course, the students specialize in a certain field of restoration. | 3 years |
| UK | City & Guilds of London Art School | Post Graduate Diploma in Conservation | The core courses taught are: stone and wood conservation (including frame conservation), materials science, theory of colour and polychromy, microscopy, introduction to modern analytical techniques and laser cleaning technique.<br>Tuition fees: full time - £6,750 for Home/EU Students and £8,500 for Overseas Students; part Time - £10,000 for Home/EU students and £13,000 for Overseas students | 1 year |

**Table 2 Long courses in conservation science**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| Italy | Science Faculty, University of Bologna | 1st Level Master Course in Advanced Diagnostics for Cultural Heritage | The course is addressed to an interdisciplinary audience with the participants of both humanistic and scientific backgrounds. It focuses on problem-solving capacity of individual diagnostic techniques. The core courses are: minero-petrographic characterization of cultural heritage materials, microchemistry and microscopy of cultural heritage materials, biodeterioration and degradation of bio-archaeological materials, environmental physics and cultural heritage, ultrasounds and magnetic resonance diagnosis, metallurgy and surface processes, analysis of organic materials, information communication technology applied to cultural heritage. 750 hours laboratory work and 500 hours lectures. Laboratory visits - for example in the Louvre Museum - are an important part of the programme. Tuition fee: 2000 Euro. Number of participants 10-25. | 1 year |

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| | Science Faculty, University of Pisa | 1st Level Master Course in Materials and Diagnostic Techniques for Cultural Heritage | The course focuses on the materials and diagnostic techniques applied to solving problems in conservation of cultural heritage The core courses are: archaeology, legislation for cultural heritage, science and technologies for inorganic materials, science and technologies for organic materials, materials and methods for restoration, spectroscopic techniques applied to cultural heritage, history and analysis of textile, physical methods for diagnostics, pigment history and analysis, biology for cultural heritage, chemometrics. 750 hours laboratory work and 272 hours lectures. Internships in research organizations and companies are an important part of the programme. Tuition fee: 3500 Euro. Number of participants 10-30. | 1 year |
| Poland | Faculty of Chemistry of the Jagiellonian University | Modern Analytical Techniques in Conservation of Historic Objects | The course contains three subject areas: 1) basics of chemistry - 30 hours of lectures and 10 hours of practice 2) science in conservation - 45 hours of lectures, 3) modern analytical techniques in investigations of historic objects - 25 hours of lectures and 55 hours of laboratory. Tuition fee is 3500 PLN (875 Euro). Number of participants: 24. Teaching staff consists of academic lecturers from Jagiellonian University, Academy of Fine Arts, University of Technology in Łódź, Polish Academy of Sciences, National Museum in Krakow, Institute of Forensic Research, The Krakow University of Economics, AGH-University of Science and Technology. Teaching language is Polish. | 1 year |

**Table 3 Long courses in archaeological conservation**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| Italy | Università degli Studi della Basilicata<br>Università degli Studi di Bologna<br>Università degli Studi di Firenze<br>Università degli Studi di Genova<br>Università degli Studi di Milano<br>Università Cattolica del Sacro Cuore<br>Università degli Studi di Napoli Federico II<br>Università degli Studi Suor Orsola Benincasa (NA)<br>Università degli Studi di Pisa<br>Università di Roma Sapienza<br>Università del Salento (LE)<br>Università degli Studi di Salerno<br>Università degli Studi di Udine | Specialization Schools in Archaeological Heritage | Listed institutions organize rather classical specialization courses in archaeology to some extent related to conservation of archaeological heritage (10/120ECTS) through knowledge and innovative technological methodologies necessary in a proper restoration of cultural heritage. | 2 years |
| | Science Faculty, University of Bologna | Ist Level Master Course in Bioarchaeology, Paleopathology and Forensic Anthropology | The course focuses on the analysis and investigations of archaeological human skeletal remains. The core courses are: biology and anatomy, anthropology and bioarchaeology, forensic pathology, paleopathology and study of mummies, taphonomy and techniques for the recovery of skeletal remains, dental anthropology. Site visits and case studies are important part of the programme. Tuition fee: 5500 Euro. Number of participants 12-15. | 1 year |
| | Department of Evolutionary Biology 'Leo Pardi', Science Faculty, University of Florence | 1st Level Master Course in Biological Anthropology of the Mediterranean Region | The course focuses on recovery, characterization and analysis of human fossils in archaeological and paleontological contexts, study of the structure and evolution of human population, biogeography and archaeozoogeography. The core courses are: ethnology, molecular anthropology, genetics of humane primate or not-human primate, skeletal anthropology, archaeo-anthropological excavation. 408 hours lectures and 225 | 1 year |

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| | | | hours of site visits. Tuition fee: 1500 Euro. Number of participants 10-40. | |
| | Letters and Philosophy Faculty, University of Siena. | 2nd Level Master Course in Conservation and Management of Archaeological and Historical-Artistic Heritage | The course focuses on the heritage science and the application of new technologies for conservation of cultural heritage. The lectures (240 hours) are organized in 6 teaching streams: archaeology, historical and artistic heritage, legislation on cultural goods in the countries of the European Union, methodology of the communication and exploitation of cultural assets, management of cultural assets, experiences on the field of management and exploitation of cultural assets. Tuition fee: 3500 Euro. Number of participants 10-25. | 1 year |
| | Arts and Philosophy Faculty, University of Siena.<br>in collaboration with the Municipality of the City of Chiusi. | 2nd Level Master Course in Archaeology and Landscape: systems of exploitation of parks and archaeological sites in the contexts of the ancient world | The course focuses on the analysis of the heritage sites in their territorial context as well as the restoration and management of archaeological heritage inside museums The core courses are: instrumental survey, operational routes and data processing, diagnostics and design of restoration, management and enhancement of archaeological planning: cartography and analysis of the archaeological components of territory, museology and museography, experimental archaeology, landscape, environmental design and botany, Italian and EU legislation, economy of cultural heritage, management, development and sustainable tourism. 100 hours laboratory work and 198 hours lectures. Site visits are an important part of the programme. Tuition fee: 3500 Euro. Number of participants 10-25. | 1 year |
| Slovenia | The Faculty of Humanities of the University of Primorska | Archaeological heritage of the Mediterranean | The compulsory subjects in the first year are historical development of archaeology and archaeological analyses of cultural material, as they provide the introduction into the field of study. The compulsory subject in the second year is concepts of management and presentation of heritage. | 2 years |

**Table 4 Long courses in architectural conservation**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| France | School of Chaillot, Department of the City of Architecture and National Heritage (Cité de l'Architecture et du Patrimoine, http://www.citechaillot.fr/formation.php) | Architecture and Heritage | The course leads to a specialization degree (DSA, Diplômes de spécialisation et d'approfondissement) with a focus on architecture and cultural heritage. There are usually 70 participants. Tuition fee 600 Euro/year. Generally, lectures are in French | 2 years |
| | The School of Architecture of Paris-Belleville (http://www.paris-belleville.archi.fr/page.php?d=ens&p=speciale&sp=dsa_patrimoine_XX) | Architecture and Archaeological Heritage | The course leads to a specialization degree (DSA, Diplômes de spécialisation et d'approfondissement) with a focus on architecture and cultural heritage. There are usually 20 participants. Tuition fee 1000 Euro/year. Generally, lectures are in French | 2 years |
| | The School of Architecture of Grenoble (http://terre.grenoble.archi.fr/documentation/dsapres.php). | Architecture and Heritage, earth architecture | The course leads to a specialisation degree (DSA, Diplômes de spécialisation et d'approfondissement) with a focus on architecture and cultural heritage. There are usually 22 participants. Tuition fee 1000 Euro/year. Generally, lectures are in French | 2 years |
| Germany | FH Potsdam - University of Applied Science | Preservation of buildings and structural alteration works | The course focuses on technical aspects of the preservation of buildings and structural alteration works, especially on structures built after 1800. Tuition fee 240 Euro/year + 500 Euro refunding for the faculty.. | 1,5 year |
| | Technical University Cottbus | Building and Conservation | The course focuses on art history, building history, town history, preservation of ancient monuments, methodic basics, CAD, GIS, building law, building materials, building revitalization and renovation. Tuition fee 580 Euro/year. The participants are encouraged to tailor their studies to their individual needs and interests. | 2 years |
| Italy | Università degli Studi di Foggia, Università degli Studi di Genova Politecnico di Milano | Specialization School in Architecture and Landscape Heritage | Courses repeatedly organised with focus on conservation of architectural heritage addressed mainly to architects and archaeologists. | 2 years |

