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# Education in the Water sector

## Next generation Industrial Control Engineering for Sustainable water system Treatment

Erasmus Mundus Design Measure

ERASMUS-EDU-2022-EMJM-DESIGN 101082541

**Prof. R. Vilanova**

21 june 2023

“Dunarea de Jos” University of Galati, Galati, Romania

# Agenda

- ❖ Erasmus Mundus
  - ❖ Erasmus+ and Erasmus Mundus
  - ❖ EMDM
- ❖ NICEST Erasmus Mundus Design Measure (EMDM)
  - ❖ Statement
  - ❖ Main Objectives
  - ❖ Concrete Objectives
  - ❖ Curriculum Structure
- ❖ Collaboration

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# Erasmus+ and Erasmus Mundus





# Erasmus Mundus Action

## New programme 2021-2027

**KA1**  
Learning  
Mobility  
for  
Individuals

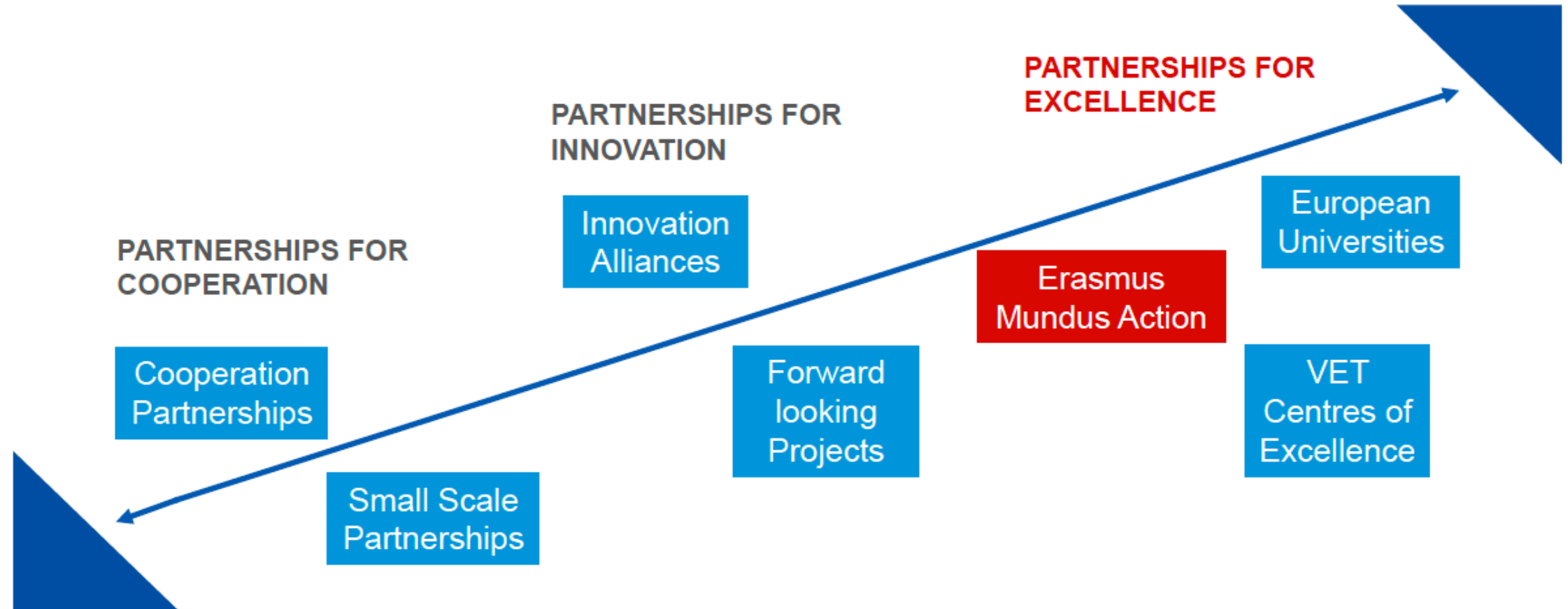
**KA2**  
Cooperation  
for Innovation  
& Good  
practices

