Date: January 27-28, 2020
Place: Skopje

Knowledge FOr Resilient soCiEty

EQUIPMENT & LABS – REPORTS AND VIDEOS ON EDUCATIONAL LABS

Faculty of Architecture, Civil Engineering and Geodesy

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

Labs in education process

The courses on **K-Force master study program,** University of Banja Luka, Faculty of Architecture, Civil Engineering and Geodesy, where equipment is used:

- **Constructive Rules for Fire safety of Building**
  - Excersises in PyroSim and Pathfinder softwares on computer equipment
- **Assessment of Damaged Structures**
  - Use of equipment for nondestructive testing in damage assesment
- **Repair of Timber, Steel and Masonry structures**
  - Use of equipment for nondestructive testing in state assesment of timber, steel and masonry structures
- **Aseismic Design and Construction**
  - Excersises on computer equipment

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Labs in education process

Educational laboratory

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Labs in education process

Laboratory equipment

No.	Laboratory equipment for education process	Pieces
1	**Multi Functional Rebar Detector** (Applicable range: F6mm-F50mm; Protective layer thickness range (mm): First range 3(70)-98, Second range 3(120)-196)	1
2	**Integrated Voice Digital Test Hammer**	1
3	**Ultrasonic thickness meter for homogeneous materials** (metal, glass, plastics and other homogeneous materials), conducts ultrasonic waves into the material to be tested.	1
4	**Pull off Adhesion Tester** (Maximum pressure: 25N/mm2)	1
5	**Control square**, size 300x200 mm; **precision feeler gauges**, on a ring, length 400 mm, precision feeler gauges thickness 0.10-2.00, length 100 mm and thickness 0.03-1.00, length 100 mm and **digital calipers.**	1
6	Professional **laser range distance measurer** finder	4
7	**Comparator** (precision 0.01 mm, rang 0-3 mm, analog) with magnetic stand with fixed post and boom arm for deflection measurements	4
8	**Multi-beam infrared thermometer** (contact-free measuring of surface temperature, temperature measuring range from -50 °C to + 500 °C)	4
9	**USB movable mikrocsope**	4
10	**Digital camera**	1
11	Other laboratory equipment (glass, balances, thermo hygrometer, timer-stopwatch...)	1

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Labs in education process

Course: Constructive Rules for Fire safety of Building

Individual excersises in PyroSim and Pathfinder softwares on computer equipment:

- Building Fire Dynamics Simulator (FDS) models in PyroSim software;
- Basics in movement simulation in Pathfinder's integrated user interface with high-quality 3-D animation.