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| | Università degli Studi di Napoli Federico II<br>Università di Roma Sapienza<br>Politecnico di Torino, public university | | | |
| | Interfaculty of Architecture and Engineering, University of Florence | 2nd Level Master Course in Restoration, Service and Safety for Historic Buildings and Monuments | The course focuses on the construction techniques and the analysis of degradation and damage of structural systems. The core courses are: materials and structures, principles of the structure mechanics, seismic vulnerability of building structures, architectural restoration, restoration interventions' planning criteria, security planning. 360 hours lectures and 500 hours practical on site work. Tuition fee: 4000 Euro. Number of participants 8-30. | 1 year |
| Poland | Faculty of Architecture, Silesian University of Technology in Gliwice | Postgraduate Studies of Monument Conservation in Architecture and Urban Planning | The course includes 170 hours of lectures, 14 hours of case study classes with the objective to develop conservation guidelines and urban designs for historic cities; 38 hours of practical activities; 18 hours of field studies. The tuition fee of 3.500 PLN (875 Euro) is paid in two instalments. Number of participants - year 2005/6 - 24; year 2007/8 – 21. The course is available only in Polish. | 1 year |
| | Faculty of Architecture of the Krakow University of Technology | Postgraduate Diploma in Conservation Architectural and Urban Monuments | The course consists mainly of lectures and site visits. The topics of the lectures are: history and theory of historic objects conservation, preservation of historic landscape, specific conservation methods of wood, stone, brick, metal, construction problems, technologies and materials in conservation, history of architecture, urban history, market value of historic objects. Tuition fee is 3.800 PLN (950 Euro). Number of participants is about 20-30. The course is available in Polish. | 1 year |
| | Faculty of Architecture of the Krakow University of Technology in cooperation with the Faculty of History | Post-Master's Studies in Conservation, Shaping of Architecture and Arrangement of Religious Interiors | The course consists of 320 hours of lectures, site visits, laboratories, studies in historical objects. The main areas of training are: theory of preservation of cultural | 1 year |

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| | and Cultural Heritage of the Pontifical Academy of Theology in Krakow | | heritage, principles of restoration and modernisation of historic buildings, restoration and conservation of paintings, sculpture, brick, wooden elements in historic objects, construction and building issues, structural conservation of historic objects, heating systems, protection systems, monitoring, illumination, design of church interiors, requirements of post-Vatican II liturgy and arrangement of the presbytery, church in urban areas, architecture and equipment of a modern church, easel and monumental painting and sculptures in a modern church interior, liturgical vessels - historic and modern -conservation methods, museology - methods of storage and exhibition of historic and modern religious objects, conservation of textiles and books. Number of participants is 20 - 30. Tuition fee – 2.900 PLN (725 Euro). | |
| | The Nicolaus Copernicus University in Toruń | Postgraduate studies of Art Connoisseurship and Preservation of Architectural Heritage | The courses programme contains: historical and conservation problems of architectural heritage, organisation and legal aspects of heritage preservation, conservation problems with old building techniques, conservation and restoration of architectural heritage, installations and security in heritage buildings. Number of participants: max 70. Tuition fee: 5,700 PLN (1,425 Euro) | 3 semesters |
| Slovenia | Graduate School of the University of Nova Gorica.<br>The post-graduate course is carried out in Venice in co-operation with the IUAV University of Venice | Economics and Techniques for the Conservation of the Architectural and Environmental Heritage | The course has been organized for each academic year since 2005.<br>The course subjects are the same as for the doctoral study programme of Economics and Techniques for the Conservation of the Architectural and Environmental Heritage. | 2 years |
| Spain | University of Valladolid | Master in Architectonic Restoration | The course covers: theory and history of architectonic restoration, protection and intervention in the historic city, analysis and assessment of the heritage, historical landscapes and cultural territory, history of the | 9 months |

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| | | | constructive processes, legal procedures for heritage conservation, design and execution of restoration works, techniques for graphic analysis of heritage, techniques for materials analysis and diagnosis, technical procedures for restoration. Tuition fee: 4035 Euro, number of participants: 15-40 participants | |
| UK | Architectural Association, School of Architecture | Part time Graduate Diploma in Building Conservation | Programme over two years is divided into six units. Topics studied include:<br>First Unit: introduction to conservation philosophy, conservation legislation, the church [and cathedrals] in the medieval context,<br>building materials: stone and lime, research and recording techniques.<br>Second Unit: medieval domestic buildings,<br>timber-framed structures, structural problems, materials: brick, cob, flint, timber<br>Third Unit: architectural history of the early Renaissance in Britain, decorative finishes and wall paintings, stained glass and metalwork,<br>roofing materials, medieval sculpture, bells and bell-hanging<br>Fourth Unit: architectural history, country houses, historic services and contemporary services in historic buildings<br>Fifth Unit: the Industrial Revolution<br>Sixth Unit: twentieth-century architecture, repair of buildings after violent damage, new design in historic contexts, conservation controversies<br>The course is organised on a regular basis | 2 years |

# Appendix 9

## Short courses

**Table1 Short courses in the conservation restoration - general**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| France | Institut National du Patrimoine - INP (National Institute for Cultural Heritage) | Adult continuous education for professionals | Training courses, round-tables and seminars for professionally active restorers of various specialities enabling them to discover new working methods and to exploit research results. Formation of a network of exchanges and reflection upon the profession is encouraged. | 2 days |
| | | Specific courses at the request of public and private heritage institutions | | |
| | | Courses related to the accreditation of restorers | At the request of the Department of the French Museums - DMF (Direction des Musées de France / DMF), the INP has, since January 2004, ensured complementary training courses relative to the accreditation procedures for restorers who are to work on the artworks for the museums of France (law n° 2002-5 of January 5th 2002). The modules involve ethics, the restoration report, materials (mineral and organic chemistry), physics of construction material, processes of material deterioration and modification. | |
| Germany | HfBK Dresden – Hochschule für Bildende Künste | Techniques for the application of organic solvents in the restoration | Short advanced course, offered on a non-regular bases, advertised by the Verband der Restauratoren - VdR (Association of Restorers), attendance fee 250 Euro | 2 days |
| Spain | Fundación Santa María de Albarracín and Instituto de Patrimonio Cultural de España (Spanish Cultural Heritage Institute) | Programme on conservation of movable heritage. | It is a permanent programme of short courses on movable heritage conservation. These courses are directed to promote the specialisation in different areas of conservation for conservation professionals, including | 3 weeks |

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| | | | practice. The areas covered by the programme are metals, paintings, books and paper, textile and preventive conservation. The participants (around 10) are professionals, graduates in conservation or fine arts. The language of the course is Spanish. | |
| UK | West Dean College (part of the University of Sussex) | Professional Conservators in Practice, course in Conservation Methodology | The College regularly offers short courses, but they vary throughout the year. This course explores how a conservation profession has developed during the last century and examines how 'western' conservation values are deployed in the management of global cultural heritage. The course will examine contentious concepts such as 'irreversibility', 'minimal intervention', value judgements and how conservators impact on the decision-making process. The course fee is: £345 (non-residential fee) | 4 days |

