

# KONKURS ZA OBAVLJANJE STRUČNE PRAKSE (ZIMSKA ŠKOLA)

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

University of Nis



Strengthening of master curricula in water resources management  
for the Western Balkans HEIs and stakeholders



UNIVERZITET U SARAJEVU

GRAĐEVINSKI FAKULTET

PATRIOTSKE LIGE 30

ERASMUS+ CBHE KA2

GRAĐEVINSKI FAKULTET UNIVERZITETA U SARAJEVU RASPISUJE KONKURS U OKVIRU  
PROJEKTA SWARM ZA FINANSIRANJE MOBILNOSTI STUDENATA ZA STRUČNU PRAKSU  
NA SLJEDEĆIM INSTITUCIJAMA:

1. **NORWEGIAN UNIVERSITY OF LIFE SCIENCES (NMBU) U OSLO (ÅS), NORVEŠKA**
2. **ARISTOTLE UNIVERSITY OF THESSALONIKI (AUTH)**
3. **UNIVERSIDADE DE LISBOA (UL)**
4. **UNIVERSITY OF RIJEKA, FACULTY OF CIVIL ENGINEERING (UNIRIFCE)**
5. **UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA (BOKU)**
6. **UNIVERSITY OF ARCHITECTURE, CIVIL ENGINEERING AND GEODESY (UACEG)**

**Rok za prijavu na konkurs je 20.10.2021. godine**

Period realizacije mobilnosti :

1. **NMBU – 25.10. 2021- godine – 05.11.2021. godine**
2. **AUTH – 06.12. 2021- godine – 17.12.2021. godine**
3. **UNIVERSIDADE DE LISBOA (UL) – 31.01. 2022- godine – 11.02.2022. godine**
4. **UNIRIFCE – 15.11. 2021- godine – 26.11.2021. godine**
5. **BOKU – 15.11. 2021- godine – 26.11.2021. godine**
6. **UACEG – 29.11. 2021- godine – 10.12.2021. godine**

**Ko se može prijaviti na konkurs?**

- Studenti master studija Građevinskog fakulteta Univerziteta u Sarajevu, Odsjek za hidrotehniku i okolišno inženjerstvo.

Trajanje stručne prakse na svim ustanovama:

- 14 (četrnaest) dana uključujući dane za putovanje.

Visina stipendije iznosi 770 eura. Navedeni iznos bit će umanjen za odgovarajući porez prema zakonima Bosne i Hercegovine. Student će dobiti i jednokratnu naknadu putnih troškova u visini stvarnih troškova do maksimalnog iznosa od 275 eura za ustanove NMBU, AUTH i BOKU, 180 eura za UNIRIFCE i UACEG te 360 eura za UL.

Trošak obaveznog zdravstvenog osiguranja u toku trajanja mobilnosti **nije pokriven** stipendijom u okviru programa Erasmus+ te ovi troškovi padaju na teret studenta.

**Navedena stipendija dobija se isključivo ukoliko se stručna praksa obavi fizički na pomenutim institucijama. U slučaju on-line načina održavanja stručne prakse studentima neće biti isplaćena stipendija niti bilo kakva druga naknada.**

Stipendija se dodjeljuje za maksimalno 1 (jednog) studenta po ustanovi. Studenti se mogu prijaviti na više institucija, a Komisija će na osnovu prijave izvršiti izbor kandidata po pojedinim ustanovama. Prednost prilikom odabira imaju institucije pod rednim brojevima 1-4 tako da će se preostale dvije institucije (BOKU i UACEG) popunjavati samo ukoliko se popune mjesta na prve četiri institucije.

**Obavezna dokumentacija za prijavu:**

- Popunjen prijavni obrazac (u prilogu),
- Motivaciono pismo na engleskom jeziku, potpisano (1 stranica),
- Biografija na engleskom jeziku (preporuka: koristiti Europass format),
- Prepis ocjena matičnog fakulteta (Transcript of Records),
- Dokaz o poznavanju engleskog jezika,
- Skenirana prva stranica pasoša (sa fotografijom),
- Dokaz da je kandidat student Građevinskog fakulteta.

Sve potrebne dokumente, u PDF formatu, potrebno je poslati Šarić Ammaru na e-mail [ammar.saric@hotmail.com](mailto:ammar.saric@hotmail.com). Za dodatna pojašnjenja i pitanja studenti se mogu obratiti na isti e-mail.

**Rok za slanje dokumenata: 20.10.2021. godine do 12:00 sati.**

Nakon završetka konkursa, prijave kandidata koji prođu tehničku provjeru i evaluaciju od strane Komisije Građevinskog fakulteta Univerziteta u Sarajevu bit će dostavljene instituciji domaćinu kao nominacije za obavljanje stručne prakse. Izabrani kandidati će biti u obavezi da nakon sprovedene mobilnosti dostave sljedeću dokumentaciju (ukoliko se ista fizički obavi na instituciji domaćinu) voditelju SWARM projekta (prof.dr. Emina Hadžić):

- Račun za smještaj,
- Račune i karte za prevoz,
- Potvrdu sa institucije domaćina o obavljenoj stručnoj praksi,
- Izvještaj sa stručne prakse (sa fotografijama).

Studenti će nakon obavljanja prakse od institucije domaćina dobiti certifikat o obavljenoj mobilnosti bez obzira na način održavanja nastave.

Prilozi:

1. Prijavni obrazac
2. Program zimske škole – UNIVERSIDADE DE LISBOA (UL),
3. Program zimske škole – ARISTOTLE UNIVERSITY OF THESSALONIKI (AUTH),
4. Program zimske škole – UNIVERSITY OF RIJEKA, FACULTY OF CIVIL ENGINEERING (UNIRIFCE),
5. Program zimske škole – UNIVERSITY OF ARCHITECTURE, CIVIL ENGINEERING AND GEODESY (UACEG),
6. Program zimske škole – NORWEGIAN UNIVERSITY OF LIFE SCIENCES (NMBU) U OSLO (ÅS), NORVEŠKA
7. Program zimske škole – UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA (BOKU).