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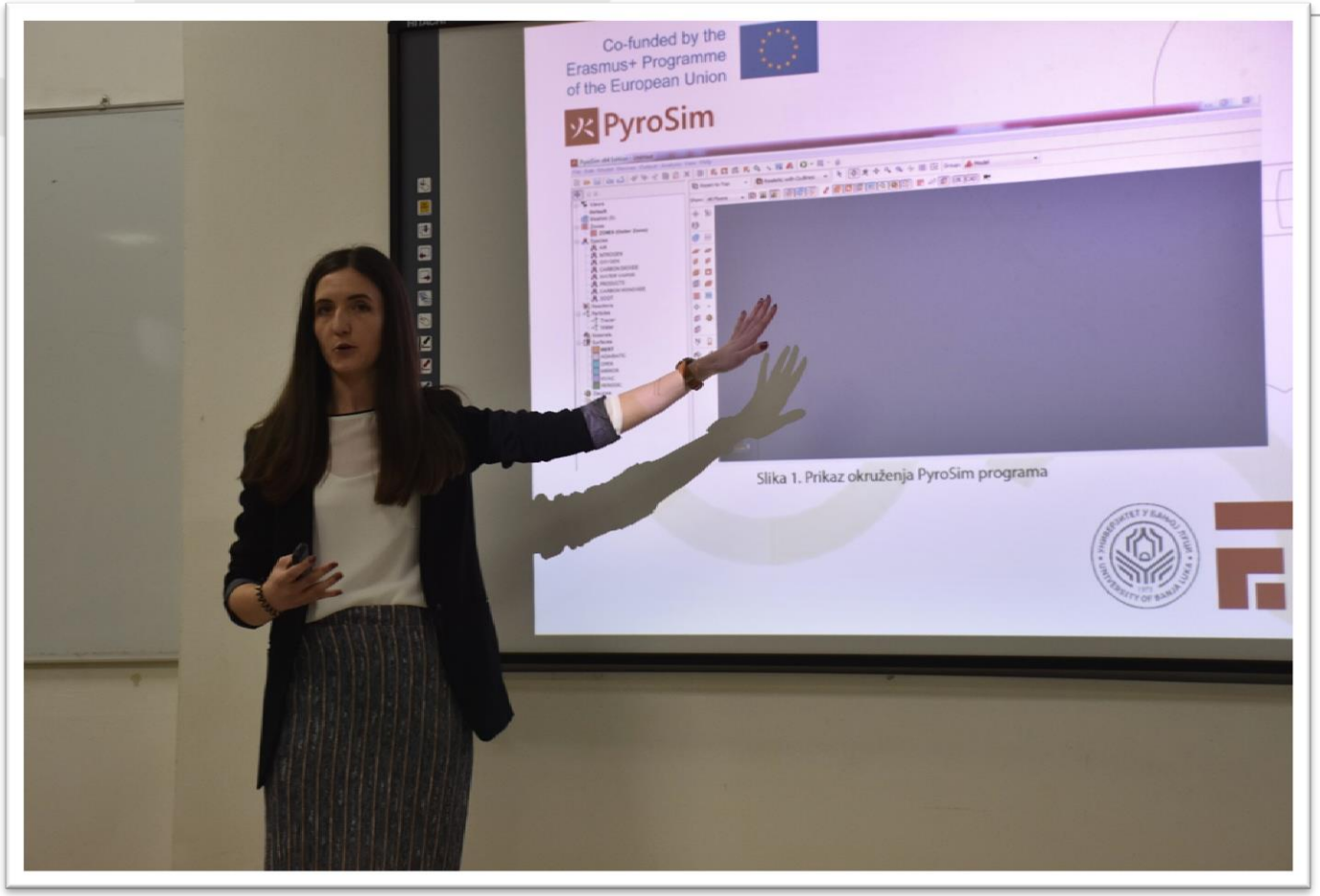

