Results from Winter School at UACEG

Assoc. Prof. Petar Filkov
University of Architecture, Civil Engineering and Geodesy - Sofia

Workshop on the sustainability of the SWARM results
Aristotle University of Thessaloniki, Department of Civil Engineering,
20 – 21 December 2021

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1. Winter School at UACEG

- **Period:** 29th of November – 10th of December 2021
- **Venue:** Online via Microsoft Teams
- **Participants:**
  - Planned number: 5 students
    - ✓ 1 from University of Nis
    - ✓ 1 from University of Montenegro
    - ✓ 1 from University in Mostar
    - ✓ 1 from University of Podgorica in Kosovska Mitrovica
    - ✓ 1 from Academy of Applied Studies of Kosovo and Metohija
  - Actual number: 3-4 students
    - ✓ One student reported ejecting problems with MS Teams
- **Schedule:** from 9:30 to 15:30 EET - each working day

1. Winter School at UACEG

First week: 29. November – 3. December

Day	Monday 29. November	Tuesday 30. November	Wednesday 1. December	Thursday 2. December	Friday 3. December
Topic	**Irrigation Systems and Drought Management**	**Investments in Irrigation Infrastructure**	**Hydrological and Hydraulic modelling**	**Water Management Optimization Problems**	**Water Management Examples - Vit River Case Study**
Lecturer	*Assoc. Prof. P. Filkov*	*Assoc. Prof. P. Filkov*	*Assist. Prof. V. Kukurin*	*Assoc. Prof. P. Filkov*	*Assist. Prof. E. Tsanov*
9:30 – 12:00 (EET)	Lectures • Introduction • Irrigation Systems in Bulgaria • Irrigation Systems – elements. • Crop Response to Water. Yield-Water relationship	Lectures • Introduction • Water Losses and Efficiency of Irrigation Systems • Investments in Irrigation Infrastructure and Water Saving Requirements • Determining Potential Water Savings due to investments	Lectures • Introduction • Types of models • Rainfall – Runoff models • Hydraulic models • 1D, 2D and 3D models	Lectures • Introduction • Linear Programming • Resource Allocation Problem • Transportation Problem • Multicriteria analysis – an Example for Prioritization of Investments in Irrigation Infrastructure	Lectures • Introduction • Vit Watershed • WEAP modelling • Optimization
Lunch					
13:00 – 15:30 (EET)	Lectures • Operation and Management of Irrigation Systems. • Water Metering in Irrigation Systems	**Assignment of Task # 1 –** Estimation of Water Losses and Efficiency of an Irrigation System and Determination of Potential Water Saving due to Investments in Irrigation Infrastructure	Lectures • Model applications • Floodplain modelling • Flood early warning systems Practical work in class with 1D or 2D models	**Assignment of Task # 2 –** Solving a simple Optimization Task related to Water Resources Management Students work in class (supervised by teacher)	Lectures • Scenarios and scenarios optimization • Water account tables
After 15:30		Students work (individually)	Students work (individually)	Students work (individually)	**Consultation Time** *Assoc. Prof. P. Filkov*

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1. Winter School at UACEG

Second week: 6. December – 10. December

Day	Monday 6. December	Tuesday 7. December	Wednesday 8. December	Thursday 9. December	Friday 10. December
Topic	**Hydraulic structures. Dams and reservoirs-1**	**Hydraulic structures. Dams and reservoirs-2**	**Hydraulic structures. Dams and reservoirs-3**	**Hydraulic structures. Dams and reservoirs-4**	**Discussion and Presentation**
Lecturer	*Assoc. Prof. M. Mavrova*	*Assoc. Prof. M. Mavrova*	*Assoc. Prof. M. Mavrova*	*Assoc. Prof. M. Mavrova*	*Assoc. Prof. P. Filkov* *Assoc. Prof. M. Mavrova*
9:30 – 13:00 (EET)	*Lectures* Elements of dam engineering • Planning of water resource projects • Embankment dam types; Concrete dam types • Spillways, outlets and ancillary works • Loads on dams	*Lectures* Embankment dam engineering • Classification and engineering characteristics of soils • Principles of embankment dam design • Seepage, stability, and stress analysis	*Lectures* Concrete dam engineering • Principles of concrete dam design • Gravity dam analysis • Concrete for dams; The roller-compacted concrete gravity dam • Design features and construction	*Lectures* Dam outlet works and Energy dissipation • Introduction • Design flood • Freeboard • Cavitation • Spillways	• Students present their work on themes assigned in lectures in previous days of the course • Students present the results of Tasks # 1 and # 2. • Discussion
Lunch					
14:00 – 15:30 (EET)	*Lectures* • Presentation of interesting examples of dams and reservoirs **Assignment of theme for presentation** Students work (in groups)	*Lectures* Embankment dam engineering • Settlement and deformation • Rockfill embankments • Examples Students work (in groups)	*Lectures* Concrete dam engineering • Dam Monitoring and Operation • Examples Students work (in groups)	*Lectures* Dam outlet works and Energy dissipation • Bottom outlets • Energy dissipation • Examples Students work (in groups)	***Reduced schedule due to smaller number of presenters than initially planned***
After 15:30	Students work (individually)	Students work (individually)	Students work (individually)	Students work (individually)	