## PRIJAVA

Ime i prezime: \_\_\_\_\_

Datum: \_\_\_\_\_

Ovim putem prijavljujem se na konkurs za obavljanje stručne prakse u okviru Erasmus+ projekta SWARM na sljedećoj instituciji (zaokružiti ponuđenu instituciju):

1. **NORWEGIAN UNIVERSITY OF LIFE SCIENCES (NMBU) U OSLU (ÅS), NORVEŠKA**
2. **ARISTOTLE UNIVERSITY OF THESSALONIKI (AUTH)**
3. **UNIVERSIDADE DE LISBOA (UL)**
4. **UNIVERSITY OF RIJEKA, FACULTY OF CIVIL ENGINEERING (UNIRIFCE)**
5. **UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES, VIENNA (BOKU)**
6. **UNIVERSITY OF ARCHITECTURE, CIVIL ENGINEERING AND GEODESY (UACEG)**

Ukoliko ste odabrali više od jedne institucije ispod rangirajte Vaše prioritete:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

## SWARM PROJECT

SUMMER/WINTER SCHOOL AT INSTITUTO SUPERIOR TÉCNICO, LISBOA UNIVERSITY (IST/UL)

WATER RESOURCES MODELING: PART 1: FLOOD ANALYSIS. PART 2: RESERVOIR OPERATION

### DRAFT AGENDA

WATER RESOURCES MODELING: PART 1: FLOOD ANALYSIS				
Monday Topic – <b>General concepts related to flood analysis</b>	Tuesday Topic – <b>Components of the flood hydrographs</b>	Wednesday Topic – <b>Components of the rainfall hyetographs</b>	Thursday Topic – <b>Rainfall/runoff models</b>	Friday Topic – <b>Synthesis and discussion</b>
Lectures: <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Basic concepts of flood analysis</li> <li>• Peak flood discharges and flood hydrographs models               <ul style="list-style-type: none"> <li>- Statistical models</li> <li>- Empirical formulae</li> <li>- Regional models</li> <li>- Flood routing models</li> <li>- Unit hydrograph model</li> </ul> </li> </ul>	Lectures: <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Components of the observed flood hydrographs</li> <li>• Models to separate the direct runoff from the baseflow</li> <li>• Estimation of the recession constant</li> </ul>	Lectures <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Components of the observed rainfall hyetographs</li> <li>• Rainfall losses: initial losses and continuous losses</li> <li>• Relevance of the curve number approach</li> <li>• Models for rainfall losses</li> <li>• Intensity-duration-frequency curves</li> <li>• Establishment of design hyetographs</li> </ul>	Lectures <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Flood modeling base on the Hydrologic Engineering Center – Hydrologic Modeling System model (HEC-HMS model)</li> </ul>	<ul style="list-style-type: none"> <li>• Based on the lectures of the previous for 4 days, each group must prepare a presentation on one of the subjects and discuss it with the other students and professors, including the relevance of the chosen subject in WB countries</li> </ul>
Students work (in groups)	Students work (in groups)	Students work (in groups)	Students work (in groups)	

## SWARM PROJECT

### SUMMER/WINTER SCHOOL AT INSTITUTO SUPERIOR TÉCNICO, LISBOA UNIVERSITY (IST/UL)

### WATER RESOURCES MODELING: PART 1: FLOOD ANALYSIS. PART 2: RESERVOIR OPERATION

#### DRAFT AGENDA

WATER RESOURCES MODELING: PART 2: RESERVOIR OPERATION				
Monday Topic – <b>Introduction to water management</b>	Tuesday Topic – <b>Simulation of reservoirs operation</b>	Wednesday Topic – <b>Optimization of reservoir operation</b>	Thursday Topic – <b>Groundwater management</b>	Friday <b>Synthesis and discussion</b>
Lectures: <ul style="list-style-type: none"> <li>• Water and civilization.</li> <li>• The importance of water for human development.</li> <li>• Consumptive and non-consumptive water uses.</li> <li>• Fundamentals of water management and the challenges of integrated watershed and water resources management.</li> </ul>	Lectures: <ul style="list-style-type: none"> <li>• Types of dams and reservoirs and its main structures.</li> <li>• Performance indicators for reservoir operation: reliability, vulnerability, resilience and sustainability.</li> <li>• Reservoir operation rules.</li> <li>• Risk management and the concept of hedging.</li> <li>• Reservoir operation simulation models and integrated water management models.</li> </ul>	Lectures: <ul style="list-style-type: none"> <li>• Simulation vs optimization models.</li> <li>• Linear programming for water management.</li> <li>• Dynamic programming for water management.</li> <li>• Multi-objective optimization.</li> </ul>	Lectures: <ul style="list-style-type: none"> <li>• Basic concepts of groundwater resources.</li> <li>• Types of aquifers and aquitards.</li> <li>• Aquifer characterization.</li> <li>• Recharge estimation.</li> <li>• Surface water / groundwater interaction.</li> <li>• Groundwater models.</li> </ul>	<ul style="list-style-type: none"> <li>• Based on the lectures of the previous for 4 days, each group must prepare a presentation on one of the subjects and discuss it with the other students and professors, including the relevance of the chosen subject in WB countries</li> </ul>
Students work (in groups)	Students work (in groups)	Students work (in groups)	Students work (in groups)	

AUTH summer school  
on  
Water resources management  
Draft schedule (version 30 June 2021)



**Week 1, 10:00-13:00**

<b>Date</b>	<b>Course</b>	<b>Short description</b>
Monday, 1/11/2021	Sustainable Water resources management and EU legislation (Prof. Kolokytha)	Principles of sustainable water resources management. The WFD, shortcomings in implementation. Major relevant EU water legislation
Tuesday, 2/11/2021	Hydraulics of open channels, rivers and dams (Prof. Prinos)	Flow in open channels and rivers. Calculation methods. Culverts and Bridges. Dam classification. Design Discharge. Spillways. Structures for energy dissipation.
Wednesday, 3/11/2021	«Ἀριστον μὲν ὕδωρ». <i>Best is Water</i> <i>Pindar 518 – 438 BC</i> Valuing the water (Prof. Kolokytha)	The value, the price and the cost of water. “The Diamond-Water Paradox”. Public or private? Social or economic? The changing water scene.
Thursday, 4/11/2021	Water resources management and GIS (part 1) (Dr. Skoulikaris)	Use of GIS for the management of environmental information. Open source GIS tools and on line data sources. Creation of water related maps.
Friday, 5/11/2021	Water resources management and GIS (part 2) (Dr. Skoulikaris)	Spatial analyst techniques for the management of hydro-meteorological data.