PyroSim software presentation

Constructive Rules for Fire safety of Building

Pathfinder software presentation

Pathfinder and Pyro Sim software exercises

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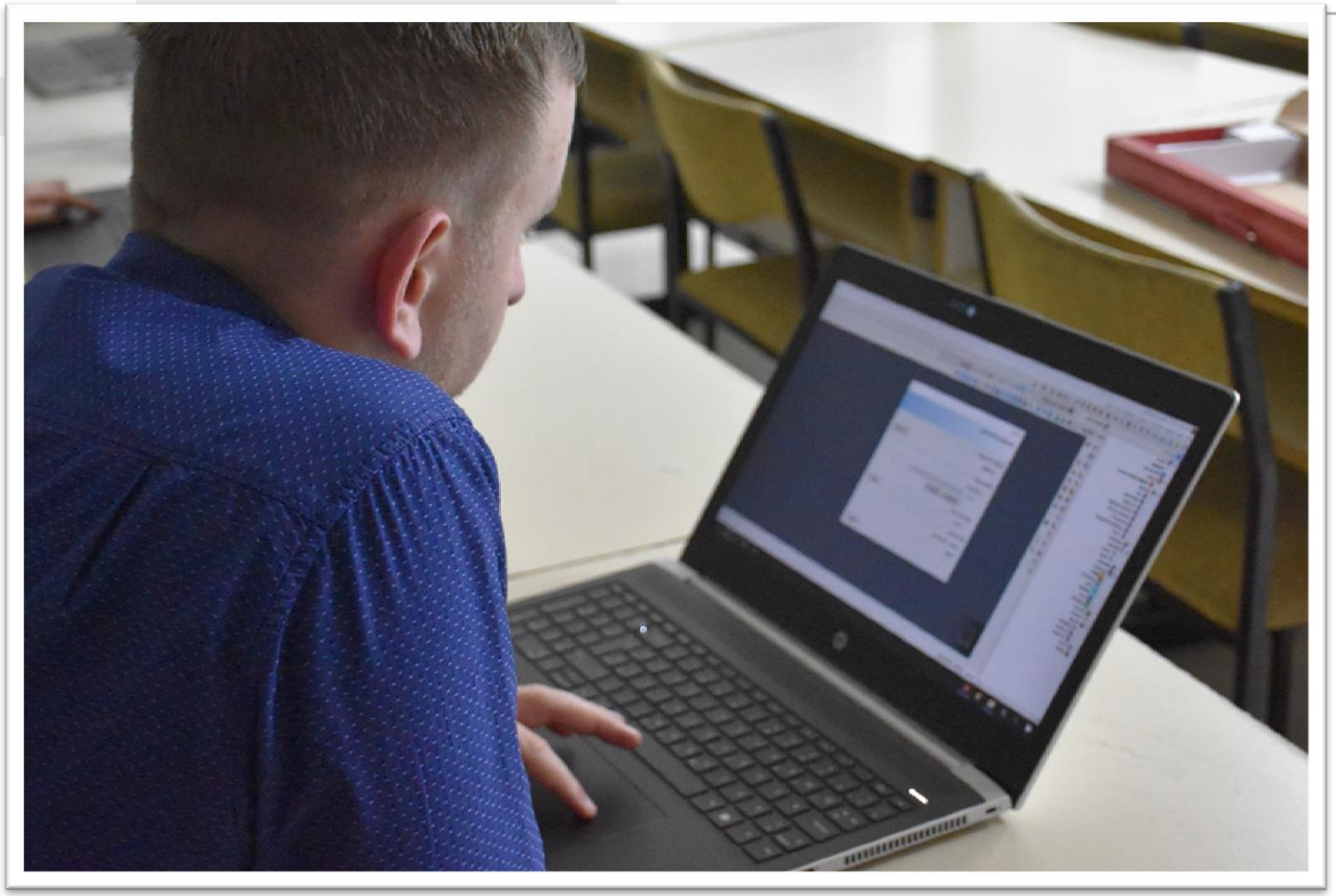

