ERAMCA

Co-funded by the Erasmus+ Programme of the European Union

ENVIRONMENTAL RISK ASSESSMENT AND MITIGATION ON CULTURAL HERITAGE ASSETS IN CENTRAL ASIA

ERAMCA

ERASMUS+ CBHE PROJECT NR. 609574

Deliverable D3.1

Definition of a Master in Cultural Heritage Conservation in Central Asia

Deliverable D3.2

Taxonomy of courses on Cultural Heritage Conservation in Central Asia

Deliverable D3.3

Description of courses on Cultural Heritage Conservation in Central Asia

te	Version	Author(s)
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1. Introduction

The deliverables with ref. no D3.1 entitled “Definition of a Master in Cultural Heritage Conservation in Central Asia”, D3.2 entitled “Taxonomy of courses on Cultural Heritage Conservation in Central Asia” and D3.3 entitled “Description of courses on Cultural Heritage Conservation Central Asia”, respectively, are elaborated by UNIOS, leader of the development Work Package type with ref. no. WP3 entitled “Design of a Master in Environmental risk assessment and mitigation on Cultural Heritage assets”, for the project “ERAMCA – Environmental Risk Assessment and Mitigation on Cultural Heritage assets in Central Asia”, in the frame of an ERASMUS+ Capacity Building in the field of Higher Education grant with the reference number 609574-EPP-1-2019-1-IT-EPPKA2-CBHE-JP. The report covers a detailed description of a Master in Cultural heritage Conservation in Central Asia including: **objectives**, **the general structure**, **the overall pedagogical approach**, **possible outcomes**, **and job placement, as well as taxonomy and description of courses on cultural heritage conservation in Central Asia**. The report is developed in conjunction with the development Work Package type with ref. no. WP4 entitled “Design and implementation of didactic tools for Cultural Heritage Conservation” (lead organization: POLITO) and ref. no WP5 entitled “Teacher and staff training” (lead organization: BUW), respectively.

1.1. Background and Motivation

In Figs. 1 and 2 given are the archive photographs of historical city of Samarqand, Uzbekistan. Uzbekistan owns more than 7.500 Cultural Heritage (CH) assets. Due to the impact of environmental and anthropogenic factors, 29 CH sites have been lost and 26 are in phase of destruction. The government has made considerable efforts to comply with its obligations under the UNESCO 1972 Convention.

Figure 1. Archive photographs of historical city of Samarqand, Uzbekistan (1st part)

Figure 2. Archive photographs of historical city of Samarqand, Uzbekistan (2nd part)

Currently, Uzbekistan has a number of concepts for preservation architectural heritage. However, these concepts have many disadvantages, since they are not based on the results of current international practices. Hence, Uzbekistan has shortage of updated skills. In Uzbekistan, the threats of physical loss of CH sites are associated with a natural and anthropogenic wear processes caused by: adverse climatic conditions and structural instability of buildings; humidity and natural disasters; geological and hydrological motions and earthquakes; inappropriate intervention on buildings; fires, vandalism and other aggressive actions.

One of the main lacks is the almost complete absence of a full documentation of each CH asset (both of international or national interests) and an appropriate monitoring of their real conditions. A second lack is the absence of technicians able to drive those processes and to suggest appropriate and economically sustainable risk reduction actions by following the most advanced suggestions coming from international recommendations. A third lack can be considered the absence of institutional curricula able to grow up a new generation of technician with the necessary knowledge.

In the Republic of Tajikistan, a total of 2020 historical and cultural monuments are registered, including more than 300 architectural and more than 1000 archaeological. Some of them come to desolation from constant negative influence of natural and man-made hazards. Tajikistan's territory is prone to the different types of natural disasters, as earthquakes, landslides, floods, debris flow, etc. and man-made hazards, as air pollution, fires, etc. These figures became the basis for the preparation of a new State Act "The protection and use of historical and cultural heritage", which was adopted in 2006, as well as "The rules for the creation and maintenance of specially protected historical and cultural territories" and "The creation of a zone of immovable objects of historical and cultural heritage", which was adopted in 2008. The further effective study of the historical architecture, the establishment of protected areas, conservation work is an urgent task for future generation.

The threats of physical loss (destruction) of CH sites are associated with a natural and man-made hazard and caused by: adverse climatic conditions and structural instability of building; humidity and natural disasters; geological and hydrological motions and earthquakes; inappropriate intervention on buildings; fires, vandalism etc. The major lacks are: absence of a proper documentation of the real conditions of cultural heritage sites (both international and national); practical absence of technical specialists at international level; lack of specific training programs in the country's Universities.

1.2. Project and Work Package Framework

The ERAMCA project aims to consider the environmental action on CH assets: climatic changes, hydrogeological phenomena, seismic phenomena and pollution. The correct interpretation of those phenomena could help the simulation of the effects of the foreseen environmental actions and therefore give significant information about the possible diseases on CH assets (buildings, historical centres, urban and natural landscapes, etc.). The correct knowledge of these interactions between CH assets and Environment could help a correct design of reduction actions and a preventive design of possible intervention in case of catastrophic events (e.g. earthquakes, landslides, floods, etc.). CH in Central Asia is prone to those problematics therefore ERAMCA would like to give to the involved Countries (Uzbekistan and Tajikistan) effective solutions by acting and enhancing local potentialities represented by young generations of teachers and students and by inviting local stakeholders (mainly public authorities and agencies) to give specific objectives to be reached.

ERAMCA join three European universities where update research and teaching activities are developed on environmental risk assessment and reduction on CH assets by using an interdisciplinary approach. Among the teachers of those three HEIs involved in the project, all the disciplines and experiences are present with a not negligible experience also in international project of Capacity Building and planning of specific curricula at a second level of the high education system (e.g. Master, Master of Science, Ph.D.).

In general, the Work Package aims to design and develop multi-disciplinary courses for a Master in Cultural Heritage conservation in Central Asia. Totally 12 compulsory (78 ECTS) and 2 elective (12 ECTS) interdisciplinary modules with high accent on practical applications and laboratory teaching is designed corresponding to 90 ECTS; other 30 ECTS are planned as ancillary activities (e.g. training/professional practice period of 10 ECTS and final project i.e. M. Sc. thesis of 20 ECTS).

The Master Course will cover the interdisciplinary approach to complex problems of environmental risk assessment and mitigation on CH assets both from a theoretical and practical point of view. The practical contents will be represented by the solution of specific problems used as best practices and by the final projects that the students of the pilot course will develop during the internships that will be played by the students, assisted by the local teachers, inside public or private agencies.

English language will be the official language of the Master Course. Guidelines for the design of this Master will come from preparation Work Package type with ref. no. WP1 entitled “Assessment of skill and competence requirements” (lead organization: TTPU) and ref. no WP2 entitled “Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries” (lead organization: KPITTU), respectively.

The focus will be on environmental risk assessment and mitigation (hydrogeology, climate changes, seismic action, etc.) on structures and natural places, documentation and monitoring strategies of structures and landscapes, restoration and conservation strategies and others. The overall objective of this Work Package is to promote a new culture of Cultural Heritage management that meets the multidimensional targets of sustainability through the development of a Master in “**Environmental Risk Assessment and Mitigation on Cultural Heritage Assets”.** In particular, the following results will be achieved:

- Design of a Master in “**Environmental Risk Assessment and Mitigation on Cultural Heritage Assets**” following a multi-level approach in capacity building;
- Design and developing of teaching modules that follows the ERAMCA Strategic Education Agenda;
- Composition and harmonization of education and training packages and integration of existing curricula and material;

- **Design a basic equipment for the laboratories which support the practical courses and the final project (as described in detail in the deliverable D3.4 entitled "Design of a Laboratory to Support Teaching and Training Activities").**

The pre-requirement for the development of Work Packages with ref. no. WP3, WP4 and WP5 was the successful completion of preparation Work Packages type with ref. no. WP1 entitled "Assessment of skill and competence requirements" (lead organization: TTPU) and ref. no WP2 entitled "Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries" (lead organization: KPITTU).

With respect to related assumptions and risks, the main risk for this Work Package is the lack of multi-level support within universities (e.g., management level) to design the Master in Environmental risk assessment and mitigation on Cultural Heritage assets.

In addition, the lack of expert researchers, capable of projecting and implementing new courses is a risk that should be minor basing on the existing knowledge of partners. These risks will be mitigated however by providing a robust training session for both teachers, management and technical staff.

2. Objectives

The objectives of the deliverable D3.1 entitled "Definition of a Master in Cultural Heritage Conservation in Central Asia", and the accompanying (integrated) deliverables D3.2 entitled "Taxonomy of courses on Cultural Heritage Conservation in Central Asia" and the deliverable D3.3 entitled "Description of courses on Cultural Heritage Conservation Central Asia", are postulated within the tasks T3.1 entitled "Definition of a Master in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets" within the project proposal, entitled T3.2 entitled "Definition of a taxonomy of courses on Cultural Heritage Conservation in Central Asia", task T3.3 "Definition of practice and final projects" and task T3.4 entitled "Definition of equipment to support teaching and practices".

This task involves the definition of a Master in "Environmental Risk Assessment and Mitigation on Cultural Heritage Assets" following a multi-level approach in capacity building. The objectives of the Master are set considering the different background and skills that Partner Countries experts have i.e. in the field of: geomatics, seismic engineering, hydrogeology, restoration and geotechnics. In addition, the general structure of the Master is defined considering the overall number of ECTS (120), share of mandatory and elective ECTS (see Section 3 General Structure). The overall pedagogical approach (see Section 4) is set up with an outline of innovative learning schemes including e-learning, participate learning and learning by doing.