**KA3**  
Support  
for  
Policy  
reform



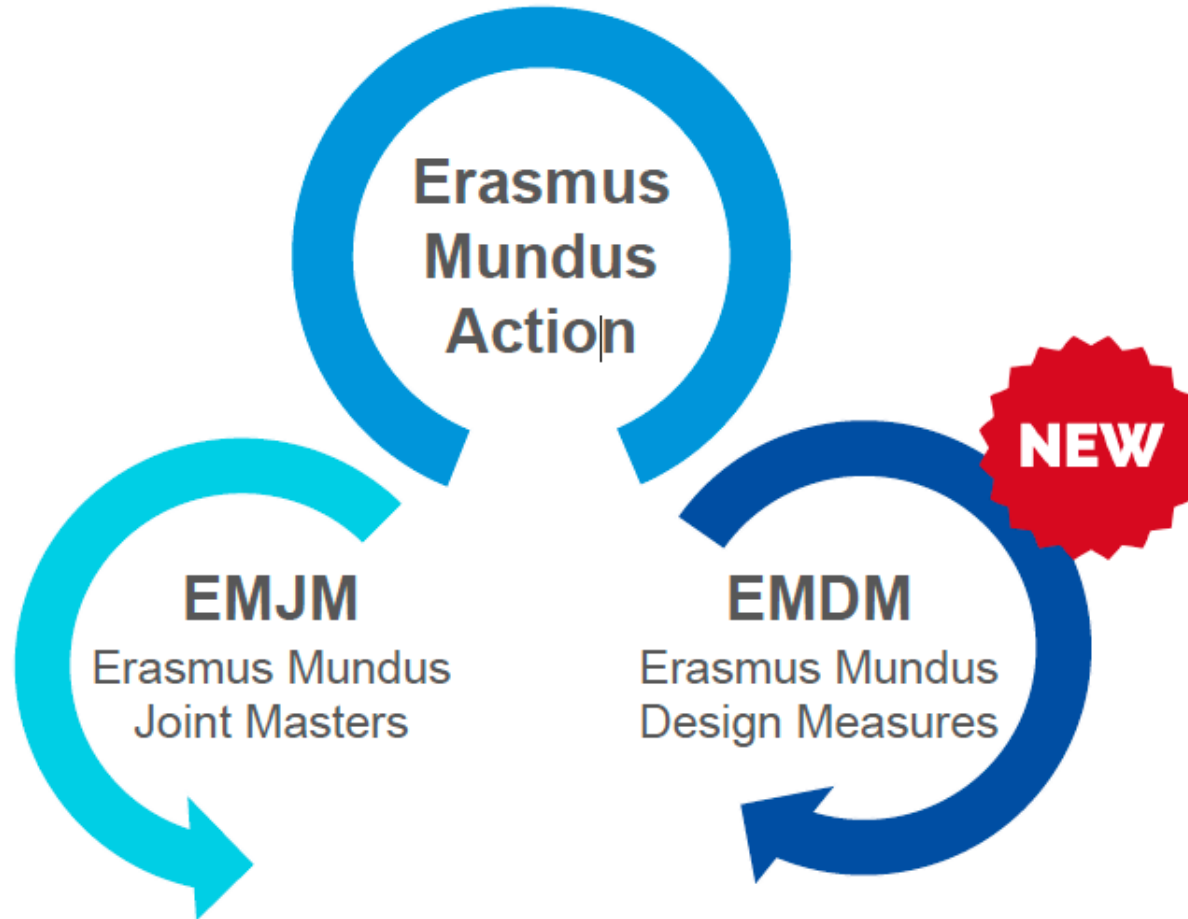


# Erasmus+ and Erasmus Mundus





# Erasmus+ and Erasmus Mundus







# Erasmus+ and Erasmus Mundus

**EMJM**, very competitive but represents a very good [opportunity for HEI](#)

High  
visibility in  
an  
international  
programme  
of  
excellence

Structured  
and  
sustainable  
academic  
cooperation  
worldwide

Attractive  
simplified  
EU funding  
scheme

Selection of  
the most  
talented  
students  
worldwide





# Erasmus+ and Erasmus Mundus

For reference definition of an EMJM:

- ✓ A jointly designed **fully integrated curriculum** and common **implementation procedures**
- ✓ Delivered by a **consortium of HEIs** (involving at least three HEIs from three different countries, of which at least two should be programme countries)
- ✓ International outreach to **attract and enrol excellent students** worldwide
- ✓ Compulsory **physical mobility** for all recruited students
- ✓ **Joint degree** or **multiple degrees**



# Erasmus+ and Erasmus Mundus

**EMJM**, participation as individuals



✓ **Open to students worldwide**

✓ **Applicants:**

- must hold **a first higher education degree** or equivalent
- must not **have benefited previously from** an EMJM scholarship