Pathfinder and Pyro Sim software exercises

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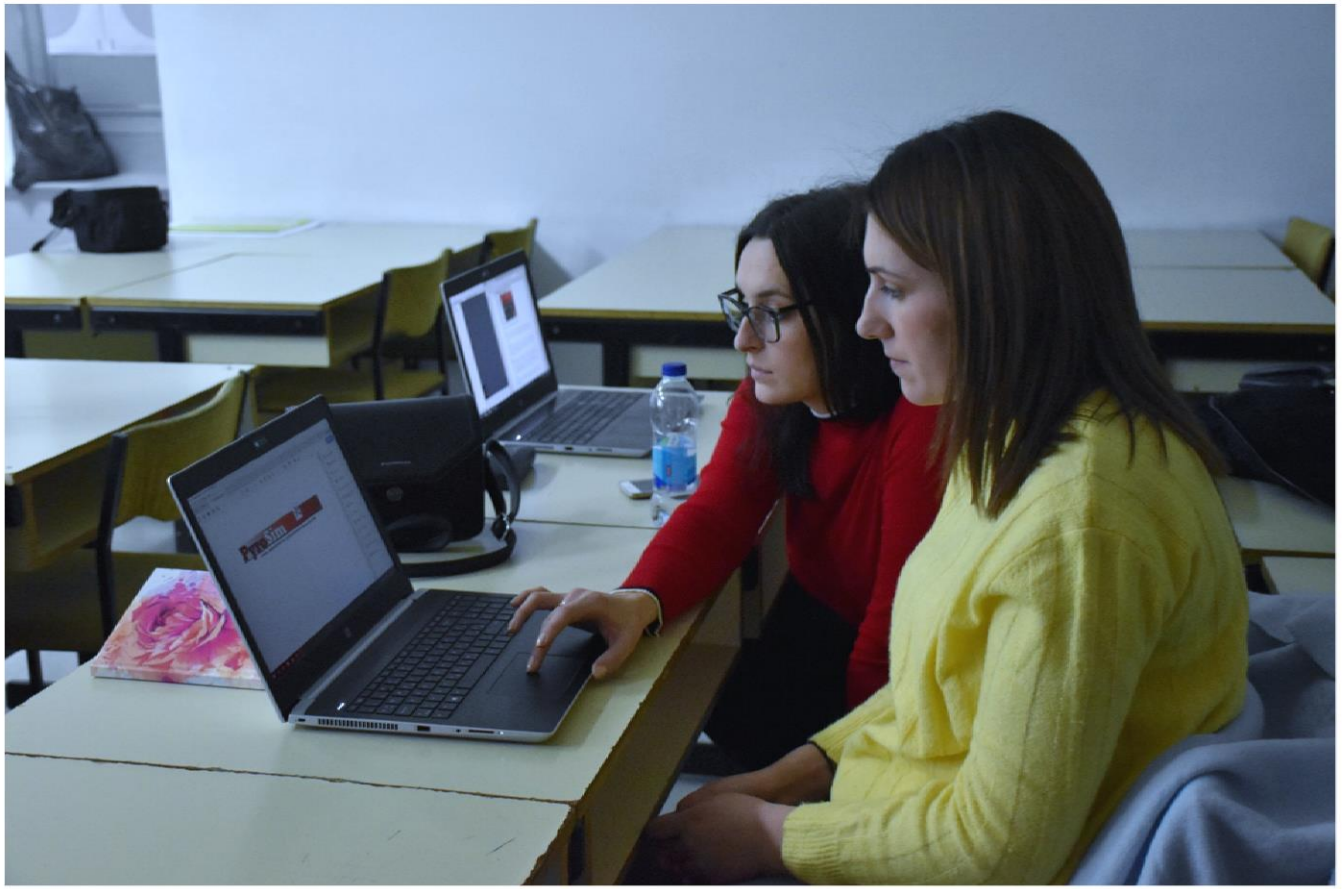
Constructive Rules for Fire safety of Building



Pathfinder and Pyro Sim software exercises

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Labs in education process

Course: Assessment of Damaged Structures

Demonstrations of equipment use for nondestructive testings of materials in damage assesment:

- Digital hammer testing
  - *Assessment of concrete strength in construction; Determination of uniformity (homogeneity) of concrete;*
- Pull off athesion testing
  - *Assessment of tensile strength and adhesion of materials in construction; Examination of the surfaces of concrete to be rehabilitated;*
- USB movable microscope

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Labs in education process

Courses: Assessment of Damaged Structures and Repair of Timber, Steel and Masonry structures

Demonstrations of equipment use for nondestructive tests:

- Rebar detection and corrosion degree determination
  - *Determination of diameter and position of reinforcement, thickness of the protective layer of concrete; use for prelliminary testings for other tests (coring, pull of); corrosion degree determination;*
- Thickness detection of steel profiles
  - *Assessment of thickness of steel profiles with ultrasonic thickness meter;*

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Assessment of Damaged Structures

Assessment of Damaged Structures – site visits

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Digital hammer testing for rebound number determination in hardened concrete

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Assessment of Damaged Structures

Pull off athesion testing demonstartion in existing concrete structure

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Multi Functional Rebar Detector testing in existing concrete structure

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Assessment of Damaged Structures and Repair of Timber, Steel and Masonry structures – site visits

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Determination of materilal thikness

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Labs in education process

The benefits for teachers and Faculty:

- Computer and laboratory equipment provides for teachers easier transfer of practical skills to students
- Possibility of demonstration of several testing methods and teaching in situ, ie on damaged objects
- Possibility of multiple and long-term use of equipment
- Increasing the representativeness of the institution by improving resources through the procurement of computer and laboratory equipment
- Widening technology and media literacy
- ....