**Table 2 Short courses in conservation science**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| France | Synchrotron SOLEIL which is principally operated by the Centre National de la Recherche Scientifique – CNRS (National Centre of Research) and Commissariat à l'Energie Atomique – CEA (Atomic Energy Commission) | New lights on ancient materials | A European school organised by France twice 14-18 December 2004 and 12-17 March 2007 | 5 days |
| | | Analysis in Art with RaDiation (AARD) | A German-French summer school organised 3 -11 September 2007 | 9 days |
| | | Nano-Photonic in Nature and in Art | A German-French summer school organised 7 -14 September 2009 | 8 days |
| | | Training on X – Ray Diffraction | A national summer school, September 2005 | |
| | | Chemistry of cultural heritage material | A national summer school, 3-8 June 2007 | 6 days |
| | Centre National de la Recherche Scientifique – CNRS, Conservatoire des ocres et pigments appliqués – OKRA, Institut des NanoSciences de Paris, – INSP, Centre de Recherche et de | Colour of materials | A spring school organised regularly since 2000 reviewing the knowledge on applied fields linked to the colour of materials with an interdisciplinary approach.<br>Attendance fee in 2008: from 1196 € for SME to 575 € | 5 days |

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| | Restauration des Musées de France - C2RMF | | for teaching and free professions, a special rate for public servants, number of participants: 80/90 | |
| Germany | Fachhochschule Potsdam - University of Applied Science, Conservation Science Faculty and Central Institute of Advanced Training | Practice oriented salt analysis | Permanent course on the development of salt damage, existing methods to assess salt contamination and methods for the salt removal | 2 days |
| | Goering Institute | Determination of types of woods | Permanent course on the determination of types of woods by microscopy. Preparation of wood samples and micro-anatomical characteristics of hard- and softwoods, organised 4 times per year, attendance fee 250 € number of participants: min 6 | |
| | HfBK Dresden – Hochschule für Bildende Künste | Instrumental analysis of art technology, conservation and restoration.<br>Part 1. Analysis of pigments and building material with X-ray diffraction (XRD), infrared spectroscopy (FT-IR) and scanning and electron microscopy<br>Part 2. Analysis of binder with infrared spectroscopy (FT-IR) and gas chromatography- mass spectrometry (GC-MS) | Short advanced courses, offered on a non-regular bases, advertised by the Verband der Restauratoren -VdR (Association of Restorers), attendance fee 260 € | 2 days |
| | | Introduction to the digital infrared reflectography | As above, attendance fee 250 € | 3 days |
| | | Basic principles of digital data collection. Creation of mapping and analysis with ARcGiS 9.2 | As above, attendance fee 200 € | |
| Slovenia | The Restoration Centre of the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS) | Workshop on Micro-Raman Spectroscopy – October 2008<br>Short Course and Workshop: Raman Spectroscopy in Mineralogy – February | The events were organised as a part of a regular educational programme of the Restoration centre of ZVKDS. Lectures were free of charge and the participation fee for experimental work with the micro- | 2 days |

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| | | 2009 | Raman spectrometer amounted to EUR 50. The official language of the event was English. | |
| Spain | Instituto Andaluz del Patrimonio Histórico (Andalusian Historical Heritage Institute) | Research on cave painting: alteration processes<br>Ceramics in architecture: alteration and treatments<br>Metals as supports of cultural heritage: damages, problems and conservation. Case of printing plates. | The IAPH has a permanent Education Program. The training programme offers several short specialisation courses in heritage and cultural management, organized in collaboration with associations and professional bodies. Different courses may be offered in each yearly programme. The attendance fee is 100 €. The participants (around 30) are professionals in conservation and cultural management. The language of the courses is Spanish. | 3 days |
| | Fundación Universidad-Sociedad | On-line specialised studies on non-destructive techniques applied to cultural heritage conservation | This on-line course will take place from April -July 2010. The attendance fee is 120 €. The planned number of participants is 60. The course is worth 6 credits (60 hours): theory 40h, practice 20h. | 2 months |
| UK | University College London in collaboration with Horniman Museum, London | Preventive Conservation Workshop: tools and techniques for best practice | The course is offered on an ad hoc basis. The course participants are conservators as well as museums and galleries collections staff. The course offers guidance towards practical, appropriate preventive conservation solutions for collections in museum, gallery, archive and historic house environments. | 1 day |

**Table 3 Short courses in archaeological conservation**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| France | Arc Antique, a public institution dedicated to the conservation of underwater archaeological remains | L'intérêt de la céramique, du verre et du metal découverts lors de fouilles sous-marines et les premières mesures de conservation à mettre en place | Courses repeatedly organised as a part of diplomaed training of professional divers by the Nautical Archaeological Society - NAS | 3 days |

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| | | L'utilisation du laser pour le nettoyage de matériaux archéologiques inorganiques and Métal et Objets métalliques | Courses organised for the Institut National du Patrimoine - INP (National Institute for Cultural Heritage) | 3 days |
| | | La conservation des métaux | Courses organised for several organisations national or local | 4 days |
| | | Les techniques de moulages | A course organised for Association des Restaurateurs d'Art et d'Archéologie de Formation Universitaire - ’ARAAFU | 3 days |
| | | Les matériaux organiques | A course organised for Institut National des Recherches Archéologiques Préventives | 1 day |
| Spain | Centre for the study of archaeological and prehistoric heritage of the Universidad Autónoma de Barcelona | Principles of conservation and archaeological materials treatment | This professional course for archaeologists is the first event within a planned permanent programme of specialised training with short courses on different subjects. The attendance fee is 120 €. The course is worth 4 ECTS. | 1 month |

**Table 4 Short courses in architectural conservation**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| Germany | Technical University of Dresden and DenkmalAkademie, funded by Deutsche Stiftung Denkmalschutz | Studies in preservation of monuments and development of existing assets | Permanent course on old handicraft techniques in construction, theory and practice, material science, theory and history of cultural heritage, attendance fee: 7 weeks 2800 €, one week 400 € it is also possible to take single days, 10-12 participants (architects, engineers and other professions from the sector of preservation of buildings, town districts and cultural landscape) | 7 weeks, 40 hours per week |
| | Remmers Akademie, a private company | Natural stone restoration and conservation | Permanent course giving introduction and basic information to the restoration of natural stone both concepts and practice, attendance fee 160 €, 26 participants | 1 day |

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| Poland | Kabe, a private company | Kabe company conservation products | There are a lot of courses presenting the products of private companies which are organised on ad hoc basis. Kabe company organises around 20 courses a year with around 2.500 participants. Remmers organises a few courses a year with 100-200 participants. Apart from company staff presenting the products, other specialists are invited with lectures – conservators, scientists, engineers etc. It seems that the courses solve problem of architectural conservators as they widely participate in the trainings. | a few hours |
| | | New assessment of silicate coatings | | |
| | Remmers, a private company | Renovation of historic facades made of stone, brick and covered with plaster. | | 2,5 days |
| | | Water-repellent treatments of historic buildings | | |
| | | Renovation of wood and frame constructions | | |
| | | Roman cement – conservation of architectural heritage of 19th and 20th centuries | | |
| | Krajowy Ośrodek Badań i Dokumentacji Zabytków (National Heritage Board of Poland) | Summer schools 'Nieśwież Academy' | A programme implemented in cooperation with Byelorussia since 1995 aiming at training conservation staff of Central European countries. 11 courses have been organised so far in the following areas – theory and practice of the protection of cultural landscapes and historic parks-gardens, protection and conservation of historic cemeteries, landscaping, protection and shaping of landscapes of small and medium cities, protection, shaping and touristic development of the Augustów Channel and the adjacent river basin, protection and possibilities of development of fortifications and defensive architecture as well as historic industrial buildings | |
| UK | West Dean College (part of the University of Sussex) | Professional Development Diploma: Conservation of Buildings Interiors and Sites | This is a permanent programme. The Professional Development Diploma is awarded in recognition of the successful completion of 10 Building Conservation Master classes (BCMs) and the submission of a 3.000-word (minimum) final essay. Each class takes approx 3-4 days and participants must complete 10 in order to receive their diploma. Courses are Monday-Thursday | |

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| | | | and held every 2-3 weeks, with participants given up to 5 years to complete their diploma. | |
| | The Society for the Protection of Ancient Buildings | The Repair of Old Buildings: a course of lectures and visits | The course is organised within a permanent programme of short courses (this course is run twice a year). The attendance fee is £710. The course is intended for architects, surveyors, structural engineers, planners, conservation officers, builders and craftsmen. The objective of the course is to illustrate by lectures and practical examples the manner in which the conservative repair of old buildings can be achieved. | 6 days |