**Week 2, 10:00-13:00**

<b>Date</b>	<b>Course</b>	<b>Short description</b>
Monday, 8/11/2021	Water resources management and hydrological modelling (Dr. Skoulikaris)	The use of HEC-HMS model for hydrologic simulations. Data preparation and simulations.
Tuesday, 9/11/2021	Global water crisis. SDG6 as a driver for sustainable development. (Prof. Kolokytha)	UN Agenda23, 2015-2030 SDG6 and its role to achieve sustainable development of our planet.
Wednesday, 10/11/2021	Hydraulics of water supply and sewerage systems (Prof. Prinos)	Design of gravity and pumping systems. Tanks. Design of water distribution networks. Valves for flow and pressure control. Design of separate and combined sewer systems. Manholes. Weirs
Thursday, 11/11/2021	Water resources management and climate change (Dr. Skoulikaris)	Management of water resources under climate change conditions. Climate change models and data. Statistical and dynamic downscaling of climatic data for use in regional scales.
Friday, 12/11/2021	Floods and Risk Management. (Prof. Prinos)	Types of Floods. Flood Mapping. Extreme Floods. Flood Risk Analysis. Vulnerability Analysis. Risk Assessment. Measures for risk reduction.





## Winter/summer school programme and training of WB teaching staff at the University of Rijeka, Faculty of Civil Engineering (UNIRIFCE)

Barbara Karleuša  
University of Rijeka, Faculty of Civil Engineering - UNIRIFCE

Sixth Project Management Committee meeting , 10/09/2021

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**Strengthening of master curricula in water resources  
management for the Western Balkans HEIs and stakeholders**

Project number: 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP

### Winter / Summer school – draft programme

POSSIBILITIES: „face-to-face“ or „on-line“


VERSION PRESENTED: on-line


DIFFERENCES: In case of „face-to-face“ school the topics will remain the same but reorganised with two days field work / visits included

FIELD WORK / VISITS: Water supply and sewage system of Rijeka  
Hydropower plant in Rijeka and reservoir Valići  
Coastal engineering structures in Rijeka and surroundings  
Field work (water velocity measurement, using different equipment...)

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## Winter / Summer school (draft)

Monday Water management	Tuesday Drinking water supply	Wednesday Drainage (waste water / storm water) in urban/rural areas	Thursday Flood protection / Torrents	Friday Synthesis and discussion
Lectures + Students work (in groups)	Lectures + Students work (in groups)	Lectures + Students work (in groups)	Lectures + Students work (in groups)	Students' presentations (PPT)  Poster preparation
Monday Hydraulic structures / Dams and reservoirs	Tuesday Coastal engineering	Wednesday Climate change and water management	Thursday Laboratory work	Friday Synthesis and discussion
Lectures + Students work (in groups)	Lectures + Students work (in groups)	Lectures + Students work (in groups)	Lectures + Students work (in groups) – regarding the experiments	Students' presentations (PPT)  Poster preparation

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## Winter / Summer school (draft)

Monday Water management	Tuesday Drinking water supply	Wednesday Drainage (waste water / storm water) in urban/rural areas	Thursday Flood protection / Torrents	Friday Synthesis and discussion
Lectures <ul style="list-style-type: none"> <li>Introduction</li> <li>Water management in Croatia</li> <li>Harmonization with EU directives</li> <li>Water management institutions/agencies:               <ul style="list-style-type: none"> <li>- Hrvatske vode ...</li> <li>- International commissions for protection of major river basins (ICPDR, ISRBC)</li> <li>- ...</li> </ul> </li> </ul> Students work (in groups)	Lectures <ul style="list-style-type: none"> <li>Introduction</li> <li>Water supply systems</li> <li>Management of WSS</li> <li>Presentation of WSS in Croatia - Rijeka and Istria</li> <li>Challenges in (future) water supply (DRINKADRIA project)</li> </ul> Students work (in groups)	Lectures <ul style="list-style-type: none"> <li>Introduction</li> <li>Drainage systems (waste water and storm water)</li> <li>Management of DS</li> <li>Presentation of DS in Croatia - Rijeka and Istria</li> <li>Challenges in (future) drainage in urban/rural areas (RAINMAN project)</li> </ul> Students work (in groups)	Lectures <ul style="list-style-type: none"> <li>Introduction</li> <li>Types of floods</li> <li>Flood mapping</li> <li>Flood hazard and flood risk</li> <li>INSPIRE Directive: spatial data sharing</li> <li>Presentation of DAREFFORT Interreg project (Danube River Basin Enhanced Flood Forecasting Cooperation)</li> </ul> Students work (in groups)	<ul style="list-style-type: none"> <li>During previous 4 days students have to prepare for each day a presentation on that day topic regarding their country / city /region</li> <li>Those presentations will be held by students on Friday and based on all material analysed there will be a structured discussion</li> <li>Each group will have to prepare a poster</li> </ul>

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## Winter / Summer school (draft)

Monday	Tuesday	Wednesday	Thursday	Friday
Hydraulic structures / Dams and reservoirs	Coastal engineering	Climate change and water management	Laboratory work	Synthesis and discussion
<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Dams and reservoirs in Croatia</li> <li>• Hydropower plants and HP systems</li> <li>• Water supply reservoirs</li> <li>• Presentation of interesting HP and other systems with dams and reservoirs (HE Rijeka, HE Senj, HE Tribalj, HE in Drava river basin, reservoirs in Istria)</li> </ul>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Marinas, beaches and other coastal structures</li> <li>• Presentation of interesting marinas, beaches and other coastal structures in Croatia</li> <li>• Advances in using photogrammetry.... Drones ...</li> </ul>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Climate change/variations and its impact on water resources</li> <li>• Mitigation measures</li> <li>• Green infrastructure</li> <li>• Presentation of Danube Floodplain Interreg project</li> </ul>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Presentation of hydraulic laboratory for research and for teaching</li> <li>• Experiment 1</li> <li>• Experiment 2</li> </ul>	<ul style="list-style-type: none"> <li>• During first 3 days students have to prepare for each day a presentation on that day topic regarding their country / city /region</li> <li>• Those presentations will be held by students on Friday and based on all material analysed there will be a structured discussion</li> <li>• Each group will have to prepare a poster</li> </ul>
Students work (in groups)	Students work (in groups)	Students work (in groups)	Students work (in groups)– regarding the experiments	

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The logo for the SWARM project, featuring a stylized blue water drop icon to the left of the word "swarm" in a lowercase, sans-serif font. A blue wavy line extends from the right side of the text.

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The flag of the European Union, consisting of twelve gold stars arranged in a circle on a blue background.