✓ **The best ones can benefit from a scholarship** depending on the number of scholarships available

✓ **Students apply directly to the EMJM consortium**





# Erasmus+ and Erasmus Mundus

**EMJM**, participation as an organisation

✓ Open to any public and private organisations in Programme & Partner countries

✓ Minimum consortium: **3 HEIs from 3 different countries** of which at least 2 must be Programme countries

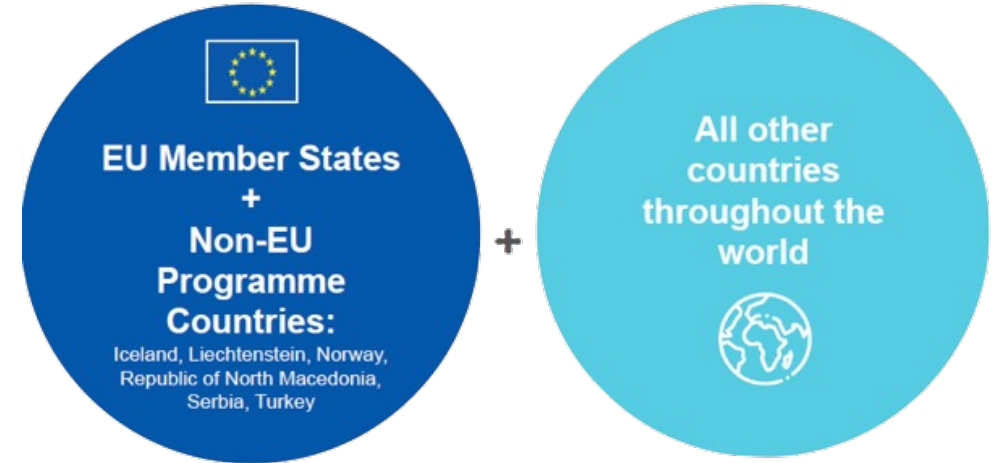
+ optional

Other full academic or non-academic partners

Associated partners

Programme Countries

Partner Countries





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# NICEST Erasmus Mundus Design Measure

- ✓ Short duration **grant to support institutions** in the set-up of a new joint master programme in Europe (and beyond)
- ✓ **One beneficiary** mobilising a group of other HEIs (aiming at an EMJM consortium)
- ✓ **Independent funding scheme** from EMJM (independent calls for proposals)



# NICEST EMDM - Statement

This proposal is aimed at the development of a **Joint Degree Master Programme** entitled **Next generation Industrial Control Engineering for Sustainable water system Treatment (NICEST)** according to the European Higher Education principles. The objective of this Master Programme is to fill a rapidly developing gap that is emerging for graduates that are trained in key processes and management associated with water supply and reuse.

The new envisaged programme has as main goal the education of professionals able to take decisions considering the operational, technological and social aspects in Water Management; specifically, water reuse and desalination from an integrated engineering perspective by covering technological, engineering and scientific related subjects.





