

**Announcement of**  
**NEREUS COST ACTION ES1403 TRAINING SCHOOL**  
**Uptake of microcontaminants by crop plants and ARB&ARGs**  
**testing in wastewater, soil and plant samples**  
**Cyprus, May 29-31, 2018**



**Course overview and objectives**

This will be an intensive three-day course focused on the state-of-the-art knowledge on the uptake of contaminants of emerging concern (CEC) by crop plants, and ARB&ARGs testing in treated wastewater (TWW), soil and plant samples. Knowledge will be provided on CEC uptake and their translocation in plants, as well as on their action as plant stressors. Laboratory techniques which are commonly used to pre-concentrate and quantify selected CEC will also be demonstrated through laboratory exercises. Furthermore, a battery of bioassays for the evaluation of the effects on the environment and on human health arising from TWW reuse will be addressed. Also, methodologies for assessing the risk to human health from the consumption of agricultural products irrigated with TWW will be discussed.

In more detail, through the course the following aspects will be addressed:

- Introduction to TWW reuse practice: Is it a source of introduction of CEC in the environment?
- Multi-residue and target compound extraction methods of selected CEC from various matrices with laboratory demonstrations and practical exercises
- LC-MS/MS tool demonstration for identification and quantification of CEC at ng- $\mu\text{g L}^{-1}$  concentrations
- Uptake and translocation of selected CEC by crops: factors affecting the uptake
- Biochar production and its use as soil amendment: Possible reduction of the bioavailability/bioaccessibility of CEC
- Methodologies for screening and quantifying ARB&ARGs in wastewater, soil and plant matrices
- Recent advances in the study of pharmaceuticals as plant stressors and stress-related physiological markers
- Human health risk assessment of the consumption of agricultural products irrigated with TWW
- Practical work on the evaluation of acute toxicity of TWW





## Trainers

---

**Dr. Despo Fatta-Kassinou**

Nireas International Water Research Center (Nireas-IWRC), University of Cyprus, Cyprus

---

**Ms. Popi Karaolia**

Nireas-IWRC, University of Cyprus, Cyprus

---

**Dr. Evroula Hapeshi**

Nireas-IWRC, University of Cyprus, Cyprus

---

**Dr. Anastasis Christou**

Agricultural Research Institute, Cyprus

---

**Dr. Marinos Stylianou**

Nireas-IWRC, University of Cyprus, Cyprus

---

**Dr. Panagiotis Dalias**

Agricultural Research Institute, Cyprus

---

**Dr. Sotirios Vassiliadis**

University of Thessaly, Greece

---

**Dr. Vassilis Fotopoulos**





Cyprus University of Technology, Cyprus

---

**Dr. Marlen I. Vasquez**

Cyprus University of Technology, Cyprus

---

 <p><b>Who can attend?</b></p>	<ul style="list-style-type: none"> <li>▪ Young researchers focusing their research activities in the field of CEC uptake by crops, CEC identification and quantification in environmental matrices, ARB&amp;ARGs identification and quantification in environmental matrices, plant stress physiology and wastewater reuse.</li> <li>▪ Researchers and/or technical/policy-making staff with a background in agricultural sciences, crop sciences, environmental sciences, chemistry, biology, microbiology, biochemistry, environmental engineering, chemical engineering etc.</li> </ul>
 <p><b>Applications</b></p>	<p>To apply, please provide:</p> <ul style="list-style-type: none"> <li>▪ A cover letter with an expression of interest and a paragraph describing the relevant scientific activities with this Training School;</li> <li>▪ A Curriculum Vitae (CV).</li> </ul> <p>Number of applicants to be reimbursed: <b>Maximum of 20 applicants</b></p> <p>All applications should be submitted to <a href="mailto:info@nereus-cost.eu">info@nereus-cost.eu</a> no later than <b>20 April 2018</b>.</p> <p>Successful applicants will be contacted directly by e-mail by <b>30 April 2018</b>.</p>
 <p><b>Eligibility Criteria</b></p>	<p>Applicants eligible to be reimbursed:</p> <ol style="list-style-type: none"> <li>1. <u>Applicants from all COST Countries:</u> <ol style="list-style-type: none"> <li>a. List of COST countries: <a href="http://www.cost.eu/about_cost/cost_countries">http://www.cost.eu/about_cost/cost_countries</a></li> </ol> </li> <li>2. <u>Applicants from the following approved Near Neighbour Countries institutions:</u> <ol style="list-style-type: none"> <li>a. Jordan University of Science and Technology</li> <li>b. Institute for Rural Engineering, Water and Forestry</li> <li>c. Kiev National University of Construction and Architecture</li> <li>d. G. Eliava Institute of Bacteriophage, Microbiology &amp; Virology (IBMV)</li> </ol> </li> </ol>
 <p><b>Selection Criteria</b></p>	<p>Applicants will be evaluated on the basis of the relevance of their studies and research experience to the topics covered by the Training School program</p>



### Financial Support Accommodation

**Fees: FREE**

Each applicant will receive a financial support grant of 750 EUR

- Travel Grant: 300 EUR
- Accommodation and meals: 150 EUR per day (3 days covered)

The Grant will be provided after the completion of the training school through the e-COST system <https://e-services.cost.eu>.