## Training of WB teaching staff – 5 days

POSSIBILITIES: „face-to-face“ or „on-line“

Face to face:

- participation in teaching / exercises / field work / visit to ...
- work with equipment in laboratory and in the field
- present and exchange good practices (e-learning, students' work assesment, plagiarism detection...)
- presenting the QA system at the UNIRIFCE

On – line: same as above but without field work / visits

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Thank you for your attention!

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## SWARM Winter school in UACEG-Sofia

Petar Filkov  
University of Architecture, Civil Engineering and Geodesy

Sixth Project Management meeting  
Sofia, 10th September 2021

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Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders

Project number: 597888-EPP-1-2018-1-RS-EPPKA2-CBHE-JP

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## GENERAL DESCRIPTION

- **Suggested period:** 22 November - 3 December 2021
  - 2 weeks (10 working days)
- **Online classes**
  - 4 topics, 4 teachers
- Individual or Group Tasks for students for some of the topics
- Final group discussion


N.B. During one of these 2 weeks UACEG can welcome WB Teaching Staff for training (in place, if allowed by COVID-19 restrictions)

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# PRELIMINARY AGENDA - 1

Monday	Tuesday	Wednesday	Thursday	Friday
<b>Topic – Hydrological and Hydraulic modelling</b>	<b>Topic – Irrigation Systems and Drought Management</b>	<b>Topic – Investments in Irrigation Infrastructure</b>	<b>Topic – Water Management Optimization Problems</b>	<b>Topic – Water Management Examples - Vit river case study</b>
<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Types of models</li> <li>• Rainfall – Runoff models</li> <li>• Hydraulic models</li> <li>• 1D, 2D and 3D models</li> <li>• Model applications</li> <li>• Floodplain modelling</li> <li>• Flood early warning systems</li> </ul> <b>Practical work with 1D or 2D models</b>  <b>Students work (in groups or individually)</b>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Irrigation Schemes in Bulgaria</li> <li>• Irrigation Schemes and Systems – general</li> <li>• Crop Response to Water. Yield-Water relationship</li> <li>• Management Issues of Irrigation Schemes.</li> <li>• Water Metering and Efficiency of Irrigation Schemes</li> <li>• Structuring the GIS database for need of Management of Irrigation Schemes</li> </ul>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Investments in Irrigation Infrastructure and Water Saving Requirements</li> <li>• Determining Potential Water Savings due to investments</li> </ul> <b>Assignment of Task # 1 –</b> Estimation of Efficiency of an Irrigation Scheme and Determination of Potential Water Saving due to Investments in Irrigation Infrastructure  <b>Students work (in groups or individually)</b>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Optimization Problems in Water Management</li> <li>• Linear Programming</li> <li>• Resource Allocation Problem</li> <li>• Transportation Problem</li> <li>• Prioritization of Investments in Irrigation Infrastructure – Multicriteria analysis</li> </ul> <b>Assignment of Task # 2 –</b> Solving a simple Optimization Task related to Water Resources Management  <b>Students work (in groups or individually)</b>	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Vit Watershed</li> <li>• WEAP modelling</li> <li>• Optimization</li> <li>• Scenarios and scenarios optimization</li> <li>• Water account tables</li> </ul> <b>Consultation Time</b>


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## PRELIMINARY AGENDA - 2

Monday	Tuesday	Wednesday	Thursday	Friday
Topic – Hydraulic structures / Dams and reservoirs-1	Topic – Hydraulic structures / Dams and reservoirs-2	Topic – Hydraulic structures / Dams and reservoirs-3	Topic – Climate change and water management	Discussion and Presentation
<b>Lectures</b> Elements of dam engineering <ul style="list-style-type: none"> <li>• Planning of water resource projects</li> <li>• Embankment dam types; Concrete dam types</li> <li>• Spillways, outlets and ancillary works</li> <li>• Loads on dams</li> <li>• Presentation of interesting examples of dams and reservoirs</li> </ul> Students work (in groups)	<b>Lectures</b> Embankment dam engineering <ul style="list-style-type: none"> <li>• Classification and engineering characteristics of soils</li> <li>• Principles of embankment dam design</li> <li>• Seepage, stability, and stress analysis</li> <li>• Settlement and deformation</li> <li>• Rockfill embankments</li> <li>• Examples</li> </ul> Students work (in groups)	<b>Lectures</b> Concrete dam engineering <ul style="list-style-type: none"> <li>• Principles of concrete dam design</li> <li>• Gravity dam analysis</li> <li>• Concrete for dams; The roller-compacted concrete gravity dam</li> <li>• Design features and construction</li> <li>• Dam Monitoring and Operation</li> <li>• Examples</li> </ul> Students work (in groups)	<b>Lectures</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Climate change/variations and its impact on water resources</li> <li>• How to evaluate climate change</li> <li>• Mitigation measures</li> <li>• Presentation of projects</li> </ul> Students work (in groups)	<ul style="list-style-type: none"> <li>• Students present the results of Tasks # 1 and # 2.</li> <li>• Students present their work on themes assigned in lectures in previous days of the course</li> <li>• Discussion</li> </ul>

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## WB Teaching staff training

- **Suggested period:**
  - 1 week in the period 22 November - 3 December 2021
- **In person** (if possible)
- Topic: ***Bulgarian experience in teaching the subject "Optimization of Irrigation and Drainage Systems" from the Master curriculum of Irrigation&Drainage Engineering at UACEG***

Thank you for your attention!



# WP4. Implementation of developed master curricula and trainings

**Zakhar Maletskyi & Harsha Ratnaweera**

progress meeting **10 September 2021**

follow up of the meetings: 23 June 2021, 17 January 2021, 15 September 2020



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein

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## What have we promised in the proposal?