**Table 5 Other**

| Country | Organisation | Name of the course | Description | Duration |
|---|---|---|---|---|
| Poland | Krajowy Ośrodek Badań i Dokumentacji Zabytków (National Heritage Board of Poland) in cooperation with the National Team Preventing Crime against National Heritage of the Criminal Office of the National Police Headquarters | Training programme on prevention and fight against crime in the area of heritage | Specialized training programme for police officers organised in 2007 and 2008 on protection of cultural heritage The training is organized under the terms of the agreement of the General Conservator of Poland and the Chief Commander of the Police of 10 March 2005 on cooperation in the area of prevention and fight against crime in the area of heritage. | |
| | Krajowy Ośrodek Badań i Dokumentacji Zabytków (National Heritage Board of Poland) | Training programme on fight against illegal trafficking in works of art | Specialised training programme for Custom Service Officers and Border Guards organised on ad hoc basis. The training is organised under the terms of the agreement of the Minster of Finances, the Minister of Culture, the Chief Commander of the Police and the Chief Commander of the Border Guards regarding cooperation in the field illegal trafficking in works of art. | |
| | Krajowy Ośrodek Badań i Dokumentacji Zabytków (National Heritage Board of Poland) in cooperation with Monuments Preservation Department of the | | A series of 7 two-day training events implemented in 2008 for the staff of the Regional (Voivodeship) Offices for Heritage Protection and their branches. The trainings were organized in different cities for selected staff members. There was no attendance fee. The trainings | 2 days |

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| | Ministry of Culture and National Heritage | | focused on legal and substantive aspects of issuing decisions on building and area development conditions, permissions to conduct works in registered historic objects and other documents by the conservation offices, protection of movable heritage. The courses concentrated on both theoretical and practical aspects of conducting administrative proceedings and implementation of conservation policies by the Offices. | |
| Slovenia | The Department of Heritage Studies of the Faculty of Humanities of the University of Primorska and the Institute for Mediterranean Heritage of the Science and Research Centre of Koper of the University of Primorska, in cooperation with the Celje International School of Museology/Celje Museum of Recent History and other partners (e.g. ICOM Slovenia, Reinwardt Akademie Amsterdam, British Council). | Summer School of Museology | Organised once a year since 2000 within the permanent programme of shorter educational events of the involved institutions in the form of seminars, lectures, field work, independent work in groups and with mentors. The programme is carried out in Slovenian and English. Employed persons pay full price, students get a 50 % discount (participation fee covers lectures, working materials, a technical excursion, visits to exhibitions and collections, meals, insurance of participants). | 4-5 days |
| UK | London Metropolitan University | Laser Technology Course | The course offers an excellent background to professionals and students in the heritage sector to gain a good understanding of laser technology. The fee is £210. The participants (around 12) are designers, professional practitioners, tutors and students within the conservation sector. | 3 days |

**Table 6 Examples of workshops disseminating results of research projects funded within the European Commission Framework Programmes**

| Place and date | Name of the project and topic of the workshop | Description |
|---|---|---|
| Warsaw, Poland, 13-14 April 2005 | FRIENDLY HEATING project – 'Friendly Heating - both comfortable for people and compatible with conservation of art works | The workshop consisted of 10 lectures presenting the results of the project, especially the measurements in the project's reference object, describing the pros and cons of different heating system, showing the conservation, economic and |

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| | preserved in churches', 2002-2005<br>National workshop of the project in Poland 'Heating of historic buildings' | social aspects of heating churches, with a special focus on the group of wooden churches in the Małopolska region. Each lecture was followed by a discussion. Additionally there was a panel discussion at the end of the workshop. The event was attended by around 80 people from Poland. The participants were mainly staff members of the Regional Offices for Heritage Protection, conservators, museum staff, church authorities, scientists. |
| Krakow, Poland, 26-27 April 2006 | ROCEM project – 'Roman Cement to Restore Built Heritage Effectively', 2003-2006<br>Regional workshop of the project (Poland, Ukraine, Baltic states) 'Roman cement – material with a history and future' | The workshop was divided into two parts. The first day consisted of 7 lectures presenting project's aims and results, describing the architecture of the 19th and beginning of 20th centuries and the use of Roman cements to decorate facades, showing their conservation problems, presenting Roman cements which were redeveloped within the project. A visit to a recently restored façade using the new approach elaborated in the project was organized. Around 70 participants took part in this part of the event. On the second day, a practical workshop was organised for 19 participants, who could use the Roman cements to make cast elements under the supervision of two restorers – participants to the project. Most of the workshop participants were staff members of small and medium conservation companies and conservators. The workshop has established the use of this novel conservation technology in Poland. |
| London, 18-19 January 2007 | NOAH'S ARK project 'Global Climate Change Impact of the Built Heritage and Cultural Landscapes', 2004-2007<br>International workshop 'Climate change vulnerability: maps and guidance for cultural heritage protection' | The two-day workshop described the findings of the project concerning the impact of climate change on cultural heritage, presented new tools and maps for assessing climate change impact, recommended new adaptation strategies for the historic environment, showed the web-based applications, and discussed how to develop policy from research. |
| Turin, Italy, 3-5 September 2008 | IDAP project 'Improved Damage Assessment of Parchments', 2002-2005<br>International Seminar and Workshop 'Conservation and Restoration of Parchments' | The objective of the Seminar was to provide the participants, by means of lectures by scholars and researchers, with an updated picture of the chemical and physical nature of parchment, its ageing processes and susceptibility to deterioration caused by environment. The speakers also illustrated the techniques used to evaluate the state of preservation of parchments and spoke about their restoration. The Seminar disseminated the knowledge gathered within the European research project IDAP, which investigated parchment ageing and deterioration mechanisms at its nanoscopic, mesoscopic and microscopic levels, and has created databases for identification of the state preservation of ancient parchments and the prevention and evaluation of their damage, and the regional |

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| | | research project OPERA, which used IDAP damage assessment techniques to classify the states of preservation of some collections of historical parchments of various origins. |

# Appendix 10

Master courses

| Country | Institution offering the Master course | Name of the course | Description |
|---|---|---|---|
| Germany | University of Applied Sciences and Arts Hildesheim/ Holzminden/ Göttingen | MA Conservation and Restoration | Students have the opportunity to specialise in Conservation and Restoration in one of the five fields of study:<br>- Books and Paper<br>- Polychrome Wooden Objects and Paintings<br>- Furniture and Wooden Objects<br>- Stone and Ceramics<br>- Mural Painting/ Architectural Surfaces |
| | University of Applied Sciences and Arts Hildesheim/ Holzminden/ Göttingen | MA Preservation of Monuments and Sites | The Master of Arts in Historic Building Conservation requires a bachelor's degree in architecture, civil engineering, wood engineering, design, preventive conservation or conservation and restoration. The Master's degree in Historic Building conservation meets, if preceded by a Bachelor's degree in architecture, the European requirements (European Guidelines for Architects 85/384) for recognition of professional qualifications. |
| Italy | 1st Level Master courses (1 year duration) | | |
| | Università degli Studi di BOLOGNA | Bioarcheologia, paleopatologia e antropologia forense<br>http://www.bioarcheologia.it/Master.html | The strong aspect lies in its multidisciplinary learning: archaeological subject are connected with biology and anatomy. |
| | Università degli Studi di BOLOGNA | Diagnostica avanzata per i beni culturali<br>http://www.unibo.it | The strong aspect is the general training on all the techniques of investigation applied to cultural heritage. |
| | Università degli Studi di PISA | Materiali e tecniche diagnostiche nel settore dei beni culturali<br>http://dcci.unipi.it/master | The strong aspect is the multidisciplinary learning: history of restoration and archaeological subject are connected with scientific subject. |