Possible links with local and international stakeholders is set-up to promote learning by doing (e.g. training periods and final works). Possible outcomes and job placement are identified as well. Finally, the quantification of necessary resources is assessed. More details can be found in Section 1.6 Job Placement.

3. General Structure

As stated in Section 1.2 Objectives, the general structure of the Master is defined considering the overall number of ECTS (120), share of mandatory and elective ECTS. This corresponds to European graduate university study programme's ECTS credits, which allow further education at postgraduate level.

With respect to the peripatetic learning or e-learning (ancillary online teaching materials) framework, the demands on Master students are growing with learning outcomes and transferable skills complexity, and are up to date with the growing demands of the market, while simultaneously providing the suitable preparation for future involvement in the research-oriented study programmes e.g. PhD level.

The proposed Master Course teaching methodology incorporated into the general structure of the course, enables easy continuation of education via PhD study programmes for the participants in either European or other national or international institution. Furthermore, due to the wide-ranging field incorporated into the proposed course, it enables easy approach to variety of specific research topics or job placement opportunities.

The general structure of the Master Course is relying on undergraduate study programmes in engineering and architecture taught in partner countries in Central Asia, as delivered by Work Packages type with ref. no. WP1 entitled "Assessment of skill and competence requirements" (lead organization: TTPU) and ref. no WP2 entitled "Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries" (lead organization: KPITTU).

Additionally, it reflects the need and high demand of courses covering the topics of:

- geomatics
- seismic engineering
- structural engineering
- hydrogeology
- restoration and
- geotechnics

including the close interaction of teachers and learners in an innovative new form (e.g. project-based learning), with respect to learner's educational background (i.e. engineering or architecture).

The planned subjects will enable the opportunity to cluster the knowledge in a comprehensive way with the main goal in environmental hazard mitigation. The number of credits per subject is in general 6 ECTS as in many European countries. The Master Course will provide the exchange between lecturers on teaching content and implemented teaching methods in an international classroom environment. Furthermore, the assembled Master Course will provide a suitable foundation for future cooperation between partner institution, with potential of implementing it in other institutions.

The participating students will, in cooperation with local and international teachers be able to create their own networks, and to enhance their future careers. They will be exposed to current advancements in the field, and further on, to wide audience and job market. The different background of architecture and civil engineering students will allow them to follow the teaching activities and project work in form of interdisciplinary teams and to experience contemporary knowledge in realistic training settings.

3.1. General Structure of Master Course activities

The two-year Master Course is divided in four semesters (two years). The overall number of 120 ECTS credits assign for Master Course is divided on 30 ECTS per semester (60 ECTS per year). In Table 1 is given the general structure of the Master Course with the corresponding ECTS credit distribution, elective (E) and compulsory modules (C), professional practice and Master's thesis, also including the pedagogical approach. The first two semesters are comprised with an elective module (E) whose purpose is to cover for the different educational bachelor programme background of architectural and civil engineering students (in particularly in the 1st semester).

Additionally, the Master Course is comprised with the four compulsory modules (C) in 1st, 2nd 3rd semester. The courses in winter semesters, are be mainly taught by a combination of in-class and teaching methods, while the summer semester is open for field-work or in-situ teaching. The number of 6 ECTS (or 12 ECTS) credits are assigned per module.

With respect to Table 1, in the 1st year the students are provided with theoretical backgrounds on different disciplines with basic training on examples to learn the use of software and instruments. In the 2nd year the students are involved into the analysis and data collection from specific case studies where they can elaborate the idea for the final thesis.

The 4th semester is comprised with the research (laboratory or field work) oriented Master's (M. Sc.) thesis writing and submission (research-based learning) of total 20 ECTS, and prior to that, the compulsory training period e.g. professional practice (stakeholders) as a work-based learning pedagogical approach of total 10 ECTS. Each discipline introduces a more detailed information by considering the selected case study. The remaining credits are devoted to develop the analysis and solution proposals on the specific case study.

The project-based learning (PBL) in the 3rd semester of the 2nd study year is coordinated by the teacher(s) who coordinates the different contributions from other teachers.

Table 1. General structure of Master Course activities

Year	Semester	Pedagogical approach	Status: Compulsory (C) or	Module	Year	1st		2nd	
					Semester	1st	2nd	3rd	4th
					ECTS credits				
1st	1st Semester Total 30 ECTS Credits	Classroom-based learning (CBL)	E	Elective module	30	6			
			C	History of Architecture in Central Asia		6			
			C	Geomatics I		6			
			C	Structural Mechanics		6			
			C	Hydrogeology		6			
	2nd Semester Total 30 ECTS Credits		C	Restoration I: History and Theories	30		6		
			C	Geotechnical Engineering			6		
			C	Earthquake Engineering			6		
			C	Advanced Structural Mechanics			6		
			E	Elective module			6		
2nd	3rd Semester Total 30 ECTS Credits	Project-based learning (PBL)	C	Restoration II	30			6	
			C	Geomatics II				6	
			C	Seismic Protection of Historical Structures				6	
			C	Risk Assessment and Mitigation (Hydrogeology and Geotechnics				12	
	4th Semester Total 30 ECTS Credits	Work-based learning (WBL)	C	Training Period (Professional practice)	30				10
		Research-based learning (RBL)	C	Master Thesis (including laboratory research or field work)					20
				Total:	120 ECTS				

3.2. Elective Modules

With respect to the future job placement preferences and possibilities defined within preparation Work Packages type with ref. no. WP1 entitled “Assessment of skill and competence requirements” (lead organization: TTPU) and ref. no WP2 entitled “Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries” (lead organization: KPITTU) the student will select an elective module from the modules offered within the bachelor study programme.

The student with an architectural bachelor study programme background are allowed to select a module only from the variety of modules offered within the civil engineering bachelor programme. On the other hand, the students with a civil engineering bachelor study programme background are allowed to select a module only from the variety of modules offered within the architectural bachelor programme. In case that a Central Asia partner university provides only engineering or architectural bachelor study programme, the elective modules required by the study programme should be supplemented with the ancillary module topics i.e. MATLAB and CAD HBIM training. The elective modulus currently offered at SamSACII referring to architectural bachelor study programme are as follows: Adaptation of cultural assets; Transformations of cultural assets and Innovations in restoration.

The elective modules offered by KPITTU, TTU, TTPU, as well as engineering or equivalent ancillary elective modules at SamSCII Central Asia partners will be defined within development Work Package type with ref. no WP5 entitled “Teacher and staff training” (lead organization: BUW), respectively.

3.3. Specific Module Details

The specific module details are provided within integrated deliverables D3.2 entitled “Taxonomy of courses on Cultural Heritage Conservation in Central Asia” and D3.3 entitled “Description of courses on Cultural Heritage Conservation Central Asia”, and additionally, within the Work Package type with ref. no. WP4 entitled “Design and implementation of didactic tools for Cultural Heritage Conservation” (lead organization: POLITO) and ref. no WP5 entitled “Teacher and staff training” (lead organization: BUW), respectively.

The attending participants will work in teams composed of students of different undergraduate background. The project work will focus on case study problems, whereas the students have to apply the experimental techniques and equipment including some pre-studies for the proper selection and arrangement of the sensors. The project work will be completed by a final report.

3.4. Module Success Criteria

The specific module success criteria are provided within integrated deliverables D3.2 entitled “Taxonomy of courses on Cultural Heritage Conservation in Central Asia” and D3.3 entitled “Description of courses on Cultural Heritage Conservation Central Asia”.

3.5. Selection of Students

The selection of students for the Master Course will be done through a multi-stage process. All Central Asia partner universities will be responsible for selecting its candidates. Students will be selected based on: their pre-knowledge and motivation in the field of the course applied for; command of English; overall average grade in architectural or civil engineering courses. Students must meet language requirements to assure that they can fully participate in all activities: minimum English level B2 or equivalent.

The course is designed for 10 students per Central Asia partner University’s Faculties of Civil Engineering or Architecture (in total maximum 20 students). The enrolment criteria should be defined by each partner considering the equal participation of students with architectural or engineering background if more than 20 students apply. Following the recent world-wide trend, additional learning materials will be collected, elaborated and provided by the module leaders for self-training purposes, an e-learning platform will be arranged for each learning activity. Module leaders will provide course specific materials and tasks for the students to prepare themselves in advance to the course.

In addition, the project coordinators assigned by each Central Asia partner University i.e. head of the master course programme at each university will support the students in all kinds of questions.

4. Overall Pedagogical Approach

The theory and principles of peripatetic school (Peripatos), founded by Aristotle (384–322 BC), a Greek philosopher and polymath during the classical period in ancient Greece, are implemented into the Master Course structure. The term peripatetic is a transliteration of the ancient Greek word *περιπατητικός* (*peripatētikós*), which means "of walking" or "given to walking about", and in this case is referring to learning-by-doing in-situ with learner and teacher working together.

The overall pedagogical approach is providing a potential, besides the peripatetic learning and learning by doing set up scheme, and could additionally exploit the possibility of distant i.e. e-learning in order to overcome the obstacles caused by COVID-19 and other circumstances (e.g. international classroom environment).