	WP4	Implementation of developed master curricula and trainings - Development			
NMBU	4.1	Implementation of developed master curricula	Master curricula implemented	14-11-2021	NMBU, WB partners
	4.2	Implementation of trainings for professionals in water sector	Participants trained - Three-day training per WB HEI and 30 participants per training	14-02-2021	NMBU, WB partners
	4.3	Self-evaluation of master curricula	Quality report on master curricula	14-09-2021	NMBU, WB partners, QAC
	4.4	Self-evaluation of trainings for professionals in water sector	Quality report on trainings	14-03-2021	NMBU, WB partners, QAC



REPORT ON MASTER CURRICULA TRAINING

Final report



SELF-EVALUATION REPORT  
(OF TRAINING)



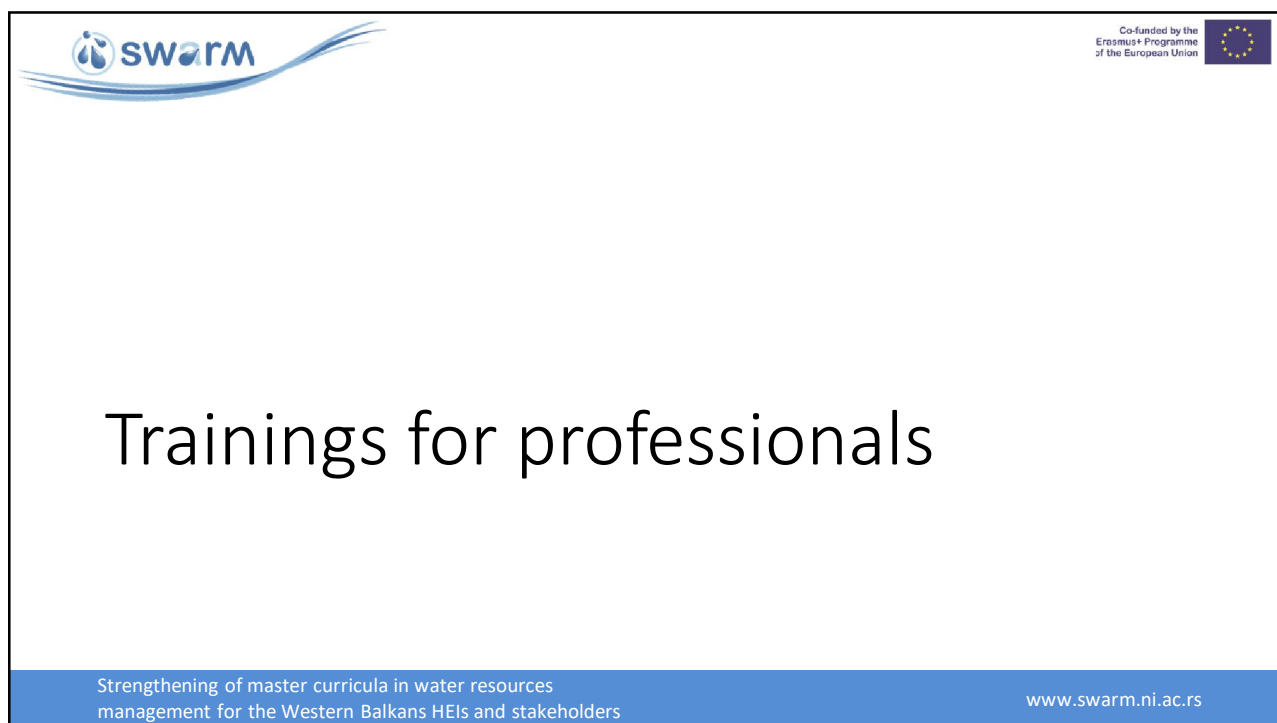
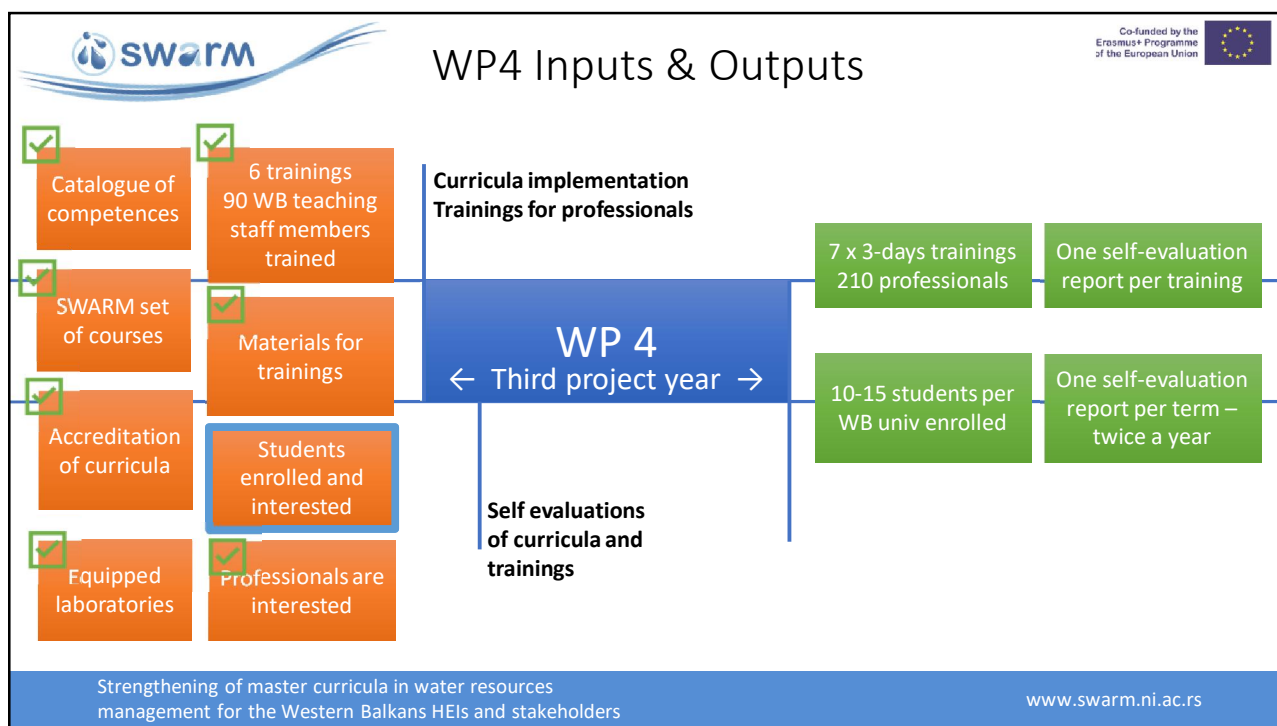
### Curricula Evaluation Practices

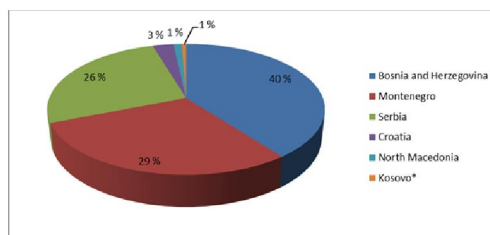
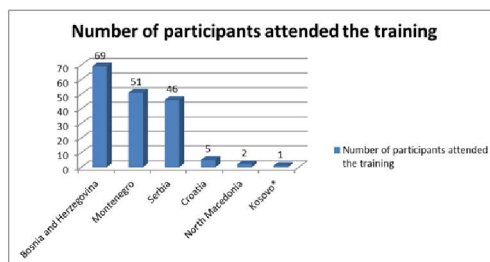