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| | Università degli Studi di FIRENZE | Antropologia biologica della regione mediterranea<br>http://www.unifi.it | The strong aspect lies in its archaeological and science subjects. |
| Italy | Master degree courses (2 year duration) leading to a degree | | |
| | Università degli Studi BOLOGNA | Science for the conservation-restoration of cultural heritage (SCoRe)<br>http://corsi.unibo.it/scienceforconservation | The master degree course (2 year duration) is the only one in Italy which is completely delivered in English and is aimed at the education and training of a conservation scientist |
| | Università di BARI | Scienza e tecnologia per la diagnostica e la conservazione dei beni culturali http://www.diagnosticabeniculturali.uniba.it | The course (2 year duration) will train conservation scientists through a multidisciplinary learning and teaching scientific environment. The main objective is to combine scientific and "artistic" knowledge; the course seems to lack taught courses on archaeology, history of art, as well as theory of conservation-restoration. |
| | Università della CALABRIA | Scienze e tecnologie per la conservazione ed il restauro dei beni culturali<br>http://www.smfn.unical.it | The master course (2 year duration) is mainly devoted to the formation of a professional with profound scientific knowledge but with a strong conservation-restoration component, which is mainly provided by elective courses. |
| | Università degli Studi di FIRENZE | Scienze per la conservazione ed il restauro<br>http://www.scienze.unifi.it | The course (2 year duration) will train conservation scientists through a multidisciplinary approach: beside chemistry, physics and petrology, architecture and restoration techniques are very important subjects. |
| | Università di GENOVA | Metodologie per la conservazione ed il restauro dei beni culturali<br>http://www.lettere.unige.it | The master course (2 year duration) will train conservation scientist and it seems to lack taught courses on theory of design, history of art, as well as theory of conservation-restoration. |
| | Università degli Studi di MODENA e REGGIO e Università di FERRARA | Conservazione e diagnostica del patrimonio culturale<br>http://www.sbanc.unimore.it | The course (2 year duration) will train conservation scientists through a multidisciplinary learning; the main objective is to combine scientific and archaeological knowledge. |
| | Università di NAPOLI “Suor | Conservazione e restauro dei beni | The course (2 year duration) will train expert in cataloguing, control and |

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| | Orsola Benincasa” | culturali<br>http://www.unisob.na.it | protection of cultural heritage. The degree course is divided into 3 curricula each with different training routes: the first Movable and artistic cultural heritage, the second Diagnostics and Restoration and the third Landscape and environmental assets. |
| | Università degli Studi di PADOVA | Scienze e tecnologie per i beni archeologici e artistici<br>http://www.unipd.it | The master course (2 year duration) will train conservation scientists through a multidisciplinary approach: archaeology, history of art subjects, restoration subject and scientific subjects. |
| | Università degli Studi di PALERMO | Conservazione e restauro per i beni culturali<br>http://www.unipa.it/restauro.laurea | The aim of the degree course is to train researchers and experts in restoration of movable cultural heritage and surfaces decorated of architectural heritage that can deal with problems related to restoration with scientific consciousness and respecting the historical and artistic context of the artifact. |
| | Università degli Studi di PARMA | Scienze per la conservazione ed il restauro<br>http://scienzetecnologiebeniculturali.unipr.it | The course (2 year duration) will train conservation scientists through a multidisciplinary approach: scientific, technical subjects, restoration subject and laboratory practice and architecture subjects. |
| | Università degli Studi di PERUGIA | Scienze e tecnologie per la conservazione ed il restauro del patrimonio storico-artistico<br>http://www.unipg.it | The master course (2 year duration) will train conservation scientists through a multidisciplinary learning; the main objective is to combine scientific, museology and librarianship knowledge. |
| | Università di ROMA “Sapienza” | Scienze applicate ai beni culturali e alla diagnostica per la loro conservazione<br>http://w3.uniroma1.it/dibeni/specialistica/index.asp | The course (2 year duration) will train conservation scientists, researchers and experts, in the field of conservation and the archeometric through a multidisciplinary approach: scientific subjects as chemistry, physics and structural materials are the most important for analyze problems of conservation and degradation processes. |
| | Università degli Studi del SALENTO (Lecce) | Scienze per la conservazione ed il restauro<br>http://www.benuculturali.unisalento.it | The course (2 year duration) will train conservation scientists through a multidisciplinary approach: scientific subjects are the most important, such as chemistry and physics, as well as archaeology and history of art. |
| | Università degli Studi di TORINO | Scienze per i beni culturali<br>http://stbeniculturali.unito.it | The course (2 year duration) will train conservation scientists through a multidisciplinary learning; the main objective is to combine scientific and “artistic” knowledge. |

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| | Università degli Studi di URBINO “Carlo Bo” | Conservazione e restauro del patrimonio storico-artistico<br>http://www.uniurb.it/restauro | The course (2 year duration) will train conservation scientists through a multidisciplinary approach: beside chemistry, physics and petrology, history of art, history and restoration techniques are very important subjects. |
| | Università di VENEZIA “Cà Foscari” | Scienze chimiche per la conservazione ed il restauro<br>http://www.unive.it/scienze | The master degree course (2 year duration) will train chemists for restoration through a multidisciplinary approach: scientific, technical subjects, restoration subject and laboratory practice. |
| Italy | Istituto Superiore per la Conservazione e il Restauro (ISCR), public governmental institute - MIBAC - Roma | Advanced School for Restoration | The course will train professional restorers through a multidisciplinary approach: historical-artistic subjects, technical, scientific subjects and restoration laboratory practice. Beside restoration technique and history of art, chemistry, geology physics and biology are very important subjects.<br>Teaching activities will guarantee a strong training in practical, scientific and historical subjects. During practical activities, over 60%, students will work in direct contact with artworks following a multidisciplinary approach.<br>Lessons and laboratories will be organised with different curricula:<br>- Natural and artificial stone<br>- Paintings (wooden or textile support); Carved artworks in wood, bone, ivory, wax; Artworks in synthetic materials<br>- Wooden artworks<br>- Materials and artworks in natural fibres, techno-fibres, leather and plumes.<br>- Ceramic and glass materials and artworks; Metal and alloy materials and artworks |
| | Opificio delle Pietre Dure (OPD), public governmental institute - MIBAC - Firenze | Advanced School for Restoration | The course will train professional restorers through a multidisciplinary approach: historical-artistic subjects, technical, scientific subjects and restoration laboratory practice. Beside restoration technique and history of art, chemistry, geology physics and biology are very important subjects.<br>Teaching activities will guarantee a strong training in practical, scientific and historical subjects. During practical activities, over 60%, students will work in direct contact with artworks following a multidisciplinary approach. |

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| | | | Lessons and laboratories will be organised with different curricula:<br>- Natural and artificial stone<br>- Paintings (wooden or textile support); Carved artworks in wood, bone, ivory, wax; Artworks in synthetic materials<br>- Wooden artworks<br>- Materials and artworks in natural fibres, techno-fibres, leather and plumes.<br>- Ceramic and glass materials and artworks; Metal and alloy materials and artworks |
| | Istituto centrale restauro e conservazione patrimonio archivistico e librario (Icpal), public governmental institute – MIBAC - Roma | Advanced School for Restoration of Archive and Library Heritage | The school will train professionals who will be able to work in the field of library materials conservation, defining the conservation state of artworks and carrying out prevention, maintenance, restoration interventions. Teaching has a strong multidisciplinary approach and it will be based on humanistic, scientific, technical and practical subjects.<br>Teaching activities will guarantee a strong training in practical, scientific and historical subjects. During practical activities, over 60%, students will work in direct contact with artworks following a multidisciplinary approach<br>Lessons and laboratories will be organised with different curricula:<br>- Archive and Library Heritage<br>- Paper artworks<br>- Photographic and Cinematographic artworks |
| | Università degli Studi di Firenze, MIUR, public university, Faculty of Licterature and Philosophy | Scienze Archivistiche e Biblioteconomiche (archive and library sciences), scientific sector LM5 (archive and library sciences). | The course trains graduated students whit a strong technical and scientific knowledge in order to manage consciously national and international archive and library heritage.<br>Main teachings:<br>L-FIL-LET/11 Contemporary Italian literature<br>L-FIL-LET/13 Philology of Italian literature<br>L-ART/01 History of Medieval Art<br>M-STO/02 Modern history<br>M-STO/07 History of Christianity<br>M-STO/08, Archive and library science |