**Travel and accommodation must be arranged by each participant after the receipt of the acceptance email and the official e-COST invitation.**

## Training School Schedule

**Tuesday, May 29<sup>th</sup>, 2018**

Time	Description
	<b>Meeting location:</b> University Campus, University of Cyprus (Nicosia) Address: 1, Panepistimiou Avenue, Aglantzia, Nicosia <a href="https://goo.gl/maps/nHN7SVW5HtN2">https://goo.gl/maps/nHN7SVW5HtN2</a>
09:00-09:30	<b>Registration</b>
09:30-10:00	<b>Welcome greetings and Introduction to the Summer School Objectives</b> Dr. Despo Fatta-Kassinou, Nireas-IWRC, University of Cyprus
10:00-10:30	<b>Introduction to treated wastewater reuse</b> Ms. Popi Karaolia, Nireas-IWRC, University of Cyprus
10:30-11:00	<b>Coffee Break</b>
11:00-11:30	<b>What do we know so far regarding CEC uptake by crops via treated wastewater reuse for irrigation?</b> Dr. Despo Fatta-Kassinou, Nireas-IWRC, University of Cyprus
11:30-12:30	<b>Methods for the extraction of CEC from wastewater, soil and crops</b> <ul style="list-style-type: none"> <li>• General methods (Accelerated Solvent Extraction, QuEChERS)</li> <li>• Methods for targeting CEC</li> <li>• Clean-up of extracts using solid phase extraction (SPE)</li> </ul> Dr. Evroula Hapeshi, Nireas-IWRC, University of Cyprus
12:30-13:00	<b>Liquid Chromatography tandem mass spectrometry: indispensable tool for the measurement of CEC extracted from crops, soil matrices and wastewater</b> <ul style="list-style-type: none"> <li>• General features of LC-MS/MS</li> <li>• Identification and quantitation mass ions</li> </ul> Dr. Evroula Hapeshi, Nireas-IWRC, University of Cyprus
13:00-14:00	<b>LUNCH</b>
14:00-14:30	<b>Transfer to UCY Main Campus (Nicosia)</b> Location: University Campus, University of Cyprus (Nicosia) Address: 75 Kallipoleos, Nicosia <a href="https://goo.gl/maps/2j1QfYbqeuQ2">https://goo.gl/maps/2j1QfYbqeuQ2</a>
14:30-15:30	<b>Hands-on experience on the extraction, clean-up and SPE pre-concentration of pharmaceutical CEC in tomato fruits harvested from field irrigated with treated wastewater</b> Dr. Evroula Hapeshi, Nireas-IWRC, University of Cyprus
15:30-17:00	<b>Demonstration of the LC-MS/MS analysis of extracted pharmaceutical CEC</b> <ul style="list-style-type: none"> <li>• Basic LC-MS/MS analysis principles</li> <li>• Identification and quantification of pharmaceutical CEC in crops</li> </ul> Dr. Evroula Hapeshi, Nireas-IWRC, University of Cyprus
17:00-17:30	<b>Transfer to Nicosia town center</b>