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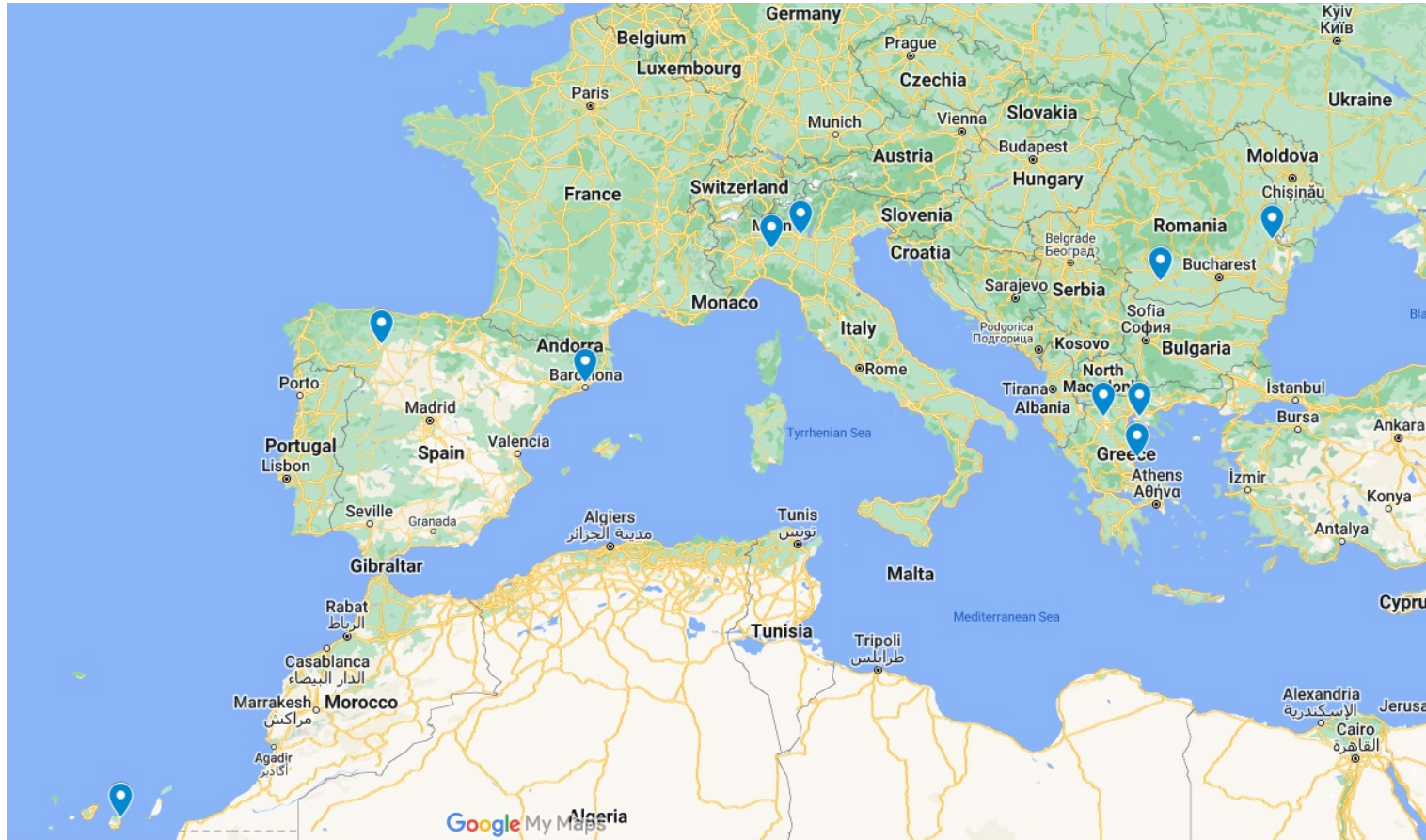
# NICEST EMDM – Statement Consortium



UNIVERSITY OF THESSALY

INTERNATIONAL HELLENIC UNIVERSITY

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS



UAB Universitat Autònoma de Barcelona

UNIVERSITÀ DI PAVIA

UNIVERSITATEA DIN CRAIOVA



UNIVERSITÀ DEGLI STUDI DI BRESCIA



universidad de león



UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA



# NICEST EMDM – Main objectives

- ✓ **Definition of an innovative programme**, paying special attention to information technologies, a subject that is on the forefront of the environmental concerns. New economic and urban developments will require a sustainable approach for safe water supply.
- ✓ Clear definition of the **partnership cooperation scheme**. Each partner should play a relevant role in the management and execution of the programme.
- ✓ The design of all **joint administrative and financial procedures** to guarantee a correct implementation of the joint master programme, as well as all support services: accreditation procedures, admission and selection procedures, registration, transcript records, mobility support, tuition fees and degree award, among others.



# NICEST EMDM – Concrete objectives

**NICEST** proposal concrete objectives regarding

- ✓ The programme definition and curriculum development
- ✓ The envisaged European dimension of the programme
- ✓ The joint Master programme implementation and delivery



# NICEST EMDM – Concrete objectives

**NICEST** proposal concrete objectives regarding

- ✓ **The programme definition and curriculum development**
  - ✓ Give response to a need in present economy of well-educated professionals in the water sector.
  - ✓ Definition of an innovative programme, paying special attention to information technologies
  - ✓ Foster the use of ICT, as a learning subject itself, but also as an approach to support the learning process
  - ✓ Foster the use of the challenge-based approach
  - ✓ Definition of the internal and external monitoring and advising procedures for quality assurance
  - ✓ Attention will be given to the learning of local languages by including courses in the curriculum
  
- ✓ The envisaged European dimension of the programme
- ✓ The joint Master programme implementation and delivery