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1. Winter School at UACEG

- **Tasks**

TASK # 1

ESTIMATION OF WATER LOSSES AND EFFICIENCY OF AN IRRIGATION SYSTEM.

DETERMINING OF THE POTENTIAL WATER SAVINGS DUE TO INVESTMENTS IN IRRIGATION INFRASTRUCTURE

1. Initial data

A simplified scheme of the investigated Irrigation System (IS) is presented on Fig. 1.

The IS consists of 7 Irrigation Fields (IFs). The delivery network of IS has a Main Canal with two sections and two Distributary Canals. The volumes of water measured at specific locations at Main and Secondary Canal, as well as at turnouts to Irrigation Fields (IFs) are given in *Terms of Reference (TOR)*. The measured volumes of water are also shown on Fig. 1.

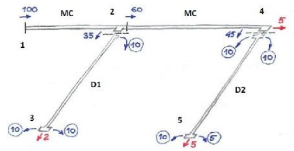


Fig. 1. Schematic View of the Delivery Network of the IS and Measured Volumes of Water at Specific Locations

TASK # 2

OPTIMIZATION PROBLEMS.

TRANSPORTATION PROBLEM – APPLICATION IN WATER RESOURCES MANAGEMENT

1. Initial data

A simplified scheme of the water management system (WMS) is presented on Fig. 1.

According to initial data provided in *Terms of Reference (TOR)* the WMS consists of 3 water sources – a pumping station (PS 1) abstracting water from a reservoir, a pumping station (PS 2) abstracting surface water and a pumping station (PS 3) abstracting groundwater. These water sources are named A_1, A_2 и A_3. The water sources have supply capacities of the following volumes of water per day (in thousands m^3): $W_1^s = 40$, $W_2^s = 40$ и $W_3^s = 20$.

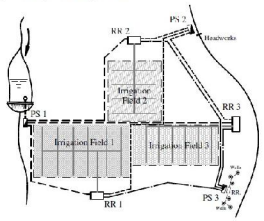
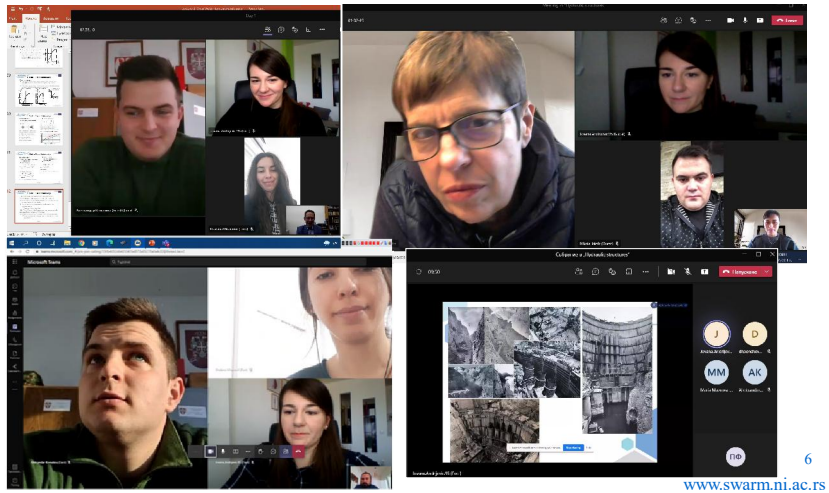


Fig. 1. Schematic View of the Water Sources, Delivery Networks and Water Users

1. Winter School at UACEG



2. Results from Winter School at UACEG

- **Certificates**

CERTIFICATE OF ATTENDANCE

This certificate is issued to confirm that

Drazana Miranovic

from

University of Montenegro

attended the winter school at the

University of Architecture, Civil Engineering and Geodesy – Sofia, Bulgaria

from **29 November 2021** to **10 December 2021,**

within the framework of ERASMUS+ CBHE KA2 SWARM project

(Grant no. 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP).