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- AASKM in Leposavic
- 38 participants
- The participants were from the local companies, STO, Fire department, Public Utility Company, Leposavic Municipality



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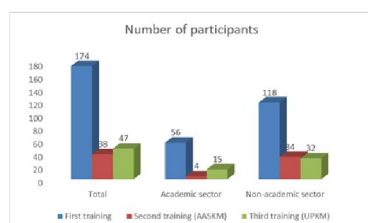
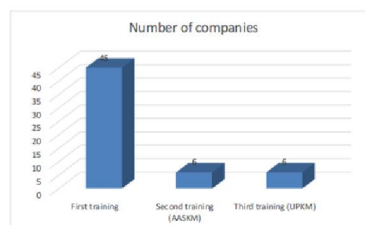
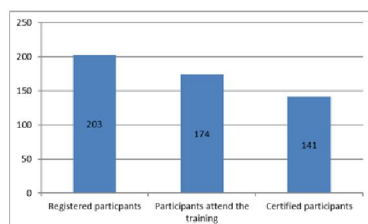
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- Kosovska Mitrovica
- 32 participants
- The participants were from Municipalities, Departments for Environment, water and forestry, Local Water companies, Units for emergence situations, Trepca company, Public utility companies



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# Curricula Implementation

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## How to turn COVID-19 crisis into an opportunity for higher education

*a brief guide for water educators*

Version 2 (07 September 2021)

### Explore potential of Serious Games for water education

1. Check opportunities suggested by SMARTEN project <https://smartenproject.eu/>
2. Recommended serious game on water-food-energy nexus and related EU project <https://sim4nexus.eu/>
3. Recommended game on Adaptive Planning <https://delfttools.tueelft.nl/page/practice/>
4. More water games <https://games4sustainability.org/water-games/>

### Try Augmented Collaboration tools<sup>†</sup>


1. GroupMap <https://www.groupmap.com/>
2. Miro [www.miro.com](https://www.miro.com)
3. Howspace [www.howspace.com](https://www.howspace.com)
4. Mentimeter <https://www.mentimeter.com/>
5. Slido [www.sli.do](https://www.sli.do)
6. Kahoot <https://kahoot.com/>



## 1 Improve eLearning with Water Harmony [eduwater.net](http://eduwater.net)

[www.eduwater.net](http://www.eduwater.net) is the Water Harmony Community Hub, a platform for exchange of eLearning content and experience in water-related higher education. Currently it hosts 7 eLearning courses ready for import into learning management system of your university (Moodle, Canvas or any other):

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1. Water Resource Management          | 5. Wastewater Treatment & Engineering |
| 2. Water Supply                       | 6. Industrial Water Management        |
| 3. Academic writing and presentations | 7. Laboratory practicum               |
| 4. Innovation & Entrepreneurship      |                                       |

1  Search courses and view content

2  Download course files

3  Import to your university eLearning platform

4  Use as e-course or in-class

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University	Status		
	15 September 2020	Update 23 June 2021	Update 10 Sept 2021
UoNiš	15 students at BSc – June 2021 / 5-10 MSc end of 2020 / locked until accreditation / 50:50	Program accredited. Call for BSc is ongoing. Planned 10 BSc. Oct-Nov 10 MSc	Enrolled 19 students at BSc Oct: first generation of MSc (10 is the target)
UoNoviSad	4-5 MSc/year – enrolment in process by end of October 2020 / online, not clear how	3 MSc 2020-2021, 3 from the previous year	
UoSarajevo	15 MSc – enrolment by end of 2020 / 50:50	7 (I year), 17 (II year)	End of Sept: (1 <sup>st</sup> year) 6 students of MSc (2 <sup>nd</sup> year)
UoMostar	10 MSc – enrolment by October 2020 / ???	Enrolment started – planning 10 MSc	Enrolment in progress – by the end of Sept-mid Oct
UoPristina	Follow up email	10 BSc + 16 MSc (2020-2021)	14 BSc enrolled (inprogress=
CollUrosevac	15 students, awaiting accreditation	10 Spec; in the process of accreditation	Sept-Oct
UoMontenegro	5 students	20 places, min 10 enrolled	20 MSc for 2021 by 10 <sup>th</sup> Oct

## Winter / summer schools

Expected Deliverable/Results/Outcomes	Work Package and Outcome ref.nr	6.5.
	Title	Winter/summer schools organised
	Type	<input type="checkbox"/> Teaching material <input type="checkbox"/> Learning material <input type="checkbox"/> Training material <input checked="" type="checkbox"/> Event <input checked="" type="checkbox"/> Report <input type="checkbox"/> Service/Product
	Description	<p>The students' short-time mobility from WB to EU partner HEIs is planned. Three winter (January 2021 – UL and AUTH, February 2021 – UNIRIFCE) and three summer schools (June 2021 – NMBU and BOKU, July 2021 – UACEG) in duration of 5 days will be organized with a participation of 13 WB students per school. The schools will be organized during the third project year.</p>

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	Selected students from each WB HEI will visit EU partner HEIs, attend lectures/exercises, compare teaching/learning methodologies in the HEI of origin and acquired knowledge with the teaching/learning methodology in EU partner HEIs and knowledge and skills of students from EU. The teaching staff from EU partner HEIs will define topics in line with applying innovative techniques in water resources management. During the same period 17 teaching staff from WB partner HEIs will be trained how to use up-to-date laboratory equipment and software purchased during the SWARM project realization.	
	Due date	14-09-2021

### • Format of the Summer School 2021

- Online lectures + workshops (June 2021)
- Participants of the online course: 1 week in November – decision in October  
(5 days funded from SWARM + co-funding from NMBU)

### • 2 students participate from SWARM project:

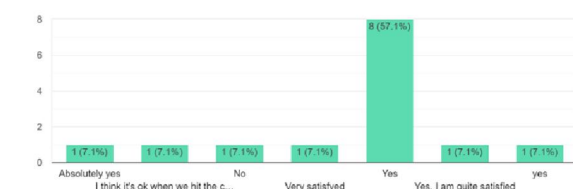
UPKM	Isidora Lazović		isidora.lazovic474@gmail.com	
UL	Daria Ilić		dariailic23@gmail.com	
265	357	183	153	177
-	385	184	152	117
		150	178	118
		181	117	325
				310