The e-learning could optionally be provided by using the e. g. Moodle platform. The platform enables the evaluation and assessment of the individual learning activities as well as the applied e-learning tools that are centralized and conducted mainly via online feedback forms (established in the Moodle platform). It provides a possibility for the evaluation of the feedback to the learning activities and other events, and with regard to the applied e-learning tools used.

The Moodle platform possesses the basic and advanced possibilities, which teachers and learners can use, and is already setup at European partner universities, while it is accessible for Central Asia partner universities. On the basis of an exemplary course, the course setup, the provision and administration of documents, the sensible use of communication and collaboration tools and the development of automatically evaluable tasks are possible. The focus of Moodle is the use of communication and collaboration tools. These include forums, wikis, blogs, diaries (journals), videoconferencing and glossaries. In addition, the joint work in a chat room and the maintenance of a database could be discussed. By means of a demo course the participants will get a vivid insight into the handling of the different collaborative possibilities. The calendar of events and the corresponding time schedule could be built and tracked within Moodle environment. The advanced knowledge of the assessment tools integrated in Moodle, such as short quizzes, tests and tasks, but also graded forum contributions, could be included and exploited. The short quizzes or tests could be taught to be designed as participant self-evaluation or assessment tools. Special emphasis will be placed on the creation of automatically evaluable tests and the different types of tasks and questions available. Furthermore, the handling and the various ways of using the Grading Centre could be introduced.

5. Learning Outcomes

The potential outcomes of the proposed Master Course are described in detail within the dissemination Work Package type with ref. no. WP8 entitled “Dissemination and Exploitation”. With respect to the nature and purpose of the proposed Master Course, where students are bringing different background from their undergraduate education i.e. architectural or civil engineering, the category of the Master Course becomes truly multi-disciplinary. The Master Course also provide an opportunity to integrate the technical and non-technical skills of engineering and to develop a commitment to professional and social responsibility and ethical codes. Graduates from an accredited Master’s Course must comprehend the learning outcomes described below, including the acquisition of knowledge, with respect to i.e. build on their, entry (relevant) engineering discipline (architecture or civil engineering). The learning outcomes stated are at enhanced and extended levels, the balance of which will vary according to the content and aims of each module. Crucially, Master students will have the ability to integrate their prior knowledge and understanding of the discipline and engineering practice with the development of advanced level knowledge and understanding, to continue their education at postgraduate level, or to solve a substantial range of environmental engineering problems, that may be complex or novel. They will have acquired much of this ability through individual and/or group projects. Ideally some of these projects would have industrial involvement or be practice-based.

In general, the recognition of the learning outcomes will be arranged by the use of ECTS credit points. Beside the already existing recognition of the learning outcomes, the project meetings will be used to discuss the

recognition of the learning outcomes at all project partner institutions based on commonly agreed and unique performance equivalents, within Work Package type with ref. no. WP4 entitled “Design and implementation of didactic tools for Cultural Heritage Conservation” (lead organization: POLITO) and ref. no WP5 entitled “Teacher and staff training” (lead organization: BUW), respectively.

5.1. Science and Mathematics

Civil engineering and architectural education are necessarily relying on science and mathematics. With the main science and mathematical knowledge developed in an undergraduate programme, Masters graduates will therefore need additionally:

- A comprehensive understanding of the relevant scientific principles of the specialisation;
- A critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of the specialisation;
- Understanding of concepts relevant to the discipline, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.

5.2. Engineering Analysis

Engineering analysis involves the application of engineering concepts and tools to the solution of engineering problems. The main engineering analysis abilities are developed within an undergraduate programme; therefore, Masters graduates will additionally need:

- Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations;
- Ability to use fundamental knowledge to investigate new and emerging technologies;
- Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods.

5.3. Architectural and Engineering Design

Design at this level is the creation and development of an economically viable solution to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real and complex problems. The main design abilities will have been developed in an undergraduate programme; therefore, Masters graduates will additionally need:

- Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies;
- Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;
- Ability to generate an innovative design for products, systems, components or processes to fulfil new needs.

5.4. Economic, Legal, Social, Ethical and Environmental Context

Engineering activity can have impacts on the environment, on commerce, on society and on individuals. Master Graduates therefore need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate, including:

- Awareness of the need for a high level of professional and ethical conduct in engineering;
- Awareness that engineers need to take account of the commercial and social contexts in which they operate;
- Knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of the particular specialisation;
- Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate;
- Awareness of relevant regulatory requirements governing engineering activities in the context of the particular specialisation;
- Awareness of and ability to make general evaluations of risk issues in the context of the particular specialisation, including health & safety, environmental and commercial risk.

5.5. Professional Practice

The main engineering practice abilities will have been developed in an accredited engineering undergraduate programme. Master's graduates will need to demonstrate application of these abilities where appropriate and additional engineering skills which can include:

- Advanced level knowledge and understanding of a wide range of engineering materials and components;
- A thorough understanding of current practice and its limitations, and some appreciation of likely new developments;
- Ability to apply engineering techniques, taking account of a range of commercial and industrial constraints;
- Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.

5.6. Additional General Skills

Graduates must have developed transferable skills, additional to those set out in the other learning outcomes, that will be of value in a wide range of situations, including the ability to:

- Apply their skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities;
- Plan self-learning and improve performance, as the foundation for lifelong learning/CPD;
- Monitor and adjust a personal programme of work on an on-going basis;
- Exercise initiative and personal responsibility, which may be as a team member or leader.

6. Job Placement

The job placement possibilities are defined within preparation Work Packages type with ref. no. WP1 entitled "Assessment of skill and competence requirements" (lead organization: TTPU) and ref. no WP2 entitled "Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries" (lead organization: KPITTU).

7. Descriptions and Taxonomy of Modules

The modules list and their description were established by implementing the interdisciplinary approach i.e. by considering the specific disciplinary requirement in the field of restoration, structures, seismic engineering, geomatics, geotechnics and hydrogeology, and with respect of the student's background knowledge and education as described in WP1 and WP2, and Table 3.1 (next page).

7.1. The First Year of Study Programme

7.1.1. The First (Winter) Semester

General Information		
Module Coordinator / Lecturer	**To be determined**	
Module Title	History of Architecture in Central Asia	
Study Programme	Master of Science (M.Sc.) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	1st (Winter) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	40 + 0 + 20

Module description
Aims
The module will be used to study the history of central Asian architecture according to its periodization from ancient time to the beginning of XX century. Student will study also existing historical stiles of different architectural schools in Central Asian cities. The purpose of course is to prepare students to use historical materials for effective protection and restoration of Architectural Monuments in Central Asia.
Pre-requisites
Students should have prior knowledge of General History of Central Asia.
Intended Learning Outcomes

• Science and Mathematics, Engineering Analysis & Architectural and Engineering Design:
  • the ability to understand and analyse the history of the built heritage in Central Asia
  • the ability to individuate the different historical constructive phases of the built heritage
  • the ability to individuate and distinguish the technical and constructional elements of the built heritage
• Economic, Legal, Social, Ethical and Environmental Context, Professional Practice & Additional General Skills:
  • the ability to understand distributive and functional items related to the architectural character of the built heritage
  • the ability to recognize the importance of tangible and intangible value of the built heritage in Central Asia

Content		
General information about Central Asian architecture. Periodization of History Central Asian architecture. Architecture of antient time in Central Asian. Architecture of II century BC - IV century AD in Central Asian. Architecture of V century – VIII century in Central Asia. Architecture of IX century – VIII century in Central Asia. Architecture of IX century – VIII century in Central Asia. Architecture of XIV century – XV century in Central Asia. Architecture of XVI century – XVII century in Central Asia. Architecture of XVII century – XVIII century in Central Asia. Architecture of XIX century – beginning of XX century in Central Asia.		
Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☐ Exercises ☐ Distance education ☐ Field Trips	☐ Individual Assignments ☐ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☐ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)
Class attendance and participation, group project work, report and presentation

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	2,0	Group seminar work	2,0	Exam	2,0

Assessment Description
Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)
• Askarov Sh. Architecture of Timurids. Tashkent. 2009. • Askarov Sh. Genesis of Uzbekistan's Architecture. Tashkent. 2014. • Akhmedov M. History of Central Asian architecture. Tashkent. 1995. • Lavrov V. Town Building Culture of Central Asia. Moskow. 1950. • Pugachenkova G. Architecture of XV century in Central Asia. Tashkent. 1976. • Pulatov Kh. History of Town Building in Central Asia. Tashkent. 2008. • World Architecture History. Moskow. 1966.

Additional Reading List

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Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Course Coordinator / Lecturer	Usmanov Saidislomkhon (TTPU); Erkin Isakov (SamSACII); Bozorov Shamsiddin, Jafar Niyazov (TTU); Usmonjon Ahmedov (KPITTU)	
Course Title	Geomatics I	
Study Programme	Master of Science (M.Sc.) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	1st (Winter) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	40 + 20 + 0

Module description

Aims

The module aims to provide the theoretical knowledge bases necessary to understand the different phases of the metric survey of a building using the techniques of photogrammetry and terrestrial laser scanner as well as the knowledge useful for the management of territorial data through GIS platforms. Starting from these tools, the documents necessary for the cognitive and planning phases foreseen in the other courses will be generated.

Pre-requisites

Students must have a basic understanding of automatic drawing systems and a good command of the mathematical and physical foundations provided in previous studies.

