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SLOVENIAN NATIONAL
BUILDING AND CIVIL
ENGINEERING INSTITUTE



programme



1st Summer School

In situ techniques
in preservation of built heritage

2-4 JULY 2024

Slovenian National Building and
Civil Engineering Institute (ZAG)
Ljubljana, Slovenia

- 1** AGENDA
- 2** LECTURERS&LECTURES
- 3** SOCIAL EVENT
- 4** GUIDED TOUR
- 5** SPONSORS

Experience science, deepen your knowledge, expand your international networks, and make this summer an unforgettable experience in Slovenia with a taste of heritage ... at ZAG.



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8:00-8:20	Registration
8:20-8:45	Opening of the summer school
8:45-9:30	Lecture: Estimation of effectiveness of consolidants with NDT Andreja Pondelak, Andrijana Sever Škapin, Sabina Dolenc, Slovenian National Building and Civil Engineering Institute, Slovenia
9:30-10:15	Lecture: In situ spectroscopic analysis of Cultural Heritage Polonca Ropret, Institute for the Protection of Cultural Heritage of Slovenia, Slovenia
10:15-10:45	<i>Coffee break</i>
10:45-11:30	Lecture: 3D X-ray imaging techniques: precious tools in the cultural heritage conservation Lidija Korat, Lucia Mancini, Slovenian National Building and Civil Engineering Institute, Slovenia, LINXS – Lund Institute for Advanced Neutron and X-ray Science, Sweden
11:30-12:15	Lecture: Multi-disciplinary approach for diagnostic and monitoring of the structural health of wall paintings by non-destructive techniques Cristiano Riminesi, National Research Council of Italy, Italy
12:15-13:00	Lecture: Electrochemical impedance spectroscopy as a tool for non-destructive testing of patinated bronze sculptures Helena Otmačić Čurković, University of Zagreb, Croatia
13:00-13:30	<i>Lunch break</i>
13:30-14:15	Lecture: Application of NDT on wood-based materials: a case study on analysis of structural health of wood in castle Leskovec Miha Humar, Biotechnical faculty, University of Ljubljana, Slovenia
14:15-15:00	Lecture: Biological burden on built heritage – how to recognize and sample Polona Zalar, Biotechnical faculty, University of Ljubljana, Slovenia
15:00-15:45	Lecture: Title to be provided Nicola Masini, National Research Council of Italy, Italy
19:00	<i>Get together dinner</i>

agenda



Tuesday,
2nd of July 2024
MATERIALS

The first day of summer school will be dedicated to non-destructive and non-invasive techniques used in characterization of materials of heritage. Series of interesting lectures and chances to start a debate during breaks will be followed by a culinary experience in the heart of Ljubljana.



- 8:00-8:45 Lecture: **Heritage Building Information Modelling**
Katja Malovrh Rebec, Slovenian National Building and Civil Engineering Institute, Slovenia
- 8:45-9:30 Lecture: **3D technology in restoration processes**
Rok Hafner, Institute for the Protection of Cultural Heritage of Slovenia, Slovenia
- 9:30-10:15 Lecture: **Use of VR and AI in heritage science**
Izidor Mlakar,
University of Maribor, Faculty of Electrical Engineering and Computer Science, Slovenia
- 10:15-11:00 Lecture: **Hyperspectral Imaging for Cultural Heritage Applications**
John Gilchrist, ClydeHSI, United Kingdom
- 11:00-12:00 *Lunch break*
- 13:00-16:00 Guided tour: **Frescoes of Church of the Annunciation in Crngrob**
The Church of the Annunciation in Crngrob is one of the most complex monuments in Slovenia. The original church dedicated to the Mother of God stood on the site of today's northern nave at least as early as the 13th century. At that time, there were only a few inhabitants in Sorško polje, from which we could conclude that the original church was already built as a pilgrimage church. In 1273, the construction of the Romanesque church began and the oldest preserved parts of the building date from this period.
As a part of a guided tour, NDT techniques will be demonstrated on site. ClydeHSI will demonstrate hyperspectral imaging on selected wall paintings. Other NDT methods that have been used over the years at ZAG to determine the consolidation effectiveness and determine the condition of wall paintings will also be presented (e. g. USV, colour difference monitoring, DRMS method).

agenda



Wednesday,
3rd of July 2024
MODELLING

The second day of summer school will offer insight into advanced modelling of built heritage.