Sofia,
10.12.2021

Assoc. Prof. Petar Filkov, PhD, M.Eng.
Dean of the Faculty of Hydraulic Engineering

CERTIFICATE OF ATTENDANCE

This certificate is issued to confirm that

Jovana Andrijevic

from

University of Nis

attended and successfully finished the winter school at the

University of Architecture, Civil Engineering and Geodesy – Sofia, Bulgaria

from **29 November 2021** to **10 December 2021,**

within the framework of ERASMUS+ CBHE KA2 SWARM project

(Grant no. 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP).

Sofia,
10.12.2021

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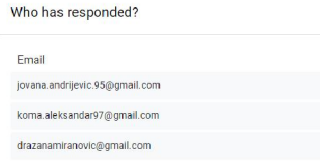
Dean of the Faculty of Hydraulic Engineering

2. Results from Winter School at UACEG

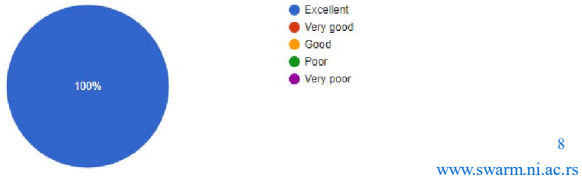
- **Evaluation form**
  - ➢ 3 students responded



Who has responded?

Email
jovana.andrijevic.95@gmail.com
koma.aleksandar97@gmail.com
drazanamiranovic@gmail.com

- **Results of evaluation of the general organization of the schools**



Logistic preparation (visa, invitations, enrolment) and organization of school

3 responses

100%

Excellent
Very good
Good
Poor
Very poor

2. Results from Winter School at UACEG

- Content of the agenda

3 responses

Arrangements of the event (venue, equipment, etc.)

3 responses

2. Results from Winter School at UACEG

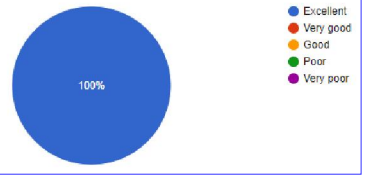
- **Results of evaluation of general working communication**

Quality of delivered documentation

3 responses

How do you rate the attention given to you?

3 responses



2. Results from Winter School at UACEG

Are you satisfied with the content of the lectures?

3 responses

Excellent
Very good
Good
Poor
Very poor

How do you rate social activities and possibilities to interact with others?

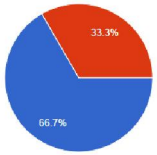
3 responses

Excellent
Very good
Good
Poor
Very poor

2. Results from Winter School at UACEG

Engagement of the participants in the activities and discussions

3 responses



Excellent
Very good
Good
Poor
Very poor

- **Results of evaluation of overall success of the schools**

How do you rate opportunities to be adventurous?

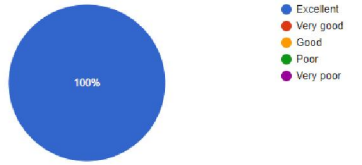
3 responses

Excellent
Very good
Good
Poor
Very poor

2. Results from Winter School at UACEG

In a general, how do you rate the classroom?

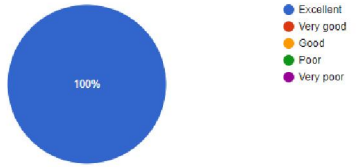
3 responses



Excellent
Very good
Good
Poor
Very poor

Usefulness of what you learned for your current studies and future profession?

3 responses



Excellent
Very good
Good
Poor
Very poor

2. Results from Winter School at UACEG

How would you rate the school you have been given?

3 responses

Excellent
Very good
Good
Poor
Very poor

Comment

2 responses

It was a really pleasant and inspiring experience.
The knowledge and lectures will be very useful in my later practice as an civil engineer.

I am very pleased with the school.

...

Thank you for your attention!