Intended Learning Outcomes

- Science and Mathematics, Engineering Analysis, Architectural and Engineering Design & Additional General Skills:
  - the bases of the statistical treatment of the measurements in order to independently manage the evaluation of the metric qualities of the surveys carried out
  - the operating principles of terrestrial laser scanners
  - the principles of automatic digital photogrammetry
  - the registration of point clouds deriving from different technologies
  - the bases of GIS for the management of data of a territorial nature
  - the management of basic instruments and software
- Economic, Legal, Social, Ethical and Environmental Context:
  -

Content

Measurement treatment – 10 hours (1CFU); Metric survey planning – 5 hours (0.5 CFU); Terrestrial Laser scanner – 10 hours (1 CFU); Automatic digital Photogrammetry – 10 hours (1 CFU); GIS – 25 hours (2.5 CFU)		
Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☒ Exercises ☐ Distance education ☐ Field Trips	☒ Individual Assignments ☐ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation, group project work, report and presentation

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	3,0	Group project work	2,0	Report and presentation	1,0

Assessment Description

Individual assessment criteria proportion: 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory – Present for free on Digital Library))

- Notes on Geomatics I
- 3D Laser Scanning for Heritage – Ed. Historic England
- R. Letellier - Recording, Documentation, and Information Management for the Conservation of Heritage Places – Guiding principles
- BIM for Heritage – Ed. Historic England
- Metric Survey Specifications – Ed. Historic England
- Photogrammetric applications for Cultural Heritage – Ed. Historic England

Additional Reading List

- W. Linder - Digital Photogrammetry –SPRINGER ISBN: 978-3-540-92724-2
- E. Stylyanidis – Photogrammetric Survey for the recording and documentation of Historic Building – SPRINGER ISSN 2366-259X
- Principle of GIS (Digital Library)

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Structural Mechanics	
Study Programme	Master of Science (M.Sc.) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	1st (Winter) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	20 + 20 + 20

Module description

Aims

The course aims to provide the students with the necessary notions and tools to understand and interpret the mechanical behaviour of framed structures in relation to the assessment of their safety in terms of deformability (displacements), stability (critical loads) and strength (stress).

Pre-requisites

Students should have prior knowledge of Calculus (functions, derivatives, integrals, differential equations, vector and matrix).

Intended Learning Outcomes

- Science and Mathematics, Engineering Analysis, Architectural and Engineering Design & Additional General Skills:
  - to apply fundamental notions about the mechanical behaviour of structures and materials, in terms of strength, stability and deformability.
  - to solve the simplest models of evaluation of the structural response.
  - to select the relevant geometrical and mechanical parameters, as a function of the considered actions.
  - to properly assess the results obtained from the calculations, included those obtained with the computer.
  - to schematize and solve a simple framed structure by hands and with a simple open source software, and to provide the results in terms of internal forces and displacements of the structure.
  - to assess the strength of sections
- Economic, Legal, Social, Ethical and Environmental Context:
  -

Content		
Structural mechanics primer; Course introduction; Elastic rectilinear beams; Supports; Remarks on ineffective constraints; Remarks on internal forces T, N and M diagrams; Introduction to beam theory; Kinematics; Statics; Virtual work theorem; Constitutive equations; Geometrical properties of the cross section; Axial displacements; Deflection of beams; Stress definition; Physical meaning of the material properties; Elastic stresses (Saint Venant solutions): normal stress / tangential stress (shear) / tangential stress (torsion); Failure due to exceeding the strength limit in the cross sections (material failure theories). The course is delivered with lectures (both in presence and online through the Moodle platform) in order to present all the topics of the subject; attendance to all lectures is strongly recommended. Workshops and lectures organized in cooperation with experts from practice are also presented to students.		
Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☒ Exercises ☐ Distance education ☐ Field Trips	☒ Individual Assignments ☐ Multimedia and the Internet ☒ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)					
The assessment criteria of acquired knowledge, comprehension, and skills are based on the class attendance and participation) and on a written exam.					
Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	4,0	Group project work	1,0	Report and presentation	1,0

Assessment Description
Assessment criteria: class attendance 40%, written exam 60%. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)
• F. Beer, E. Russell Johnston, J. DeWolf, D. Mazurek, Mechanics of Materials, McGraw-Hill Science, 2011 • M. Salvadori, Why buildings stand up: the strength of architecture, W.W. Norton & Company, 1980

Additional Reading List
• A.J. Macdonald, Structure and Architecture, Routledge, 2019 • J. Stanford, Structural Analysis Made Easy: A practice book for calculating statically determined systems, 2018

Number of copies of obligatory literature in relation to the number of students currently attending course		
Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Hydrogeology	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	1st (Winter) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	40 + 0 + 20

Module description

Aims

Historic buildings in Tajikistan and Uzbekistan are made of rammed earth (pakhsa), roughly formed mud bricks (guvalya), more or less standardized mud bricks (adobe), half-timbered construction (a combination of wood and mud bricks called sintch) as well as brickwork and natural stone masonry. The course aims to convey the influence of surface and groundwater on such structures. Students will have the following knowledge and skills: sound expertise, i.e. understanding basic and selected specific aspects of hydrogeology. With regard to the topic of "groundwater in the building site", they can interpret hydrological and (hydro)geological boundary conditions of construction measures independently and correctly. Extension of methodological and self-competence as well as social competence by developing a project document in small groups.

Pre-requisites

There are no pre-requisites, but it would be advantageous to have base knowledge in geotechnics (soil mechanics) as well as in geology and geography of Central Asia.

Intended Learning Outcomes

- Science and Mathematics:
  - A comprehensive understanding of the relevant scientific principles of hydrogeology,
  - A critical awareness of current problems and/or new insights into the state of research in hydrogeology,
  - Understanding of concepts relevant to hydrogeology, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.
- Engineering Analysis:
  - Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods.
- Architectural and Engineering Design:

- Ability to understand the influence of groundwater with dissolved substances on the stability and durability of buildings made of natural stone, clay and brick masonry.
- Economic, Legal, Social, Ethical and Environmental Context:
  - Awareness of the fundamental relevance of hydraulic influences in designing engineering works that are sustainable from an economical and environmental point of view.
- Professional Practice:
  - Advanced level knowledge and understanding of the hydrological situation in different kind of soil and rock and under changing climatic conditions,
  - Ability to correctly identify and interpret the interaction of a wide range of engineering materials and groundwater.
- Additional General Skills:
  - Apply their skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities,
  - Plan self-learning and improve performance, as the foundation for lifelong learning/CPD.

Content

Basics of geology (designed for repetition and for students without prior geological knowledge), main minerals, soil and rock, cycle of rocks, sedimentology, discontinuity planes, etc.); Hydrological basics, with particular reference to the situation in Tajikistan and Uzbekistan and under the influence of climate change (precipitation, surface run-off, infiltration, etc.); Groundwater (GW) as part of the hydrological and (hydro)geological cycle, GW deposits and species, hydrogeological regions in Tajikistan and Uzbekistan; Basic features of pedology with GW-influenced soil types; GW movements in saturated and unsaturated soil as well as in rock (pore, fracture and karst aquifers); Permeability/ Coefficient of hydraulic conductivity (Darcy's law), standard laboratory tests (constant and falling pressure height) for various soils, estimate based on particle size distribution, influence of water temperature and Reynolds number, etc.); Geochemistry or geogenic GW quality and anthropogenic pollution and their influence on construction measures (e.g. concrete aggressiveness and rising damp in masonry); Exploration with conventional and geophysical methods, monitoring of GW movements, introduction into flow calculations with conventional and numerical methods; The course takes place partly as a project study, in which the students work on a hydrogeological topic in groups.

Suggestions for optional topics:

A half-day excursion on foot or by public transport could illustrate hydrogeological issues around the university (flood protection, construction sites, measuring of groundwater levels and sampling in boreholes and wells, GW-related damage to historical architecture, etc.).

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☒ Exercises ☐ Distance education ☒ Field Trips	☒ Individual Assignments ☒ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation including study of uploaded papers in the course, group project work, report and presentation, preparing for the exam, self-study and further education.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	2,0	Group project work	1,0	Report and presentation	0,67
Preparing for the exam	1,0	Self-study and further education	1,33		

Assessment Description

Individual assessment criteria proportion: 67 % written examination; 33 % written report and oral presentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Documents and slides uploaded to the current topics during the Moodle course
- Suitable literature found in the digital library of the ERAMCA project
- Hiscock, Kevin M. & Bense, Victor F. (3rd edition 2021): Hydrogeology: Principles and Practice (Wiley)
- Hölting, Bernward & Coldewey, Wilhelm G. (1st edition 2019): Hydrogeology (Springer)

Additional Reading List

- Hydrogeological writings and maps of the State Geological Services in Tajikistan and Uzbekistan,
- Sarsby, Robert W. (2nd edition 2013): Environmental Geotechnics (ici publishing).

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

7.1.2. The Second (Summer) Semester

General Information		
Module Coordinator / Lecturer	**To be determined**	
Module Title	Restoration I: History and Theories	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	Second (Summer) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0 Credits
	Format (Lectures + Exercises + Seminar)	40 + 0 + 20

Module description

Aims

The course is the first didactic moment concerning architectural restoration within the MSc in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets. Therefore, the significance of the value of the restoration discipline in the architectural field will be clarified, focusing on the relationship between conservation theory and practice. The course aims to provide students with adequate theoretical-methodological means to acquire critical skills in the protection, conservation, and restoration of architectural heritage.