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| | | | Other teachings:<br>CHIM/02 Physical Chemistry<br>CHIM/12 Environmental and Cultural Heritage Chemistry<br>IUS/09 public law<br>IUS/19 history of medieval and modern law<br>L-ART/03 History of Contemporary art<br>L-ART/06 Cinema, photography and television<br>L-ART/07 Musicology and music history<br>M-STO/09 Palaeography |
| | Università degli Studi del Salento, MIUR, public university, Faculty of Cultural Heritage | Scienze Archivistiche e Biblioteconomiche (archive and library science), scientific sector LM5 (archive and library science). | The course trains graduated students whit a strong technical and scientific knowledge in order to manage and preserve archive and library heritage. Specific sectors: analysis, management, cataloguing, edition and promotion of archive and library, modern and contemporary, heritage.<br><br>Graduated students will have specialist skills in order to plan, direct and realize studies, interventions and services as regards archive and library heritage.<br><br>Main teachings:<br>- L-FIL-LET/10 Italian literature<br>- NF/01 Informatics<br>- M-STO/08 Archive and library science<br>- M-STO/09 Paleography<br>- M-STO/01 medieval history<br>- M-STO/02 modern history<br>- M-STO/04 contemporary history<br><br>Other teachings:<br>- FIS/07 Applied Physics (to cultural and environmental heritage, biology and medicine)<br>- IUS/08 constitutional law<br>- L-ART/01 History of medieval art<br>- M-STO/08 Archive and library science |
| | Università degli Studi di Catania, MIUR, public university, Faculty of Literature and Philosophy | Valorizzazione dei Beni Archivistici e Librari (promotion of archive and library heritage), scientific sector S/5 (archive and library science). | The course is aimed:<br>- to obtain specialist scientific, theoretical, methodological and practical skills in the field of archive and library sciences<br>- to obtain skills in management, conservation and restoration of archive and |

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| | | | library heritage and transmission of library information<br>- to be able to use entirely main informatics and communication instruments<br>- to develop every cultural and organising aspect related to the promotion of archive and library heritage<br><br>Main teachings:<br>- book, archive and image sciences<br>- history and institutions<br><br>Other teachings:<br>- chemistry and physics<br>- philology and literature subjects<br>- legal and social subjects<br>- book, archive and image sciences<br>- economy, management and communication of cultural heritage<br>- Informatics and language theory |
| | Università degli Studi di Pisa, MIUR, public university, Faculty of Literature and Philosophy | Scienze del Libro, della Biblioteca e dell'Archivio" (Book, Library And Archive Science), scientific sector S/5 (archive and library science). | The course is aimed:<br>- to have strong specialised, methodological, theoretical and practical knowledge and skills as concerns book, library and archive sciences<br>- to have strong knowledge and skills for main subjects of the course.<br>- to obtain advanced skills for what concerns analysis, planning, direction and realization of studies, interventions and services in library and archive field (management and transmission, ancient and contemporary)<br>- to be able to use entirely main informatics and communication instruments<br><br>Teaching areas:<br>- archive and library sciences (35-40CFU)<br>- history and institutions (15-20 CFU)<br>- book, archive and image sciences (55-75CFU)<br>- Informatics and language theory (5-15 CFU)<br>- chemistry and physics (1-10)<br>- legal and social subjects (5-15 CFU)<br>- economy, management and communication of cultural heritage (5-15 CFU)<br>- philology and literature subjects (5-15 CFU) |
| | Università degli Studi di Cagliari, MIUR, public university, Facolty | Conservazione dei Beni Architettonici e Ambientali (Conservation of | The educational approach presents multidisciplinary aspects with a strong stress on subjects aimed to knowledge and transformation of historical and |

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| | of Architecture | Architectural and Environmental Heritage) - scientific sector LM10 (Conservation of Architectural and Environmental Heritage). | modern architecture.<br>This curriculum trains the master graduated to face diagnostic and intervention topic in order to preserve Historical Architectural heritage, in particular Sardinia and Mediterranean Cultural Heritage. |
| | Università degli Studi di Palermo, MIUR, public university, Faculty of Architecture | Conservazione e Restauro dei Beni Architettonici e Ambientali (Conservation and Restoration of architectural and environmental Heritage), scientific sector LM10 (Conservation of Architectural and Environmental Heritage). | Main aim of this master degree is to train a conservator architect, a professional with advanced skills in the field of knowledge, study, analysis, design and direction of conservation and restoration of architectural and environmental heritage.<br>The educational approach presents multidisciplinary aspects with a strong stress on subjects aimed to knowledge and transformation of historical and modern architecture. |
| | Università degli Studi "Mediterranea" di Reggio Calabria,MIUR, public university, Faculty of Architecture | Conservazione e Restauro del Patrimonio Storico-Artistico (Restoration, Conservation and promotion of architectural and environmental Heritage), scientific sector LM10 (Conservation of Architectural and Environmental Heritage). | The course is aimed to train a professional with technical and historical skills at the same time, in order to work with directive positions and high responsibility in public institutions of conservation, safeguard, management and promotion of architectural heritage. |
| | Università degli Studi di Torino,MIUR, public university, Faculty of Sciences and Faculty of Literature and Philosophy. In collaboration with Conservation and Restoration Centre "La Venaria Reale", public-provate foundation, Torino. | Conservazione e Restauro dei Beni Culturali (Conservation and Restoration of Cultural Heritage), scientific sector LM11 (Conservation and Restoration of Cultural Heritage). | Graduated will be able to work independently for what concerns decisions and practice in order to define the conservation state of artworks and to carry out interventions of prevention, maintenance, restoration and to limit decay processes on constitutive materials.<br>They will have a deep knowledge of scientific methodology, diagnostic techniques, data analysis aimed to recovery, conservation and restoration of cultural heritage; a deep knowledge of characteristics, properties and decay of materials constituting artwork. Moreover they will have strong practical skills in restoration.<br>Teaching have a multidisciplinary approach and it is based on humanistic, scientific and technical subjects. Moreover some basic elements of cultural heritage law and economy will be faced.<br>Laboratory activity is carried out in the laboratories of the Restoration and |

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| | | | Conservation Centre "La Venaria Reale".<br><br>Course areas:<br>- Natural and artificial stone<br>- Paintings (wooden or textile support); Carved artworks in wood, bone, ivory, wax; Artworks in synthetic materials<br>- Wooden artworks<br>- Materials and artworks in natural fibres, techno-fibres, leather and plumes.<br>- Ceramic and glass materials and artworks; Metal and alloy materials and artworks |
| | Università degli Studi di Roma Tor Vergata, MIUR, public university, Faculty of Literature and Philosophy. In collaboration with ICPAL, MIBAC, public institute, Rom | Restauro dei Materiali Librari (Restoration of library materials), scientific sector LM11 (Conservation and Restoration of Cultural Heritage). | Graduated will work in the field of library materials conservation defining the conservation state of artworks and carrying out interventions of prevention, maintenance, restoration and to limit decay processes on constitutive materials.<br><br>They will have a deep knowledge of scientific methodology, diagnostic techniques, data analysis, aimed to recovery, conservation and restoration of cultural heritage; a deep knowledge of characteristics, properties and decay of materials constituting artworks. Moreover they will have strong practical skills in restoration.<br><br>Teaching have a multidisciplinary approach and it is based on humanistic, scientific and technical subjects. |
| | Università degli Studi Suor Orsola Benincasa (NA), public university, MIUR - Faculty of Literature and Philosophy | Conservazione e Restauro dei Beni Culturali (Conservation and Restoration of Cultural Heritage), scientific sector S12 (Conservation and Restoration of Cultural Heritage). | This master course gives specific skills in different historical areas: medieval, modern and contemporary.<br><br>The educational opportunities cover a wide range of subjects: archive documentation, research methodology and art criticism (in particular in the case of Campania), constitutive materials (properties, conservation and restoration), material science and building construction. For these reasons the course offers subjects in art and literature and in science applied to cultural heritage.<br><br>Study areas:<br>- movable artistic heritage (medieval, modern, contemporary)<br>- diagnostics and restoration (archaeological and historical heritage); |