# NICEST EMDM – Concrete objectives

**NICEST** proposal concrete objectives regarding

- ✓ The programme definition and curriculum development
- ✓ **The envisaged European dimension of the programme**
  - ✓ Intensification of the student and teacher's mobility
  - ✓ Enhance the attractiveness of the joint master programme outside Europe
  - ✓ One set of entry criteria, application forms and admission procedures
  - ✓ Work for a joint diploma award
  - ✓ Quality assessment mechanisms according to the adhere to the Standards for Quality Assurance of Joint Programmes
- ✓ The joint Master programme implementation and delivery

# NICEST EMDM – Concrete objectives

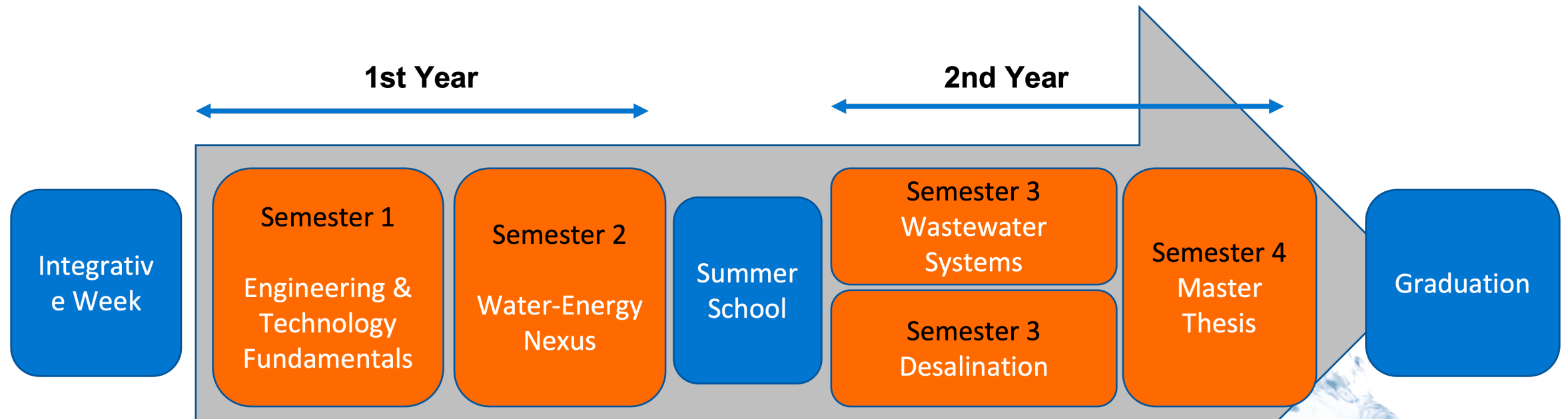
**NICEST** proposal concrete objectives regarding

- ✓ The programme definition and curriculum development
- ✓ The envisaged European dimension of the programme
- ✓ **The joint Master programme implementation and delivery**
  - ✓ Assurance of the sufficient academic and administrative staff resources and procedures.
  - ✓ Definition of a business plan for ensuring the sustainable funding for the programme
  - ✓ Definition of the data gathering and monitoring procedures for the quality assurance of the programme delivery





# NICEST EMDM – Curriculum Structure





# NICEST EMDM – Curriculum Structure

## SEMESTER 1 ENGINEERING & TECHNOLOGY FUNDAMENTALS

Sustainability and  
Green Engineering  
(6 ECTS)

Data Analysis, Optimization  
and Decision Making  
(6 ECTS)

Bioprocess Engineering  
(6 ECTS)

Industrial  
Cibersecurity  
(4 ECTS)

Industrial Communications  
(4 ECTS)

Industrial Data Analysis  
and Visualization  
(4 ECTS)

## SEMESTER 2 WATER-ENERGY NEXUS

Introduction to Water  
Energy nexus  
(4 ECTS)

Energy and nutrient  
recovery  
(5 ECTS)

Wastewater treatment  
technologies  
(4 ECTS)

Biorefinery  
Development  
(3 ECTS)

Sustainable energy  
systems  
(3 ECTS)

Water recovery and  
reuse  
(5 ECTS)

Water-formed scale  
deposition and mitigation  
(3 ECTS)

Greek Language  
and Culture  
(3 ECTS)



# NICEST EMDM – Curriculum Structure

## SEMESTER 3: WASTEWATER SYSTEMS STRAND

Modelling, Identification  
and Simulation of WWTP  
(6 ECTS)