Pre-requisites

The student must have acquired knowledge related to the History of Architecture (in various geographical context and especially in the Central Asia area), the fundamentals regarding technological culture and the ability to read an architectural organism thanks to the tools of drawing and representation.

Intended Learning Outcomes

- Architectural and Engineering Design:
  - to read and recognize main transformations and restoration interventions present within an architectural, urban, archaeological environment, etc. is expected,
  - to interpret main documents and international regulation;
  - to identify proper methods for documenting heritage within an architectural, urban, archaeological environment
  - these results, and others, are aimed at creating useful knowledge in the cultural and operational sphere in order to identify the most suitable choices to preserve, enhance and manage the Architectural and Landscape Heritage

Content		
First part: European architecture and restoration (1 credit); Introduction to the history of Restoration in Europe Restoration in the early 19th century in Italy and France; E. E. Viollet le Duc and J. Ruskin; The Italian panorama I, II; Restoration in the late 19th century and the early 20th century; The 20th century theories, restoration's contemporary theory Second part: Central Asian architecture and restoration (2 credits); General information about Central Asian architecture; Early middle ages architecture in Central Asia (V-VIII cc.); Restoration in the Renaissance of Central Asia in medieval (IX-XIII cc. 20th years); Restoration of the Timurid period architecture in Central Asia (XIII cc. 20th years –XV c.); Restoration in the Central Asian khanate period (XVI-XX cc); Restoration of the Khiva khanate traditional architecture (beginning of the XVI c. –till 1920 years); Restoration of the Bukhara emirate traditional architecture; Restoration of the Kokand khanate traditional architecture Third part: International law for preservation (1 credit); International Chartres for preservation; Activity of international bodies in Cultural Heritage preservation; ICOMOS and its agreements on Central Asian monuments; Exclusion of Central Asian several buildings from the UNESCO Heritage List. Fourth part: Restoration project (2 credits); Survey of materials, degradation, restoration technique; Restoration project: analysis and design; Restoration project: historical building reuse for cultural purposes.		
Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☐ Exercises ☐ Distance education ☐ Field Trips	☒ Individual Assignments ☒ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)
Class attendance and participation, group project work, report and presentation

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	2,0	Group project work	0,0	Report and presentation	2,0
Exam	2,0				

Assessment Description
Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Jokilehto, Jukka; A History of Architectural Conservation, London, Routledge, 2018.
- Glendinning, Miles; The Conservation Movement: a History of Architectural Preservation. Antiquity to Modernity, London - New York, Routledge, 2013.
- Caccia, Susanna; Restoration in a few word: methodology and techniques, Whuan, 2013.
- Bandarin, Francesco; Van Oers, Ron; The Historic Urban landscape. Managing heritage in an urban century, Wiley Blackwell, 2012.
- Brandi, Cesare (edited by Basile Giuseppe) Theory of Restoration, Firenze, Nardini, 2005.
- Inglese, Carlo; Ippolito, Alfonso; Analysis, Conservation and Restoration of tangible and intangible cultural heritage, Hershey, 2019.
- Mastropietro, Mario (edited by); Restoration and beyond: Archutecture from conservation to conversion. Project and works by Andrea Bruno (1960-1995), Milano, Lybra 1996.

Additional Reading List

- B.Azizova, A.Osello (2020) Integration of natural elements into the traditional house (of Khorezm region, Uzbekistan) for the climate improvement, Environmental Engineering 7(1), 43-49 pp., DOI: 10.37023/ee.7.1.6
- B.Azizova (2017) Architectural Longevity-in the Case of the Summer Palace Chandra-Hauly in Khiva City, Uzbekistan, MOJ Civil Eng. 2(5), 158-160 pp. DOI: 10.15406/mojce.2017.02.00045
- B. Azizova (2015) Architectural Proportioning of Madrassas in Khiva, Uzbekistan. J Archit Eng Tech 4, 143 p. DOI:10.4172/2168-9717.1000143

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Geotechnical Engineering	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	Second (Summer) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	40 + 20 + 0

Module description

Aims

The course is devoted to give the students some basics of soil and rock mechanic and engineering problems related to these materials, with the aim of providing a homogeneous basic knowledge of these topics to all the students, independently from their knowhow. The course will give the students the ability of interpreting the results of the usual lab and in situ tests performed to characterize soils and rocks, evaluating the most representative parameters in terms of strength and deformability behaviour.

Pre-requisites

Students should have prior knowledge of Structural Mechanics.

Intended Learning Outcomes

- Science and Mathematics:
  - A comprehensive understanding of the relevant scientific principles of soil and rock mechanics
  - A critical awareness of current problems and/or new insights in Geotechnics
  - Understanding of concepts relevant to the discipline, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.
- Engineering Analysis:
  - Ability to use fundamental knowledge to investigate new and emerging technologies
  - Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods.
- Architectural and Engineering Design:
  - Ability to understand the fundamental influence of soil and rock mechanical properties on the stability of structures and infrastructures.

- Economic, Legal, Social, Ethical and Environmental Context:
  - Awareness of the fundamental relevance of soil and rock mechanics in designing engineering works that are sustainable from an economical and environmental point of view.
  - Professional Practice:
  - Ability to correctly identify and interpret the interaction between soil/rock and engineering structures and infrastructures
- Additional General Skills:
  - Apply their skills in problem solving, communication, working with others, and the effective use of general IT facilities
  - Plan self-learning and improve performance
  - Monitor and adjust a personal programme of work on an on-going basis

Content

Physical characteristics of soil; Atterberg limits; Stresses in soil; Water in soil: drained and undrained conditions; Lab and in situ tests for soil characterization; Soil strength criteria; Settlements and consolidation; Active and Passive lateral earth pressure; Nature of rock and rock masses. The geotechnical model; Discontinuities representation; Rock matrix mechanical characterization (and lab tests); Discontinuities mechanical characterization (and lab tests); Rock mass classifications; Rock mass mechanical characterization (and in situ tests).

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☒ Exercises ☐ Distance education ☒ Field Trips	☒ Individual Assignments ☐ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation, group work, written and oral exam

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	4,0	Group project work	1,0	Reports on exercises and discussion	0,6
Field trips	0,4				

Assessment Description

Individual assessment criteria proportion: e.g. 10 % Report on exercises and discussion; 50 % Oral exam; 40% Written exam. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)
• Documents and slides uploaded during the course • R. Lancellotta (2009). "Geotechnical Engineering" 2nd edition. Taylor & Francis, Abingdon (UK) and New York (USA) • I. Smith (2014). “Smith's Elements of Soil Mechanics” 9th edition. Wiley (US) • John A. Hudson and John P. Harrison (1997) 1st edition. “Engineering Rock Mechanics”. Elsevier Science
Additional Reading List
• E. Hoek, J. Bray (1981). “Rock slope engineering«. Spon press • Robert W. Sarsby (2013) 2nd edition. “Environmental Geotechnics”. Ici publishing
Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled “Design and implementation of didactic tools for Cultural Heritage Conservation” (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences
Written exam (40% of the final grade), oral exam (50% of the final grade) and reports on exercises and discussion (10% of final grade), in the examination period at the end of the semester

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Earthquake Engineering	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	Second (Summer) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	30 + 28 + 2

Module description

Aims

The module aims to provide principles and practices for dealing with seismic engineering problems. After an introduction to dynamic systems and their response to earthquakes, the main methods of seismic analysis will be presented and discussed. The exercise lessons, consisting of both numerical and design applications, introduce students to modern numerical tools for earthquake engineering, and help them in the use of international standards and rules for structures in seismic areas.

Pre-requisites

Students should have prior knowledge of mathematics and mechanics.

Intended Learning Outcomes

- Science and Mathematics:
  - A comprehensive understanding of the relevant scientific principles of the specialisation
- Engineering Analysis:
  - Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations
- Architectural and Engineering Design:
  - Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies.
- Additional General Skills:
  - Apply skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities

Content
Seismic response. Response of elementary structures to arbitrary dynamic excitation: frequency domain and time domain approaches. Elements of signal analysis and spectra. Response spectra. Experimental evaluation of damping. Direct integration of the equations of motion, time stepping methods. Basic concepts of seismic isolation. Modal analysis of discretized systems. Non-classically damped systems. Distributed mass systems. Use of FEM in earthquake engineering and dynamics. Elements of experimental modal analysis. Structural reliability and seismic risk. Basic concepts of structural reliability. Elements of applied seismology, attenuation relationships and seismic scales. Seismic hazard analysis, Cornell's method. Vulnerability of exposed values. Seismic analysis. Elasto-plastic oscillator and ductility demand. Inelastic response spectra. Linear and non-linear (push-over) static analysis. Modal analysis: response spectrum analysis; response history analysis with artificial accelerograms. Application of modern seismic analysis tools (ETABS, SAP2000, etc.). Earthquake-resistant building design. Experiences learned from recent earthquakes: masonry, reinforced concrete, steel, timber buildings, bridges, special and hazardous structures etc. Seismic code development. Design of structures and regularity criteria for earthquake resistance; performance and experience-based design concepts; rules for engineered buildings (R/C, steel, masonry) and non-engineered buildings. Global ductility criteria and capacity design. Local ductility criteria and structural detailing for seismic areas. Soil-Structure interaction.