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| | | | - landscape and environmental heritage |
| | Università degli Studi di Urbino "Carlo Bo", public university, MIUR, Faculty of Literature and Philosophy and Faculty of Science and Technology | Conservazione e Restauro del Patrimonio Storico-Artistico" (Conservation and Restoration of Cultural Heritage), scientific sector S12 (Conservation and Restoration of Cultural Heritage). | Aims of the course:<br>- knowledge of basic elements of chemistry, physics, mathematics, geology and informatics;<br>- knowledge of history and art history<br>- knowledge of data analysis and scientific methodologies for recovery, conservation and restoration of cultural heritage<br>- multidisciplinary approach in order to face complex problems related to conservation, recovery and promotion of cultural heritage,<br>- knowledge of constitutive materials and their properties<br>- knowledge of basic elements of law and economy applied to cultural heritage |
| Latvia | Department of Restoration, Faculty of History and Theory of Arts, Academy of Fine Arts (Restaurācijas nodaļa, Mākslas vēstures un teorijas fakultāte, Latvijas Mākslas Akadēmija) | Master's degree programme in restoration of paintings | A 2-year master course follows a 4-year bachelor training in restoration of paintings. During studies, the students obtain knowledge and skills necessary for restoration of icon painting, easel-painting and wall-paintings. The theoretical studies consist of courses in technologies of painting, specialized courses in chemistry and biology, material studies, diagnostics of damages and research of paintings' structure. On practical classes students are working on real art works acquiring different techniques of restoration. In addition, to gather a detailed knowledge on different techniques, treatments and diagnostics in restoration, the students also obtain skills in copying of paintings and print works. The department cooperates with museums, Latvian State Institute of Wood Chemistry of Latvian Academy of Science, Faculty of Material Science and Applied Chemistry of Riga Technical University and leading specialists in Latvia and abroad. During the master's programme, the students continue deeper studies of the restoraton of paintings, and write master's thesis, a research paper on a choosen subject. |
| | Faculty of History and Philosophy, University of Latvia (Vēstures un filozofijas fakultāte, Latvijas Universitāte) | Cultural heritage course as a part of master's degree programme | "Cultural heritage" is a part of 2-year master's programme following a 3-year bachelor studies in history. It is offered by The Chair of Archaeology and Auxiliary Disciplines of History. Alltogether, the chair offers several courses in restoration and protection of cultural heritage for the bachelor and masters level students, including theory of restoration, protection of cultural heritage, work with sources of cultural heritage, concepts of architectural heritage through 19th and 20th century, development of idea of cultural heritage, practical survey of cultural heritage, studies of cultural and historical heritage |

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| | | | of Latvia, cultural monuments of Latvia are the courses offered by the department available for the students of history who want to specialize in cultural heritage issues. The course “Cultural heritage” concentrates upon research work of the students, leading to written master’s thesis, an independent research paper on the student’s choosen subject in order to obtain a master’s degree in history. |
| | Faculty of Architecture and Urban Planning, Riga Technical University (Arhitektūras un pilsētplānošanas fakultāte, Rīgas Tehniskā universitāte) | Master’s degree programme in architecture | A 1,5-year master’s programme following a 5,5-year professional training as an architect (3,5-year bachelor training plus 2-year professional training). The programme covers a broad field of advanced architectural subjects and problems, including contemporary architecture, various aspects of research methodology, regeneration and planning of spatial structures including urban and rural environment, ecology, urban planning, pedagogy, architectural morphology, organization and management of design work, and architectural design. These courses can be complemented by several subjects of student’s choice, including an advanced course in history of architecture and urban planning (developing further and deeper the knowledge acquired during bachelor and professional studies), methodology of renovation and reconstruction of architectural monuments, or courses from other branches of architecture. The course “Methodology of Renovation and Reconstruction of Architectural Monuments” covers issues of regional and international praxis of renovation of architectural heritage, regeneration of historical buildings and sites via functional transformations, and includes a completion of a project of a conversion and transformation of a historical urban site. The entire programme concludes with master’s theses on a subject chosen by the student. The work on the thesis is an independent course led by the supervisor of the student which includes individualized consultations and training leading to the completion of thesis. |
| Malta | Heritage Malta – Institute of Conservation and Management of Cultural Heritage (ICMCH) / University of Malta | Master in Conservation – M.Cons. | ICMCH resolutely approaches conservation as an academic discipline, and the creation of the M.Cons. is part of the Institute’s attempt to fully integrate conservation to University standards in line with ENCoRE’s objectives and, as of 2007, the outcomes of the Heritage Malta-led ECPL project. For this reason, the course addresses specifically students who already have a sound background in conservation. The M.Cons. course is open to students who already have completed undergraduate studies in conservation (or have equivalent qualifications). Moreover, the course is based on clearly defined |

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| | | | learning outcomes related to knowledge, skills and competences that were defined during the ECPL project on the parameters indicated within the European Qualifications Framework. This brings the course to the forefront of conservation-restoration education in Europe.<br><br>Apart from featuring a theoretical part, the course includes both a practical component and a research component, thus giving students the opportunity to further develop their knowledge, skills and competences as future professional conservator-restorers. M.Cons. graduates may, depending on their interest, proceed to doctoral studies and/or work in the conservation-restoration profession upon receipt of a warrant. The Masters degree is also valid overseas.<br><br>The course is offered in a variety of areas of study and gives students the opportunity to:<br>- Further develop their skills as hands-on conservators;<br>- Conduct in-depth research;<br>- Acquire an in-depth knowledge of the specific materials they are dealing with.<br>- Work in the conservation profession. |
| | Heritage Malta – Institute of Conservation and Management of Cultural Heritage (ICMCH) / University of Malta | Master of Arts in Cultural Heritage Management –<br><br>M.A. CHM | The purpose of the M.A. CHM is to contribute to the formation of management professionals capable of working in this particular sector. In order to achieve this objective, this changeover course provides management skills and knowledge in relevant areas of cultural heritage with particular reference to Mediterranean cultural heritage.<br><br>This multidisciplinary course is designed to attract candidates from different fields including graduates in management, tourism studies, music, theatre, conservation, art history, architecture, anthropology and archaeology in order for students to benefit from each other's knowledge and experience. Apart from providing theoretical tuition, the course also includes practical projects in cultural heritage institutions in Malta and Italy in which the student can learn hands-on whilst applying the theoretical concepts acquired during the course.<br><br>Graduates of this programme will be capable of managing museums and sites, organizing cultural events, attracting funding (including EU funding) to cultural heritage, and responding to the needs of the cultural tourism sector in |

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| | | | practical terms. |
| UK | University of Bournemouth | MsC Building Conservation | Run in partnership with the Weald and Downland Open Air Museum, West Sussex. The Museum is well established as a centre of excellence in historic building conservation and is committed to the provision of training in this field. The Museum recognises the building industry's need for well-rounded conservators who can look at a building, assess, survey, record its current state, write a report, specify repairs, execute or oversee those repairs and write a final report on the work undertaken and the state of the building after the repairs.<br><br>The course aims to influence practice in the industry by helping students to become all-round "conservators" with competence in areas that are normally split between "professionals" and "craftsmen". In brief summary, "professionals" acquire knowledge and experience of practical processes, and "craftsmen" acquire understanding and competence in analysis, planning, controlling and reporting.<br><br>http://onlineservices.bournemouth.ac.uk/courses/Course.aspx?course=510&school=CS&level=pg&code=MSBC&mode=pd |
| | University of Bournemouth | MA Museum Studies | This pioneering course offers up-to-the-minute approaches to creative museum practice. Intensive study units incorporate the very best teaching methodologies with collections handling, visiting speakers and our own professoriate contributing to a dynamic inspiring course. The course is team taught by academics and leading museum and heritage professionals.<br><br>http://onlineservices.bournemouth.ac.uk/courses/course.aspx?course=222 |
| | University of Bournemouth | MSc Timber Building Conservation | Run in partnership with the Weald and Downland Open Air Museum, West Sussex.<br><br>This course can enable practising building conservators to improve their competence, and open new doors to other building professionals wanting to specialise or change career direction.<br><br>http://onlineservices.bournemouth.ac.uk/courses/Course.aspx?course=110&school=CS&level=pg&code=MSTBC&mode=pd |
| | University of Bradford | MsC Archaeological Sciences | This course is designed to give graduates a systematic training in the |