The list of WB staff per institution

- BOKU- UNMO (1), TCASU (1), UoM (1); UACEG – UNI (2), UPKM (1); UL – UNS (1), UNSA (1), UoM (1); AUTH – UNI (2), UNSA (1); UNIRIFCE – UNI (2), UPKM (1); NMBU – UNS (1), UNMO (1)

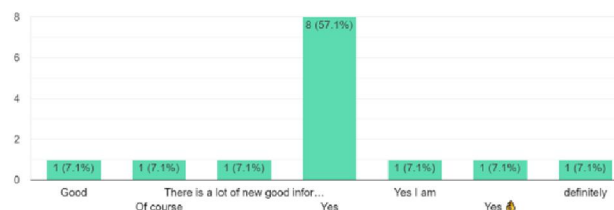
Are you satisfied with the help during the application phase? (Invitations, enrolment, etc)

14 responses



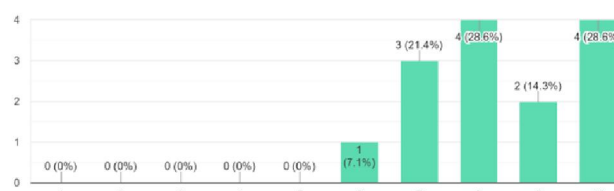
Are you satisfied with the teaching material?

14 responses



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

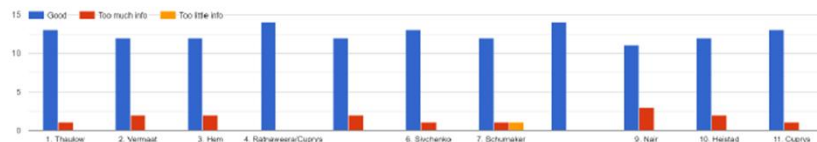
14 responses



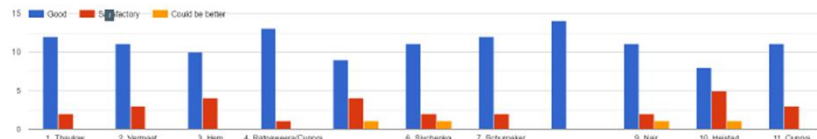
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How do you evaluate the lecture content?



How do you evaluate the lecture quality?



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## What is your overall impression of the course? 14 responses

I have only positive emotions after the course. I learned a lot and improved my English level. At first, I had the impression that there was a very difficult job ahead, but as I got acquainted with the material and the teachers, it was very interesting, and the learning process itself was delayed due to interest.

Great, good work

Every thing were fine

generally, i liked the way lectures was represented. I mostly enjoyed participating in group work such as games and discussion.

It was interesting experience

Wonderful

I got pleasure during the course, I met many students and professors who did not recognize before

Great course with a lot of useful information, but lack of practical work due to quarantine restrictions

Honestly, sometimes it was boring. But it was interesting when we played games and spoke with students.

I liked the attentiveness of the teachers and their willingness to answer questions.

It was good. It has expanded my current knowledge a bit and gave practical skills with programs I've never used before. If I was still getting my bachelor's degree I would've learnt more because some information from course I've only learnt in my master's year. It was nice to connect general knowledge about some subjects I've got in university with water treatment during this course. Also I liked that lecturers were trying to engage audience to participate in discussions at lectures and gave time to prepare instead of keeping talking to black screen or waiting for immediate response.

Well organized and useful course

I was very happy with the educational process. I was glad to meet interesting people and even make new friends.

## Glocal Adaptation of Nanotechnologies in Water Treatment

Joint course by:



Stony Brook University

Established with support from:



**\*Glocal** = A glocal approach means presenting global knowledge within a local context.  
It encapsulates the concept 'think globally, act locally'.



## What is COIL?



**Collaborative Online International Learning (COIL)** connects students and professors in different countries for collaborative projects and discussions as part of their coursework.

COIL Collaborations between students and professors provide meaningful, significant opportunities for global experiences built into programs of study. COIL enhances intercultural student interaction through proven approaches to meaningful online engagement, while providing universities a cost-effective way to ensure that their students are globally engaged.

The SUNY COIL Center pioneered the COIL model more than 15 years ago, and has been helping professors and institutions realize the power of COIL ever since.

We invite you to explore our website and learn about the possibilities when you bring COIL into your teaching and learning practice.

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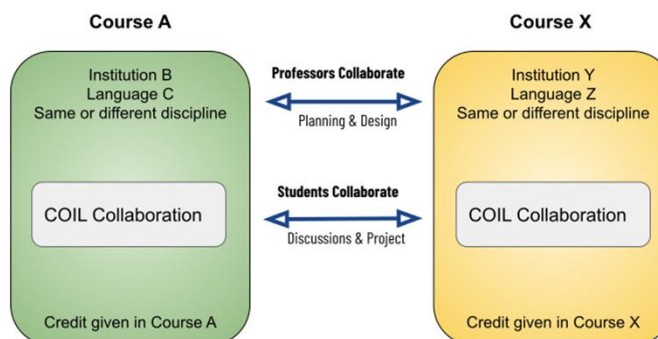
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## What is COIL?

### COIL Methodology

COIL Collaborations are developed by partnering professors from different institutions who want to enrich their courses with student interaction and collaborative learning. Professors work together to design and implement the COIL Collaboration, allowing COIL to be customized to meet the needs of any class, in any discipline. It takes planning and careful attention to design to have a successful COIL Collaboration that benefits students, professors and institutions.

Visit [What is COIL?](#) to learn more and see examples of past COIL Collaborations.



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- **Goals of Module:**

By the end of this module the successful student will understand how sustainable nanotechnologies are used in water treatment from a glocal\* perspective.

- **Learning Outcomes:**

1. Define water pollution as an element of environmental engineering.
2. Demonstrate how Norway, the EU and the U.S.A. address water pollution
3. Attain multiple perspectives on water treatment and management
4. Explain how micro pollutants in water can be managed using sustainable nanotechnologies.