Exciting guided tour will follow in the afternoon introducing not only the landscape beauty of Slovenia but also one of the most complex monuments in Slovenia, and a sneak peek into use of NDTs on site.

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- 8:00-8:45 Lecture: **Masonry – non-destructive versus destructive testing for earthquake resistance studies**
Miha Tomažević, Slovenian National Building and Civil Engineering Institute, Slovenia
- 8:45-9:30 Lecture: **Distributed Fibre Optic Sensing (DFOS)**
Katarzyna Zdanowicz, Nerve Sensors, Poland
Stanislav Lenart, Slovenian National Building and Civil Engineering Institute, Slovenia
- 9:30-10:15 Lecture: **Damage identification and evaluation using acoustic emission and air-coupled ultrasonics**
Dimitrios Aggelis, Vrije Universiteit Brussel, Belgium
- 10:15-11:00 Lecture: **Title to be provided**
Markus Krüger, Technical University in Graz, Austria
- 11:00-11:30 *Coffee break*
- 11:30-12:15 Lecture: **Integration of underground architectures into development and management programs of degraded areas**
Mateja Golež, Rok Vežočanik,
Slovenian National Building and Civil Engineering Institute, Slovenia
Janko Rožič, architect Odprti krog
- 12:15-13:00 Lecture: **Infrared assessment of built heritage**
Zvonko Jagličič, Andreja Padovnik
University of Ljubljana, Faculty of Civil and Geodetic Engineering, Slovenia
- 13:00-13:45 Lecture: **Interdisciplinary insight into baroque stucco marble**
Irena Kralj Cigić, University of Ljubljana, Faculty of Chemistry and Chemical Technology, SLO
Matej Klemenčič, University of Ljubljana, Faculty of Arts, Slovenia
Martina Vuga, University of Ljubljana, Academy of Fine Arts and Design, Slovenia
Katja Kavkler, Institute for the Protection of Cultural Heritage of Slovenia, Slovenia
- 13:00-13:45 *Lunch*
- 15:15 Closure of the summer school

agenda



Thursday,
4th of July 2024
**STRUCTURES, SENSING
& INTERDISCIPLINARITY**

The third day of summer school will cover topics connected with structures, sensing, and interdisciplinary approach to heritage.

After lunch the closure of three days of science, heritage, and a fun get-together will follow - with an interweaving of new ties and acquaintances and with a broadened view of heritage.

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The church of the annunciation of Mary in Crngrob

The small village of Crngrob lies next to Škofja Loka and is best known for its Church of the Annunciation of Mary. It is a Gothic church which has been rebuilt several times in the past. The church's artwork includes a painting of Holy Sunday from the workshop of Johannes of Ljubljana (cca. 1460), a gothic painting of Saint Christopher on the south wall from 1464 (usually referred to as the Crngrob Façade Master), a painting of St. Christopher on the bell tower (Janez Gosar, mid-19th century), and now almost completely faded frescoes of another St. Christopher from the 14th and 15th centuries on the north wall of the nave painted by Master Bolfgang.



CHEREZAD



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guided tour



The church of the annunciation of Mary in Crngrob



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guided tour



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Organizing committee:

Sabina Dolenc, Andreja Pondelak, Maruša Mrak, Katarina Šter, and Ana Brunčič



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FOR HERITAGE SCIENCE - SLOVENIA



Slovenian Research and Innovation Agency

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ARIS research project No. J2-4424 - An integrated approach for conservation of cultural heritage wall paintings

ARIS research core funding No. IO-0032 - Testing of Materials and Structures

sponsors



Experience science, heritage,
and a fun get-together all in
three days.

See you in Slovenia!

Registration [here](#).

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