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| | | | application of scientific methods in archaeology and is appropriate for students with either humanities or science-based academic backgrounds. It combines introductions to scientific principles and practices with a wide choice of specialist modules, including practical experience in the extensive suite of laboratories. Graduates from the course have found it an excellent foundation from which to pursue further research or to enter relevant employment.<br><br>http://www.brad.ac.uk/archenvi/courses/mscarchsci.php |
| | University of Bradford | MsC Analytical Science | The MSc in Analytical Sciences is designed to provide a platform for specialism in modern subject areas with direct relevance to the employment market. The course develops a solid set of practical skills in the University's state-of-the-art Analytical Centre leading to specialist applications and employment opportunities as an analytical scientist in named themes: Pharmaceutical, Forensic, Astrobiological, Archaeological and Environmental analytical sciences. The Analytical Centre is housed in a new pursose-built building at the heart of the University's main campus.<br><br>http://www.brad.ac.uk/university/pgpros/analytical.php |
| | Camberwell College of Arts | MA Conservation | Conservators help to preserve the world's memory by caring for a wide range of works of art, artifacts and structures which have significance for the local, national and global community. Conservators are skilled professionals who undertake a wide range of activities including developing preservation strategies, undertaking interventive conservation (such as repair or chemical treatments) liaising with other museum professionals and being advocates for conservation to the wider community.<br><br>The MA offers you the opportunity to focus on a self-managed programme of work, encompassing conservation practice, scientific research, museological investigation and art historical / bibliographical investigation. These subject areas are supported by specialist classes in studio and laboratory techniques.<br><br>http://www.camberwell.arts.ac.uk/courses/ma_conservation.htm |
| | University of Cardiff | MSc Conservation | Cardiff's Conservation Masters of Science degree provides opportunities for qualified conservators and scientists to develop their primary training in professional conservation practice and to enhance their research skills. On the one hand, the MSc Conservation is designed primarily for trained conservators. |

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| | | | Thus, the Cardiff degree is different from other conservation masters schemes which are conversion courses aimed at students with non-conservation undergraduate degrees. On the other hand, the Cardiff MSc provides science graduates with the opportunity to utilise their training and to develop their specific research skills within conservation science.<br><br>www.cardiff.ac.uk/hisar/archaeology/study/msc_conservation.html |
| | University of Cardiff | MsC Care of Collections | The Cardiff Masters of Science in Care of Collections provides opportunities for graduates from conservation and other disciplines to study preventive conservation and care of cultural collections. Applicants who already posses a conservation qualification can extend their original training while they study collections care. Students without a conservation qualification will acquire foundation knowledge about the structure and decay of materials and the museum environment.<br><br>www.cardiff.ac.uk/hisar/degreeprogrammes/postgraduate/collectionsmsc/index.html |
| | University of Durham | MA in Conservation of Archaeological and Museum objects | The MA course, is designed to develop professional skills in object research, the 'hands on' techniques of conservation, environmental monitoring, the long term care of artefacts and professional conduct and within the first few weeks of the course students are engaged in hands-on work, recording, researching and conserving archaeological and museum objects. They develop these skills in the first twelve months of the course, with expert in-house tuition, before opting in the second year of study for either a nine-month industrial placement in a conservation laboratory of a major British or overseas museum, or to undertake a conservation research project using the facilities of Durham University.<br><br>www.dur.ac.uk/archaeology/postgraduate/ma_conservation/ |
| | Heriot Watt University | MsC Building Conservation (Technology And Management) Distance Learning Only | Building conservation is a combination of social, historic, philosophical, technical and legislative processes. The MSc in Building Conservation (Technology & Management) has been designed to encapsulate these core areas. The distance learning nature of the course offers a flexible education experience that can accommodate the demands placed upon students whilst in the work place. |

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| | | | A three day summer school is run annually, consolidating the knowledge from the core modules via group work and debate. In addition, one of the days is comprised of a series of lectures from experts within the building conservation sector. A site visit is also incorporated into the summer school. Modules are supported by experts in the respective fields.<br><br>http://www.postgraduate.hw.ac.uk/course/33/pgenquiries@sbe.hw.ac.uk |
| | University of Lincoln | MSc Forensic Conservation (Heritage Science) | The MSc Forensic Conservation (Heritage Science) course aims to provide students with the skills necessary to perform as professional scientists in the field of heritage science. Through studying this course, students will develop skills in applying modern forensic methods and evidential-based investigation to various aspects of cultural heritage, including heritage conservation, and authentication of works of art, documents and antiquities.<br><br>The application of science and technology, and forensic investigative techniques, are essential for the identification and understanding of the materials from which artefacts are made, and the causes and prevention of deterioration. The power of modern scientific methods for forensic examination in the study, conservation and authentication of works of art, documents and antiquities is increasingly being recognised, with a growing global trend in art and museum conservation, archaeology and forensic evidence related to heritage materials.<br><br>http://www.lincoln.ac.uk/fabs/_courses/postgraduate/forensic_conservation/default.asp |
| | Northumbria University | MA Preventative Conservation | Preventive Conservation develops an understanding of the wide range of materials that are used to create objects of moveable cultural heritage as well as the most appropriate strategies for storage, display and transportation. The programme is highly vocational, provides an ideal route into collections care or preventive conservation and is suitable for those with first degrees in art history, archaeology, fine art, chemistry, physics and engineering or computing. For those already involved in collections care it offers the opportunity to underpin established knowledge and understanding with a formal qualification contributing towards professional accreditation.<br><br>http://www.northumbria.ac.uk/?view=CourseDetail&code=DTDPCO6 |

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| | University of Portsmouth | MSc Historic Building Conservation | This course is part of a broad programme of heritage and maritime post-graduate courses based in the award-winning Grade II* Boathouse No 6 built in 1843 and located in the world-famous Georgian and nineteenth-century area of Portsmouth Historic Dockyard. Teaching takes place both there and in the University's Portland Building completed in 1997 and itself the winner of a Civic Trust award.<br><br>The course aims to:<br>- develop an understanding of the theoretical, practical and management aspects of the conservation of historic monuments, ensembles and sites in Britain, Europe and elsewhere in the world.<br>- develop an appreciation of the development of philosophical and ethical principles relating to heritage and its conservation, of the use of historical and technical knowledge, research and analysis as the basis for conservation, of architectural and archaeological theory and design issues and of the necessary professional, legal, craft, management and administration skills.<br>- reinforce and apply that understanding and appreciation through the undertaking of case studies of buildings and sites within central southern England, and, where possible, through fieldwork elsewhere in Europe or beyond.<br><br>www.port.ac.uk/courses/coursetypes/postgraduate/MScHistoricBuildingConservation/ |
| | University College London | MSc in Conservation | The programme focuses on **principles** (conservation biology and ethics), **policy** (socio-economics, law and governance) and **practice** of conservation in relation to the following inter-related driving forces:<br>- Globalisation<br>- Demographic trends<br>- Introduced species<br>- Climate change<br>- Habitat degradation<br>- Loss of biodiversity<br><br>www.geog.ucl.ac.uk/admissions-and-teaching/postgraduates/msc-in-conservation/ |

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| | University College London | MRes in Heritage Science (leading to PhD study) | This interdisciplinary programme takes an innovative approach to teaching of 'hard' science subjects by taking cultural heritage as its context. The aim is to develop a holistic understanding of state-of-the-art science among researchers and practitioners in order to develop the science leaders of the future. Heritage science delivers intellectual access to cultural heritage by enhancing knowledge of conservation, interpretation, research and management. It offers ample opportunities to question and reflect on research in light of broader societal and environmental issues. By engaging in interdisciplinary discourse with other researchers, and with a wider diverse public, our graduates will gain the ability to engage with policy-makers.<br><br>www.ucl.ac.uk/sustainableheritage/mres.html |