**Wednesday, May 30<sup>th</sup>, 2018**

Time	Description
	<b>Meeting Location:</b> University Campus, University of Cyprus (Nicosia) Address: 1 Panepistimiou Avenue, Aglantzia, Nicosia <a href="https://goo.gl/maps/nHN7SVW5HtN2">https://goo.gl/maps/nHN7SVW5HtN2</a>
08:15-09:00	<b>Transfer to Vathia Gonia WWTP (Nicosia)</b>
09:00-10:30	<b>Presentation of the treatment stages of a full-scale urban WWTP that combines treated wastewater irrigation schemes</b> <ul style="list-style-type: none"> <li>• Tour to Vathia Gonia WWTP that uses MBR treatment</li> <li>• Field visit to Vathia Gonia and Potamia sites where treated wastewater is reused for irrigation in the long-term</li> </ul> <b>Dr. Anastasis Christou</b> , Agricultural Research Institute
10:30-11:00	<b>Transfer to Agricultural Research Institute (Nicosia)</b>
	Location: Agricultural Research Institute Address: <a href="https://goo.gl/maps/2j1QfYbqeuQ2">https://goo.gl/maps/2j1QfYbqeuQ2</a>
11:00-11:30	<b>Coffee Break</b>
11:30-12:30	<b>Uptake and bioaccumulation of pharmaceuticals by crops grown in fields irrigated with treated wastewater: data based on field surveys and field experiments</b> Dr. Anastasis Christou, Agricultural Research Institute
12:30-13:00	<b>Production and characterization of biochar from various feedstock materials</b> Dr. Marinos Stylianou, Nireas-IWRC, University of Cyprus
13:00-14:00	<b>LUNCH</b>
14:00-15:00	<b>The potential use of biochar for the mitigation of CEC uptake by crop plants</b> Dr. Panagiotis Dalias, Agricultural Research Institute
15:00-15:30	<b>Next generation sequencing approaches for ARB&amp;ARGs screening in wastewater, soil and plant environments</b> Dr. Sotirios Vassiliadis, University of Thessaly
15:30-17:00	<b>Study tour to long-term (more than 7 years) treated wastewater-irrigated experimental sites and to the greenhouse of the Agricultural Research Institute of Cyprus where plants are irrigated with treated wastewater</b> <ul style="list-style-type: none"> <li>• Experimental treatments and designs</li> <li>• Hands on experience</li> </ul> Dr. Anastasis Christou, Agricultural Research Institute
15:30-16:30	<b>Demonstration of the LC-MS/MS analysis of extracted pharmaceutical CEC</b> <ul style="list-style-type: none"> <li>• Basic LC-MS/MS analysis principles</li> <li>• Identification and quantification of pharmaceutical CEC in crops</li> </ul> Dr. Evroula Hapeshi, Nireas-IWRC, University of Cyprus, Cyprus
16:30-17:00	<b>Transfer to Nicosia town center</b>
17:00	<b>Tour in Nicosia city center</b>

**Thursday, May 31<sup>st</sup>, 2018**

Time	Description
	<b>Meeting Location:</b> University Campus, University of Cyprus (Nicosia) Address: 1 Panepistimiou Avenue, Aglantzia, Nicosia <a href="https://goo.gl/maps/nHN7SVW5HtN2">https://goo.gl/maps/nHN7SVW5HtN2</a>
08:15-09:30	<b>Transfer to Cyprus University of Technology (CUT) (Limassol)</b>
09:30-10:00	<b>Tour to CUT laboratories</b> Assoc. Prof. Vassilis Fotopoulos, CUT
10:00-10:30	<b>Plant stress physiology linked to pharmaceutically active compounds (PhACs)</b> Assoc. Prof. Vassilis Fotopoulos, CUT
10:30-11:00	<b>Coffee Break</b>
11:00-11:30	<b>Methodologies for public health risk assessment</b> Dr. Anastasis Christou, Agricultural Research Institute
11:30-14:00	<b>Hands-on experience in the evaluation of stress-related physiological markers of plants</b> <ul style="list-style-type: none"> <li>• Quantification of photosynthetic pigments in plant tissues</li> <li>• Quantification of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) in plant tissues</li> <li>• Quantification of malondialdehyde (MDA) content in plant tissues</li> </ul> Assoc. Prof. Vassilis Fotopoulos, CUT
14:00-15:30	<b>LUNCH</b>
15:30-16:00	<b>An overview of bioassays to monitor environmental and human health effects of treated wastewater</b> Dr. Marlen I. Vasquez, CUT
16:00-17:00	<b>Hands-on experience on acute toxicity assessment on luminescent bacteria</b> <ul style="list-style-type: none"> <li>• Experimental design and pre-treatment of samples</li> <li>• Acute toxicity testing experimentation</li> <li>• Introduction to data analysis and management</li> </ul> Dr. Marlen I. Vasquez, CUT
17:00-18:30	<b>Tour in Limassol city center</b>
15:30-16:30	<b>Transfer to Nicosia city center</b>

---

## Abbreviations

ARB&ARGs: Antibiotic-Resistant Bacteria and Antibiotic Resistance Genes

CEC: Contaminants of Emerging Concern

CUT: Cyprus University of Technology

Nireas-IWRC: Nireas-International Water Research Center

LC: Liquid chromatography

MS: Mass spectrometry

PhACs: pharmaceutically Active Compounds

UCY: University of Cyprus

WWTP: WasteWater Treatment Plant