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☒ Exercises ☒ Distance education ☐ Field Trips	☐ Individual Assignments ☒ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)
Class attendance and participation, group project work, report and presentation

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	2,0	Group project work	2,0	Report and presentation	2,0

Assessment Description
Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Lecture notes of the Earthquake Engineering module
- International standards for constructions in seismic areas

Additional Reading List

- Dynamics of structures / Ray W. Clough, Joseph Penzien, 1993.
- Dynamics of structures: theory and applications to earthquake engineering/ Anil K. Chopra, 2005.
- Fundamentals of earthquake engineering / Nathan M. Newmark, Emilio Rosenblueth, 1971.
- Theoretical and experimental modal analysis/ Nuno MM Maia, Julio MM Silva, 1997.

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Advanced Structural Mechanics	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	Second (Summer) Semester (1st Year)	
Pedagogical Approach	Classroom-based learning (CBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	20 + 20 + 20

Module description

Aims

The course will be used to apply classical structural analysis methods to civil engineering systems, with emphasis on historical buildings. The course is delivered with lectures (both in presence and online through the Moodle platform) in order to present all the topics of the subject; attendance to all lectures is strongly recommended. A case-study project, to be carried out step by step during the course is assigned to groups of students (3-4 individuals). This assignment will be delivered at the end of the course and contribute to the final evaluation. Workshops and lectures organized in cooperation with experts from practice are also presented to students.

Pre-requisites

Students should have prior knowledge of “Structural Mechanics”.

Intended Learning Outcomes

- Science and Mathematics, Engineering Analysis, Architectural and Engineering Design & Additional General Skills:
  - capable of assessing the stability of structural elements and the strength of truss structures
  - able to understand the behaviour of curved beams, arches, plates and domes.
  - able to solve simple statically indeterminate structures.
  - able to understand the behaviour of simple structures loaded by dynamic forces (earthquakes).
  - able to properly assess the results obtained from the calculations, included those obtained with the computer for a case study.

Content

Course introduction; Failure due to elastic instability; Truss structures; Curved beams (arches), general aspects of plates and shells (domes). Unit load method: Displacement calculation; Statically indeterminate structures; Structural dynamics; Introduction to numerical methods and to structural software (SAP2000).		
Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☒ Exercises ☐ Distance education ☐ Field Trips	☐ Individual Assignments ☐ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

The assessment criteria of acquired knowledge, comprehension, and skills are based on the class attendance and participation, the results of case-study project (report and presentation) and a on a written exam.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	2,0	Group project work	2,0	Report and presentation	2,0

Assessment Description

Assessment criteria: class attendance 20%, case-study project (final report and presentation) 40%, written exam 40%.

Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- D. Johnson, Advanced structural mechanics An introduction to continuum mechanics and structural mechanics, Thomas Telford Limited 2000
- E.L. Wilson, Three-Dimensional Static and Dynamic Analysis of Structures – A Physical Approach with Emphasis on Earthquake Engineering, Computers & Structures Inc., 2002
- J.N. Reddy, Energy Principles and Variational Methods in Applied Mechanics, 3rd edition, Wiley, 2017. ISBN: 978-1-119-08737-3
- A.I. Rusakov, Fundamentals of Structural Mechanics, Dynamics, and Stability
- A.J.M. Ferreira, N. Fantuzzi, MATLAB Codes for Finite Element Analysis, 2nd Edition, Springer, 2020. ISBN: 978-3-030-47951-0

Additional Reading List

- R. Szilard, Theories and Applications of Plate Analysis, John Wiley & sons Inc., 2003
- S. Timoshenko, S. Woinowsky-Krieger, Theory of Plates and Shells, 2nd ed., McGraw-Hill Book Company, New York,

- Mario Como, Statics of Historic Masonry Constructions, Springer Series in Solid and Structural Mechanics, Volume 9, 2016.
- Bahman Ghiassi and Gabriele Milani, Numerical Modeling of Masonry and Historical Structures, Woodhead Publishing Series in Civil and Structural Engineering, 2019.

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

7.2. The Second Year of the Study Programme

7.2.1. The Third (Winter) Semester

General Information		
Module Coordinator / Lecturer	**To be determined**	
Module Title	Restoration II	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	3rd (Winter) Semester (2nd Year)	
Pedagogical Approach	Project-based learning (PBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	20 + 0 + 40

Module description.
Aims
The Restoration contribution inside the Project Work aims to provide the student of the Master with a training course dedicated to dialogue and integration between Restoration and Structural Rehabilitation; approaching the item in a multidisciplinary way. The course concerns the restoration project of historical buildings affected by structural damages and instabilities, at architectural scale, considering both the case of interventions on damaged constructions and those for the damage prevention.
Pre-requisites
The basic knowledges of the courses of “History of Architecture in the Central Asia” and “Restoration I: History and Theories” must be considered as already acquired, together with the basics of architecture drawing and survey. For a full comprehension of the structural topics related to this Course in the Project Work, it is necessary to hold the knowledges presented in the course of “Structural Mechanics”.
Intended Learning Outcomes

• Architectural and Engineering Design:
  • The ability to understand, analyse and represent the material, historic and cultural consistency of the built heritage, coming to the identification of criticality and potential.
  • The ability to individuate and represent the different constructive phases of the built heritage.
  • The ability to individuate and represent the technical and constructional elements of the built heritage.
  • The ability to analyse the structural behaviour of the building assessing the necessity of a structural intervention (together with Structural Course).

- The ability to recognise and represent the structural damages and crack patterns.
- The ability to apply structural solutions related to the architectural character of the built heritage (together with Structural Course).
- The ability to apply distributive and functional solutions related to the architectural character of the built heritage.
- The ability to work in a project team providing specific cultural and technical skills.

Content

The Project Work is organized as a multidisciplinary training course shared between all the disciplines that are part of the Master itself. A unique project will be developed on a specific case-study (or multiple case studies) which will have as priority the preservation of the tangible and intangible values of the architectural heritage within the structural rehabilitation. The aim is providing the community with its architectural heritage, exhibiting new functions and new role within the context. The Course consists in ex-cathedra lessons, on-site visit to the case-study, exercises and reviews of the project. The lessons take almost one third of the whole teaching schedule time (15/18 hours) and they will constitute the fundamentals for developing the project.

The topics will include:

- methodologies for the contemporary restoration project (examples and critical analyses) (2 hours);
- constructive systems and techniques in the historical buildings (2 hours);
- Identity and memory, intangible values (2h).
- survey for the restoration project (2 hours) (with Geomatics);
- mapping and analysis of the status of defects (2 hours);
- legislative reference framework and their adjustments (2 hours);

the project of the restoration intervention and the theoretical debate on the design choices (3 hours).

The lectures aim at providing the student with the necessary skills for developing a practical exercise of architectural and structural restoration project, regarding a case-study in ancient-new dialogue. Furthermore, one or more on-site visit to the case-study is/are planned with the teachers and the opportunity of meetings with local Authorities is also planned.

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☐ Exercises ☐ Distance education ☐ Field Trips	☒ Individual Assignments ☒ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation, group project work, report and presentation. The project is developed by teams of 2-4 students. The time dedicated to the project is divided in two parts, with an intermediate check about the state of the work of each team.

The first part (8/10 weeks) is articulated in lectures, on-site visit, analysis and exercises while the second part (4/6 weeks) is entirely dedicated to the project. The exercises (developed individually or by teams) are mainly conducted during the first weeks of the Atelier.

The second part is entirely devoted to the redaction of the project.

During the first meeting a detailed schedule time will be given to the students: the teachers will indicate the deadlines, the joint review meetings where each group is required to document the progress of work with a presentation and which will constitute a mid-term evaluation.

During the hours dedicated to classroom work and reviews (which will take place with joint meetings with all the teachers of all the disciplines, and moments of individual interview for each discipline) observations on the work carried out will be noted from the teachers and the groups will be informed of the mid-term evaluation of the progress of the work.

Even though the project is developed by team, each student will be independently responsible of the whole work.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	1,0	Group project work	2,0	Report and presentation	1,0
Exam	2,0				

Assessment Description

Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- J. Earl, Building Conservation Philosophy, Donheat, Shaftesbury 2003
- C. Brandi, Theory of restoration, Nardini Editore, Firenze 2005 (1st ed. in Italian, 1963)
- T. Arrhenius, The Fragile Monument: On Conservation and Modernity, Black Dog Publishing, London 2011
- G. Carbonara, An Italian contribution to architectural restoration, in “Frontiers of Architectural Research”, vol. 1, Issue 1, March 2012, pp. 2-9
- "Journal of Architectural Heritage",
- "Journal of Cultural Heritage"
- The references will be integrated during the Course for allowing specific investigations on some topics or according to the student’s request.

Note:

The teachers will use the Teaching Portal for uploading the material necessary for developing the project and for sharing with the student of the Atelier the registered lectures and/or the written presentations of the lectures. The portal will also be used to upload links and study materials in pdf or dwg format, as well as hosting the students' works that will be examined by the teachers.

Additional Reading List

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Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students

To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Course Coordinator / Lecturer	Usmanov Saidislomkhon (TTPU); Erkin Isakov (SamSACII); Bozorov Shamsiddin, Jafar Niyazov (TTU); Usmonjon Ahmedov (KPITTU)	
Course Title	Geomatics II	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	3rd (Winter) Semester (2nd Year)	
Pedagogical Approach	Project-based learning (PBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	0 + 30 + 30

Module description

Aims

The course aims to assist the students engaged in a practical metric survey of the site selected for the Master application on real cases. Students will plan the metric survey strategy, acquire the primary data, manage the primary data to generate 3D models, generate final deliverables of the metric survey

Pre-requisites

Students must have a knowledge of the basics on metric survey, Terrestrial Laser Scanner and automatic digital photogrammetry primary data acquisition and management, use of CAD and GIS platforms.