Software sensors (Big Data)  
for WWTP  
(6 ECTS)

Control and operation of  
WWTP  
(6 ECTS)

SCADA Systems for WWTP  
(6 ECTS)

Ethics and academic  
integrity  
(3 ECTS)

Entrepreneurship &  
Innovation Management  
(3 ECTS)

## SEMESTER 3: DESALINATION SYSTEMS STRAND

Water desalination systems:  
design, software and  
standardization of data  
(6 ECTS)

Pre- and post-treatments  
for desalination processes  
(3 ECTS)

Energy Efficiency in  
desalination  
(6 ECTS)

Desalination with  
Renewable Energies  
(6 ECTS)

Control and Intelligent  
Automation of Water  
Desalination Processes  
(3 ECTS)

Environmental Impact of  
Desalination Technologies  
(6 ECTS)

## SEMESTER 4: MASTER THESIS



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- ❖ **Collaboration**



# Collaboration

**EMJM**, participation as an organisation

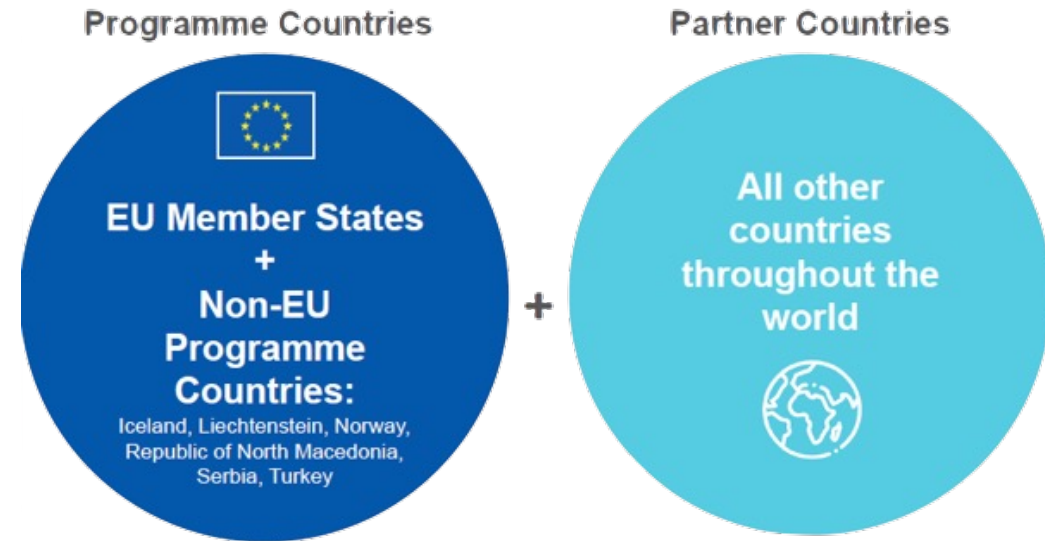
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+ optional