- **Online Intercultural Competencies:**

1. Students will develop intercultural awareness
2. Students will develop virtual intercultural interaction skills
3. Students will develop global collaborative skills

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## Enrolment requirements

- If you have taken THT311, then you are eligible for the SUNY.SB-NMBU certificate and 3 ECTS NMBU certificate
- If you have not taken THT311, then are eligible only for the SUNY.SB-NMBU certificate (no ECTS)
- **Enrolment process:**
  - Please send an email to Susuann with student name, email, university and year of study (xth year in MSc etc)

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- **20<sup>th</sup> September:** deadline for formal enrolment at NMBU (with ECTS)
- **20<sup>th</sup> October:** without formal enrolment but with project certificate – *must have support letter from the teacher from the partner university*
- 25 Oct (Monday): meet & greet
- 26 Oct (Tuesday): Assignment 1: Discussion board upload – about yourself/college/country etc
- 27 Oct: (Wed) 2 lectures (Lecture 1: Elements of environmental engineering and science: water pollution & Lecture 2: Global cases of water pollution)
- 29 Oct (Friday): 2 lectures (Lecture 3: Surveillance and management of emerging micropollutants in water using nanotechnologies & Lecture 4: Using nanotechnologies for water and wastewater treatment processes)
- 5 Nov (Friday): Assignment 2 (Essay 1500 words + 4 PPT slides)
- **20<sup>th</sup> Jan (Thursday): Assignment 3** – extended project report on nanotechnology in water (4000 pages, 12-15 pages)
- **Two certificates:**
  - SUNY.SB-NMBU "Joint certificate of completion": completes with the submission of short essay on 5<sup>th</sup> Nov
  - 3 ECTS certificate from NMBU: work completes with the submission of an extended essay



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and Environment

# Computational Methods in Hydrodynamics for Water Resources Management

Daniel Wildt

SWARM Summer School  
15 – 26 November 2021

draft: 7th September 2021

# Outline I



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and Environment

## Concept and Intended Learning Outcomes

Summer School

Training for teaching staff

## Date and venue

## Program

Week 1: Summer School and training of teaching staff

Week 2: Summer School

## Teaching Materials

---

# Concept and Intended Learning Outcomes: Summer School



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The attendees of the summer school will acquire the following knowledge and abilities:

- ▶ mathematical formulation of hydrodynamic problems using differential equations
- ▶ discretization of differential equations for the numerical solution
- ▶ implementation of models for the numerical solution of simple hydrodynamic problems
- ▶ use of open-source code for the solution of more complex computational fluid dynamics models

# Concept and Intended Learning Outcomes: Training for teaching staff



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Training of teaching staff is held simultaneously within the first week of the summer school. Lecturers will be presented with illustrative ways of presenting highly technical topics such as numerical hydrodynamics to a group of students. In addition they will be provided with relevant teaching materials including Excel Worksheets for the numerical solution of basic hydrodynamic problems.

In addition to innovative teaching methods the training for teaching staff will cover the R-package R/Exams (Zeileis et al., 2014). The package enables an efficient and flexible way of E-learning exams as well as exams on paper.

# Date and venue



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The summer school as well as the training for teaching staff are planned to be held at University of Natural Resources and Life Sciences, Vienna (Austria). Due to travel restrictions depending of the current pandemic situation a change to an online format might be necessary.

The summer school and the training for teaching staff is planned to be held on the following dates:

- ▶ Week 1 (summer school and training for teaching staff): 15th November 2021 until 19th November
- ▶ Week 2 (summer school): 22nd November 2021 until 26th November 2021



# Program: Week 1: Summer School and training of teaching staff



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Department of Water, Atmosphere  
and Environment

Monday, 15th November 2021

- ▶ morning: Welcome session, presentation of University, Department and Institute (Michael Tritthart and Daniel Wildt)
- ▶ afternoon: Unsteady problems in hydrodynamics (Daniel Wildt)
  - ▶ Balancing of the water levels of two tanks connected through a pipe
  - ▶ Heat and mass transport in free-surface waterbodies

Tuesday, 16th November 2021

- ▶ morning: Ordinary Differential Equations: Water surface estimation in non-uniform flow (Daniel Wildt)
  - ▶ afternoon summer school: Self-organised learning
  - ▶ afternoon training for teaching staff: Introduction to the R-package
- 
- R/Exams

# Program: Week 1: Summer School and training of teaching staff



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Wednesday, 17th November 2021

- ▶ morning: Theory on computer-based river modelling (Michael Tritthart)
- ▶ afternoon: Partial Differential Equations: Development of a flood wave (Daniel Wildt)

Thursday, 18th November 2021

- ▶ morning (Daniel Wildt):
  - ▶ Set-up of a 1D model of a channel system using the Excel worksheets UNDA
  - ▶ Error estimation in physical lab experiments
- ▶ afternoon: Hydraulic lab tour

# Program: Week 1: Summer School and training of teaching staff



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Friday, 19th November 2021

- ▶ morning: Unsteady pipe flow (hydraulic surge; Daniel Wildt)
- ▶ afternoon: Excursion and get-together with the IAHR Young Professional Network Vienna (Daniel Wildt)

# Program: Week 2: Summer School



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and Environment

Monday, 22nd November 2021

- ▶ morning: Introduction to Linux operating systems and the Unix command line (Michael Tritthart)
- ▶ afternoon: Self-organised learning

Tuesday, 23rd November 2021

- ▶ morning: Introduction to OpenFOAM (Daniel Wildt)
- ▶ afternoon: Self-organised learning

# Program: Week 2: Summer School



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Wednesday, 24th November 2021

- ▶ morning: “*An Introduction to OpenFOAM: A User View*” presentation by Prof. Hrojve Jasak at the University of Ghent (May 2016) Part I
- ▶ afternoon: Group project assignment and work on group projects

Thursday, 25th November 2021

- ▶ morning: “*An Introduction to OpenFOAM: A User View*” presentation by Prof. Hrojve Jasak at the University of Ghent (May 2016) Part II
- ▶ afternoon: Group project work

Friday, 26th November 2021

- ▶ morning: Summary / Project Presentation
- ▶ afternoon: Recap of the summer school and feedback meeting

# Teaching Materials:



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and Environment

Participants will be supplied with various teaching materials in digital form:

- ▶ handouts
- ▶ MS Excel Worksheets
- ▶ literature list and weblinks
- ▶ OpenFOAM test cases

The materials will be shared with the participants via an E-Learning platform (e. g. Moodle).



Zeileis, A., N. Umlauf and F. Leisch (2014). 'Flexible Generation of E-Learning Exams in R: Moodle Quizzes, OLAT Assessments, and Beyond'. In: *Journal of Statistical Software* 58 (1). DOI: [10.18637/jss.v058.i01](https://doi.org/10.18637/jss.v058.i01).