Intended Learning Outcomes

- Science and Mathematics, Engineering Analysis, Architectural and Engineering Design & Additional General Skills:
  - Planning of a metric survey of a real site
  - Point clouds acquisition
  - Modelling of point clouds to generate 3D models
  - Generating 2D and 3D database
  - Generating 2D drawings from 3D models

Content

Planning of the metric survey of the selected site (5 hours); Primary data acquisition (20 hours); Data management (35 hours).

Type of Instruction (Double Click to Mark the Empty Box)	☐ Lectures	☒ Individual Assignments

	☒ Seminars and Workshops ☒ Exercises ☐ Distance education ☒ Field Trips	☐ Multimedia and the Internet ☒ Laboratory ☒ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation, group project work, report and presentation

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	1,0	Group project work	4,0	Report and presentation	1,0

Assessment Description

Individual assessment criteria proportion: 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List

- Notes on Geomatics II
- QGIS Training manual
- Blender manual
- Cloud Compare user manual
- Metashape user manual
- RECAP PRO User manual
- RECAP PHOTO User manual

Additional Reading List

- R. Eppich - Recording, Documentation, and Information Management for the Conservation of Heritage Places – Illustrated examples (Digital Library)
- Understanding historical building – Ed. Historic England (Digital Library)
- Understanding Place – Ed. Historic England (Digital Library)

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences
Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content: - quality of counselling and accessibility of information; - general procedure of the activity; - content; - problems encountered. Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content: - learning outcomes; - achieved / trained competencies; - benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Seismic Protection of Historical Structures	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	3rd (Winter) Semester (2nd Year)	
Pedagogical Approach	Project-based learning (PBL)	
Credits and Format	ECTS	6,0
	Format (Lectures + Exercises + Seminar)	30 + 26 + 4

Module description

Aims

The module concerns the general methodological criteria that should drive the selection and implementation of seismic protection measures suited for architectural heritage structures. For heritage assets it is essential to define the target levels of seismic performance, in order to reconcile the protection of human life and the conservation of cultural value. This usually requires more accurate models for the prediction of the seismic response, and therefore experimental investigations to improve the state of knowledge of the artefact.

Pre-requisites

Students should have prior knowledge of the fundamentals of earthquake engineering.

Intended Learning Outcomes

- Science and Mathematics:
  - Understanding of concepts relevant to the discipline, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.
- Engineering Analysis:
  - Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations.
- Ability to use fundamental knowledge to investigate new and emerging technologies.
- Architectural and Engineering Design:
  - Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
- Economic, Legal, Social, Ethical and Environmental Context:
  - Awareness of the need for a high level of professional and ethical conduct in engineering.

- Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate.
- Awareness of relevant regulatory requirements governing engineering activities in the context of the particular specialisation.

- Professional Practice:
  - Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.
- Additional General Skills:
  - Apply skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities.
  - Exercise initiative and personal responsibility, which may be as a team member or leader.

Content

Structural reliability and basis of structural design. Social perception of risk. Standards of structural and seismic safety. Safety and conservation requirements. International standards for seismic design. International guidelines and deontological codes for historical buildings (ICOMOS-ISCARSAH, EU-India Economic Cross-Cultural Programme, Italian guidelines for evaluation and mitigation of seismic risk to cultural heritage, etc.). Seismic improvement and seismic safety indices.

Structural investigations. Geometric survey, historical analysis and anamnesis, construction materials and conservation states, mechanical properties of materials, soil and foundations. Dynamic tests and Structural Health Monitoring. FE Model Updating. Periodic and continuous monitoring programs for historical buildings.

Seismic protection strategies. Resistance. Ductility. Isolation and dissipation: systems and devices for passive control. Active, hybrid and semi-active control. Seismic monitoring networks and early warning systems.

Seismic interventions on historical buildings. Experiences learned from recent earthquakes: masonry buildings, religious buildings and structures with large halls, towers, bridges; archaeological ruins; minarets; castles and fortresses; art objects; 20th century architectures. Models and methods for the seismic assessment of historical buildings. Classification and selection of seismic protection interventions. Review of strengthening interventions on masonry, timber, concrete, steel etc. Field trip and survey on an historical building located in a seismic area.

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☒ Seminars and Workshops ☒ Exercises ☐ Distance education ☒ Field Trips	☒ Individual Assignments ☒ Multimedia and the Internet ☐ Laboratory ☐ Mentoring ☐ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation, group project work, report and presentation.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	2,0	Group project work	2,0	Report and presentation	2,0

Assessment Description

Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Lecture notes of the Seismic Protection of Historical Structures module
- International standards for constructions in seismic areas
- International guidelines for evaluation and mitigation of seismic risk to cultural heritage

Additional Reading List

- Historic construction and conservation: materials, systems and damage / Pere Roca, Paulo B Lourenço, Angelo Gaetani, 2020.
- Earthquake-Resistant Design of Masonry Buildings/ Miha Tomazevic, 1999.
- The Conservation and Structural Restoration of Architecture Heritage: Theory and Practice / Giorgio Croci, 1998.
- Masonry Structures: Behavior and Design / Robert Drysdale, Ahmad Hamid, 2008.

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information

Module Coordinator / Lecturer	**To be determined**	
Module Title	Geotechnical and Hydrogeological Risk Assessment and Mitigation	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	3rd (Winter) Semester (2nd Year)	
Pedagogical Approach	Project-based learning (PBL)	
Credits and Format	ECTS	12,0
	Format (Lectures + Exercises + Project Work)	60 + 20 + 40

Module description

Aims

The course is devoted to give the students basic practical tools useful for facing the risk assessment of cultural and historical heritages. The interaction between soil/rock/water and structures/infrastructures is analysed and the solution for the related engineering problems are described.

Pre-requisites

Students should have prior knowledge of Structural Mechanics, Geotechnics and Hydrogeology.

Intended Learning Outcomes

- Science and Mathematics:
  - A comprehensive understanding of the relevant engineering problems related to the interaction between soil/rock/water and structures/infrastructures
  - Understanding of concepts relevant to the discipline, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.
- Engineering Analysis:
  - Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods.
- Architectural and Engineering Design:
  - Ability to understand the main problems related to the influence of environmental characteristics on the historical assets.
- Economic, Legal, Social, Ethical and Environmental Context:
  - Awareness of the fundamental relevance of risk assessment in managing, maintaining and protect the historical and cultural heritage.

- Professional Practice:
  - Ability to choose and design the best mitigation measure of geotechnical and hydrogeological risk for historical and cultural assets
- Additional General Skills:
  - Apply their skills in problem solving, communication, working with others, and the effective use of general IT facilities
  - Monitor and adjust a personal programme of work on an on-going basis
  - Exercise initiative and personal responsibility, which may be as a team member or leader.

Content

Part Hydrogeology (consists of lectures and exercises); Groundwater movements horizontally and vertically in alternating sedimentary layers of cohesive and non-cohesive soils under changing climatic conditions. Groundwater management for excavation pits and for the protection of historical sites (drainage, wells, multi-well systems, hydraulic heave). Influences of the groundwater on embankments and natural slopes as well as measures to protect them, stability of dams and dikes built to protect cultural heritage assets. Effect of salts on earthen building materials deterioration after humidity cycling. Geogenic and anthropogenic pollutants (e.g. heavy metals from mining areas or hydrocarbons) in soil and groundwater, vulnerability analysis using current criteria, adapted decontamination measures. Restoration of hydrogeological conditions after completion of a construction project (could be combined with a model area, for which the students develop solutions based on the lecture).

Part Geotechnics (consists of lectures and application also by using appropriate codes); Soil slope stability; Rock slope stability (sliding, rockfall); Foundations; Retaining walls; Stabilization systems; Ground improvement techniques; Foundation remediation.

Suggestions for optional topics:

Lectures by external experts (e.g. from Cultural Heritage Preservation Authorities or Geological Surveys) serve to connect theory and practice.

A one-day field excursion to Cultural Heritage Assets in the region is intended to familiarize students with the historic architecture and the building materials used, as well as to show the environmental hazards to which they are exposed. It is to be carried out by a hired coach or by public transport.

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☒ Exercises ☐ Distance education ☒ Field Trips	☒ Individual Assignments ☒ Multimedia and the Internet ☒ Laboratory ☐ Mentoring ☒ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

Class attendance and participation including study of uploaded papers in the course, reports on projects and discussion, field trips

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	4	Group project work	3	Reports on projects and discussion	1
Field trips	0,4	Self-study	3,6		

Assessment Description

Oral exam in the examination period at the end of the semester (60% of final grade) and written project report with oral defence (40% of final grade).

Individual assessment criteria proportion: 60 % oral exam; 40 % written project report and oral presentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Documents and slides uploaded to the current topics during the Moodle course,
- Suitable literature found in the digital library of the ERAMCA project.