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Labs in education process

The benefits for students:

- Gaining knowledge in damage and material properties identification by using adequat equipment
- Easier recognition of existing building structures and materialization
- Gaining field observation and data collection skils
- Learning new technology skills
- Learning new softwares in the area of evacuation and fire simulations
- .....

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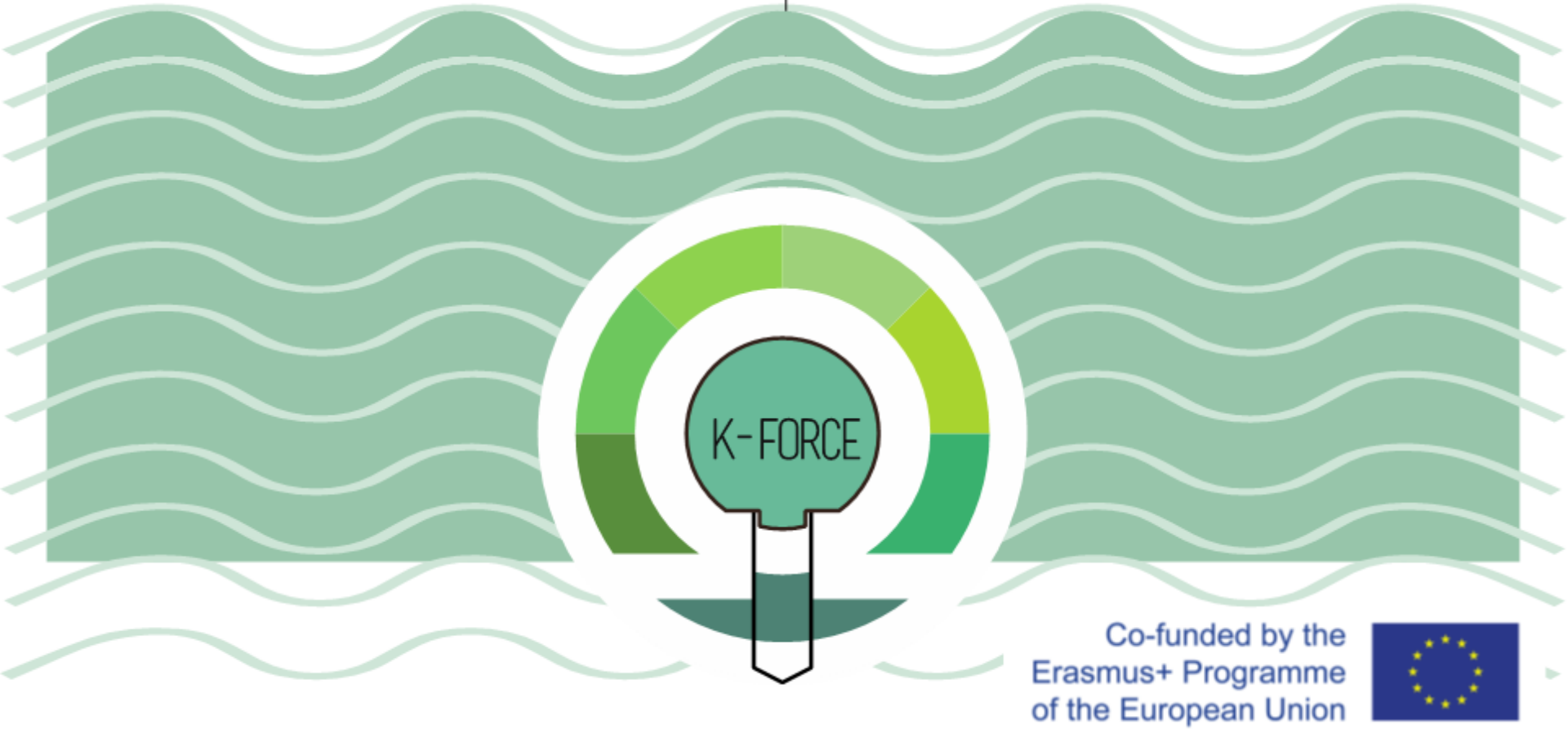

THANK YOU FOR YOUR ATTENTION

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