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Associated partners

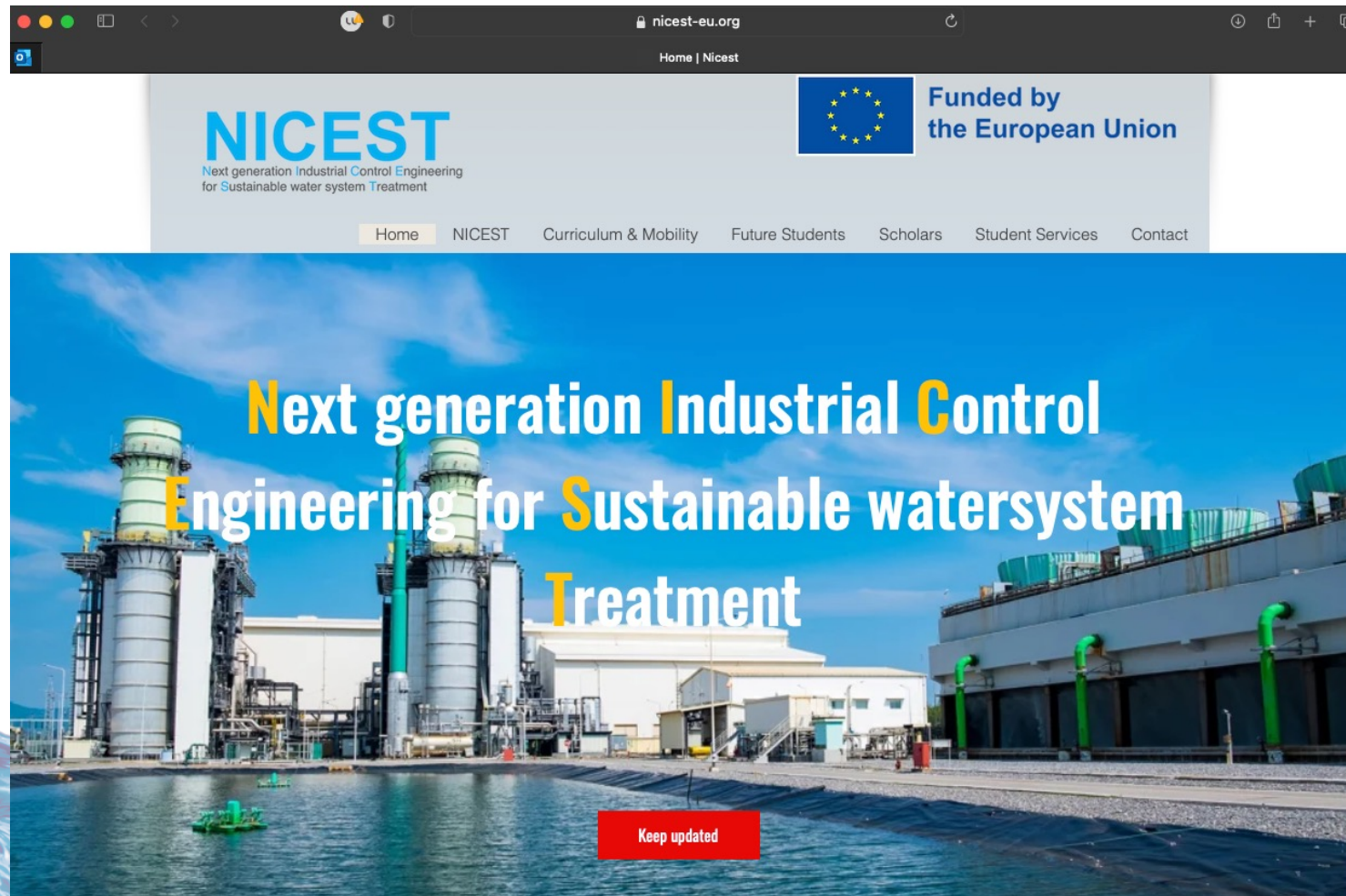






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# Collaboration

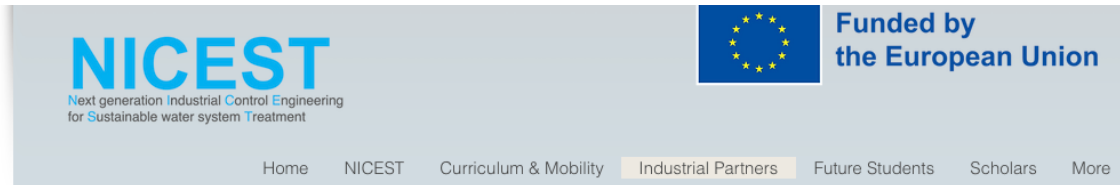


<https://www.nicest-eu.org/>





# Collaboration



## Industrial partners linked to NICEST

Industry feedback and collaborations are one of the important pillars of this Joint Master programme. Industrial partners from various industry sectors indeed expressed their needs and their interest in NICEST and contributing towards making NICEST an excellence programme.

Involving industry in NICEST is also a priority and will be achieved by:

### HOSTING NICEST STUDENTS

for an internship or proposing an industrial related topic for the Master thesis;

### PARTICIPATING AND CONTRIBUTING

to summer-schools and lectures in several courses of each specialization track: they will especially be able to tackle industrial case studies, transverse topics such as project management but also provide job perspectives on how the knowledge the students acquire is definitely needed for the industry;

### BEING PART OF THE DIFFERENT BOARDS

such as the recruitment board of the meta4.0 students, management board or advisory board providing expertise and strategic advice relevant to their knowledge and for the fine-tuning of the educational program.



<https://www.nicest-eu.org/>



**DESAL+**

## DESAL+ LIVING LAB

A desalination-oriented real-life and testbed environment to research, develop, test and validate your water desalination solutions with water-energy nexus and the use of renewable energies approach.