Additional Reading List

- Mitchell, J. K. & Soga, K. (2005): Fundamentals of Soil Behavior.- 3rd Edition, John Wiley & Sons (New York)
- ICOMOS-ISCS (2008): Illustrated glossary on stone deterioration patterns. - International Council on Monuments and Sites, International Scientific Committee for Stone Vol. XV, 78p. (Paris)
- E. Hoek, J. Bray (1981). "Rock slope engineering«. Spon press

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

7.2.2. The Fourth (Summer) Semester

General Information		
Module Coordinator / Lecturer	**To be determined.**	
Module Title	Professional Practice	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	4th (Summer) Semester (2nd Year)	
Pedagogical Approach	Work-based learning (WBL)	
Credits and Format	ECTS	10
	Format (Lectures + Exercises + Seminar)	15 + 240 + 45

Module description

Aims

The course has the aim to develop main engineering practice skills and abilities to apply the acquired knowledge and competencies to the professional context and to use them properly on selected case studies. Students will demonstrate ability to solve specific tasks and to create a report on the implementation of work tasks during the performance of professional practices.

Pre-requisites

There are no pre-requisites.

Intended Learning Outcomes

- Advanced level knowledge and understanding of a wide range of engineering materials and components
- A thorough understanding of current practice and its limitations, and some appreciation of new developments and trends
- Ability to apply engineering techniques, considering wide range of construction market constraints
- Understanding different roles and tasks within an engineering team and the ability to provide initiative and personal responsibility, as a team member or as a leader.

Content

- Introduction to the organization, functioning, system of work and the core business of the business entity, institution or organization in which the professional practice will be performed
- Workplace health and safety

- Information security practices and awareness
- Instructions for equipment handling
- Communication and team work

Type of Instruction (Double Click to Mark the Empty Box)	☒ Lectures ☐ Seminars and Workshops ☐ Exercises ☐ Distance education ☐ Field Trips	☐ Individual Assignments ☐ Multimedia and the Internet ☐ Laboratory ☒ Mentoring ☐ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)

During the practice: attending a professional practice and taking notes to a practice report, employer's certificate as proof of completed practice

After the practice: preparing a written report describing the activities and tasks performed during practice and presentation of the main results achieved.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)

Class attendance and participation	0,5	Group project work	0,0	Report and presentation	1,5
Practice	8,0				

Assessment Description

Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % Literacy and documentation.

Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)

- Summary - Green jobs and occupational safety and health: Foresight on new and emerging risks associated with new technologies by 2020, available at: https://osha.europa.eu/en/publications/summary-green-jobs-and-occupational-safety-and-health-foresight-new-and-emerging-risks/view
- Peter Hartley and Clive G. Bruckmann, Business Communication, Routledge, 2002, available at: https://www.lsms.ac/public/uploads/YbBkW8F7LAVRLjc7RZJh9PVbojT8dkUv8DV0d4iF1YKVh8Bywd1575394856ZiK14FBsdZIJoyn9O7Yp4gTIui0ioob62VKDTlEWmjzs8rkSeE.pdf
- Richard House, Richard Layton Jessica Livingston, Sean Moseley The Engineering Communication Manual, Oxford Press, 2016
- Will Scott and Bertil Billing, Communication for professional engineers, Second edition, ICE Publishing, Thomas Telford Publishing, 1998

- Emerging and Future Risks Framework - Introductory Manual, ENISA, Jeremy Ward, ExecIA LLP, 2010 available at https://www.enisa.europa.eu/publications/emerging-and-future-risks-framework-introductory-manual

Additional Reading List

- https://engineeringmanagementinstitute.org/book/
  Podcasts:
- https://www.macslist.org/top-career-podcast-guide-2019

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined within the Work Package with ref. no. WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation" (lead organization: POLITO)		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

General Information		
Module Coordinator / Lecturer	**To be determined.**	
Module Title	Master Thesis	
Study Programme	Master of Science (MSc) Study Programme in Environmental Risk Assessment and Mitigation on Cultural Heritage Assets	
Status	Compulsory (C)	
Semester (Year)	4th (Summer) Semester (2nd Year)	
Pedagogical Approach	Research-based learning (RBL)	
Credits and Format	ECTS	20
	Format (Lectures + Exercises + Seminar)	0 + 0 + 0

Module description

Aims

A thesis presents a student's research results, describing the research with reference to relevant work in the field. It will include a description of the methods of research considered, and those actually employed, and present the student's conclusions. It is essential that any use of another author's work is properly acknowledged. The thesis is the student's own work and must be written by the student.

Pre-requisites

There are no pre-requisites.

Intended Learning Outcomes

- demonstration of knowledge and understanding that is founded upon and extends and/or enhances that typically associated with Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context;
- application of knowledge, understanding, and problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study;
- the ability to integrate knowledge and handle complexity, and formulate judgements on a body of information, and to reflect on social and ethical responsibilities linked to the application of their knowledge and judgements;
- communication of conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously;
- the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous e.g. the degree of doctor of philosophy

Content		
It is essential that the student discusses general layout and referencing conventions with his/her supervisors to ensure that subject or discipline-specific requirements or rules are followed right from the start. Supervisors are expected to provide constructive criticism and feedback on the thesis during candidature; however, supervisors should not be requested to provide English language training or undertake proof-reading.		
Type of Instruction (Double Click to Mark the Empty Box)	☐ Lectures ☐ Seminars and Workshops ☐ Exercises ☐ Distance education ☐ Field Trips	☒ Individual Assignments ☐ Multimedia and the Internet ☒ Laboratory ☒ Mentoring ☐ Various: Group Assignments
Additional Notes	The official course language is English, Uzbek, Tajik or Russian.	

Assessment Criteria (Class Attendance, Seminar Paper, …)
In assessing a thesis, the examiners will bear in mind the standard and scope of work which it is reasonable to expect a capable and diligent student to present after a period of time equivalent to the minimum candidature period for the degree being examined.

Assessment (ECTS Points of the Total; 1 ECTS = 30 Hours of Work)					
Class attendance and participation	0	Group project work	0	Report and presentation	0
Thesis	20				

Assessment Description
Individual assessment criteria proportion: e.g. 30 % Presentation; 60 % Report; 10 % literacy and documentation. Attained points (percentages) in relation to grades: 90 – 100 % excellent (5); 80 – 89.9 % very good (4); 70 – 79.9 % good (3); 60 – 69.9 % sufficient (2); 0 – 59.9 % insufficient (1).

Reading List (Obligatory)
To be determined.

Additional Reading List
To be determined.

Number of copies of obligatory literature in relation to the number of students currently attending course

Title	Number of copies	Number of students
To be determined.		

Quality assurance methods that ensure the acquisition of the output of knowledge, skills and competences

Monitoring and evaluation of learning outcomes achieved through individual assessment criteria and class attendance and participation. Each participant will have to complete a survey form i.e. questionnaire sent by e-mail with following content:

- quality of counselling and accessibility of information;
- general procedure of the activity;
- content;
- problems encountered.

Monitoring and evaluation of the course workload assigned through learning outcomes expected and achieved relation, with respect to teaching methodology and assessment criteria. A short report will be directed by the coordinator which will include feedback from the course coordinator to the participants with following content:

- learning outcomes;
- achieved / trained competencies;
- benefits for the lecturer.

8. Concluding Remarks

The definition of a Master Course is based on the experience of European partners with adaption to recognized needs of Central Asia partners. This is reflected through the Course structure i.e. modules, and the corresponding learning outcomes, arranged with the use of ECTS credit points. The project meetings will be used to discuss the recognition of the learning outcomes at all project partner institutions according to commonly agreed and unique performance equivalents.

The Course modules, offered as compulsory (C) or elective (E) modules in the course curriculum, are set to 6 ECTS credits together with a grade from excellence to failed, at all partner universities. The Course graduates will be able to continue their education via PhD programmes at international level. A detailed description of the Master Course modules is provided within the integrated deliverables namely D3.2 "Taxonomy of courses on Cultural Heritage Conservation in Central Asia" and D3.3 "Description of courses on Cultural Heritage Conservation in Central Asia".

In preparation of the recognition of the Master Course curriculum, the courses have to be accredited at some of the partner universities. The corresponding accreditation procedure will be one of the first tasks of the Master Course initialization.

9. References

- The Accreditation of Higher Education Programmes. UK Standard for Professional Engineering Competence. Third edition. Engineering Council. 2014.
- ERASMUS+ KA2– Cooperation for innovation and the exchange of good practices – Capacity Building in the field of Higher Education. Application Form. Call for Proposals 2019 - EAC/A03/2018. Environmental Risk Assessment and Mitigation on Cultural Heritage assets in Central Asia / ERAMCA. Detailed description of the project.
- Erasmus+ project card [Internet]. Erasmus+ - European Commission. 2020 [Accessed: 28 January 2021]. Available at: https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/609574-
- ERAMCA project main web-site [Internet]. Eramca.com. 2020 [Accessed: 28 January 2021]. Available at: https://www.eramca.com/
- Work Package WP3, deliverable D3.4 entitled "Design of a Laboratory to Support Teaching and Training Activities"
- Work Package WP1 entitled "Assessment of skill and competence requirements"
- Work Package WP2 entitled "Identification of actual educational portfolio in environmental risk assessment and mitigation on Cultural Heritage in Partner Countries"
- Azvo.hr. 2021. Agency for Science and Higher Education. [online] Available at: <https://www.azvo.hr/en/> [Accessed 24 May 2021].
- Work Package WP4 entitled "Design and implementation of didactic tools for Cultural Heritage Conservation"
- Work Package WP5 entitled "Teacher and staff training".