



## UNITAFRICA

*Empowering the Academic Cooperation between Italy and Africa for fostering the quality and effectiveness of the higher education systems in a mutual learning environment*

TNE23-00050 - CUP D81I24000280007

## Course syllabus

<b>Course</b>	<b>Appropriate Technologies &amp; Digital solutions to Create Resilient Communities to face environmental and health challenges</b>
<b>Organizing Institutions</b>	<p><b>Organizing Universities:</b> University of Brescia (Italy) Université Cheikh Anta Diop de Dakar (UCAD) (Senegal)</p> <p><b>Other participating Universities:</b> UGB - University of Gaston Berger, (Senegal) KNUST - Kwame Nkrumah University of Science and Technology, Kumasi, (Ghana) Moi University, Eldoret, (Kenya)</p>
<b>Target participants</b>	PhD students, Master students
<b>Objectives of the course</b>	<p>The course aims to provide theoretical-practical knowledge of the appropriate technologies and digital solutions for environmental conservation and health protection, in order to foster community empowerment and resilience in their livelihood and natural resources management.</p> <p>Objectives of the course include:</p> <ul style="list-style-type: none"> <li>- Provide skills in the use of appropriate technologies and digital tools (IoT, big data, AI, blockchain, platforms) to address challenges related to global health, environmental sustainability (water, sanitation and waste management), agriculture and energy in developing countries.</li> <li>- Explore how to integrate digital technologies in resource-constrained contexts to optimize natural resource management and promote long-term resilience.</li> <li>- Foster the adoption of scalable, sustainable and culturally appropriate solutions to improve the quality of life of vulnerable communities and reduce the risks associated with health emergencies, natural disasters and environmental crises.</li> </ul>



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<b>Strategic thematic area</b>	<p><b>STRATEGIC THEMATIC AREAS:</b></p> <ul style="list-style-type: none"> <li>A. Rural development, land management, agrifood and food supply chains;</li> <li>B. Health, water and hygiene, One Health;</li> <li>C. Sustainable Energy, environment and natural resource management.</li> </ul> <p>SDGs (Sustainable Development Goals): 3-4-6-7-11-13-15-17</p> <p>Agenda 2063 Goals: 1, 2, 3, 7, 19</p>
<b>Abstract</b>	<p>The African continent, home to 1.4 billion people (projected to reach 2.5 billion by 2050), has the youngest population in the world. Its demographics and growing economy necessitate a forward-looking approach to environmental sustainability - an essential factor for the resilience and prosperity of communities - especially in the face of climate change, as emphasized in the African Union's Agenda 2063</p> <p>The course takes an interdisciplinary approach, aiming to equip participants with the knowledge of the most suitable technological and digital tools to tackle environmental and health issues through bottom-up, scalable, replicable, and impactful solutions, by integrating the following modules:</p> <ol style="list-style-type: none"> <li><b>1. Global health</b> This module will equip students with the skills to identify and critically analyze health determinants and major health challenges in resource-limited settings, taking into account the One Health approach and the emerging role of digital health.</li> <li><b>2. Environment (WASH, water sanitation and hygiene)</b> This module will analyse the conventional and digital appropriate tools to increase the resilience of communities and improve the sustainability of water and waste management systems in rural and isolated areas.</li> <li><b>3. Agriculture and zootecnics</b> This module will explore the principles of sustainable agriculture and livestock farming, including: Farm and Livestock management strategies that balance productivity and environmental impact, Climate-smart agriculture and adaptation strategies to mitigate the effects of climate change.</li> <li><b>4. Renewable energies:</b> This module will explore solutions for energy systems for domestic use, especially appropriate for rural areas, aimed at improving their</li> </ol>



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	<p>efficiency and healthiness. Furthermore, the module will investigate the use of renewables to improve electrification in off-grid and remote rural areas, as well as the use of digitalization and technologies as enabling tools.</p> <p>Given its nature, the course ultimately aims to enhance students' ability to establish connections across various sectors, fostering collaborative networks for education, research, and innovation between Italy and Africa.</p> <p>The following methodologies will be used during the course: challenge-based learning, participatory learning, cooperative learning, problem-based learning, flipped classroom, work group and case study presentation.</p>
<b>Period</b>	30 June - 4 July 2025
<b>Place</b>	Cheikh Anta Diop University in Dakar (UCAD) conference room, Salle visio-conférence UCAD II, address Bp 5005 Dakar Fann
<b>Teaching delivery mode</b>	In person
<b>Language</b>	English
<b>Final evaluation</b>	<p>A certificate of attendance will be provided to all the participants</p> <p>Students should attend full time the course</p> <p>The final evaluation is based on project work and presentation</p> <p>The summer school does not provide the release of training credits. However, the universities of origin of the participating students may provide for the assignment of credits according to their own regulations.</p>
<b>How to apply</b>	Application to be sent to <a href="mailto:unitafrica@unibs.it">unitafrica@unibs.it</a> (see art. 5 of the call)
<b>Contacts</b>	<p>Sabrina Sorlini <a href="mailto:unitafrica@unibs.it">unitafrica@unibs.it</a></p> <p>Gianluca Di Rosario <a href="mailto:unitafrica@unibs.it">unitafrica@unibs.it</a></p> <p>Cheikh Abdoul Kadir Diop <a href="mailto:cheikhak.diop@ucad.edu.sn">cheikhak.diop@ucad.edu.sn</a></p>
<b>Extended programme</b>	See below



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## Week schedule - 5 days timeline (40 hours in total)

	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Introduction + Global Health	Environment WASH	Environment WASH group work/present ation	Agriculture case study/group work	Energy
Afternoon	Global health case study/group work	Environment WASH case study/group work	Agriculture	Agriculture group work/present ation	Final group work presentation

## Speakers

Beye Assane (UCAD University, Dakar, Senegal)

Castelli Francesco (University of Brescia, Italy)

Cavallo Eugenio (Italian Embassy in Dakar, Senegal)

Diop Abdoul Khadir Cheikh (UCAD University, Dakar, Senegal)

Diouf Djicknoum (UGB University of Gaston Berger, Senegal)

Domini Marta (University of Brescia, Italy)

Ferronato Giulia (University of Brescia, Italy)

Gilioli Gianni (University of Brescia, Italy)

Gueye Mouhamadou Thierno (UCAD University, Dakar, Senegal)

Lwande Gerald (Moi University, Eldoret, Kenya)

Matteelli Alberto (University of Brescia, Italy)

Mazzù Angelo (University of Brescia, Italy)

Mbengue Ramatoulaye (UCAD University, Dakar, Senegal)

Nyarko Kwabena Biritwum (KNUST University, Kumasi, Ghana)

Rinaldi Stefano (University of Brescia, Italy)

Sorlini Sabrina (University of Brescia, Italy)



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## Extended programme

### **TNE Summer school course for students**

**Appropriate Technologies**

**& Digital solutions to Create Resilient Communities to face environmental  
and health challenges**

**30th June - 4th July 2025**

Time	Lecture title	Teachers	Learning method
<b>Monday 30th June</b>			
9:00-11:00	<p>Welcome speech &amp; introduction</p> <p>Opening speech</p> <p>Initiatives to promote Italy-Senegal collaboration in higher education, research and innovation</p> <p>Presentation of UNITAFRICA Project</p> <p>Presentation of the course program &amp; lectures</p> <p>Presentation of the attendees</p>	<p>Cheikh Abdoul Khadir Diop</p> <p>Francesco Castelli</p> <p>Eugenio Cavallo</p> <p>Sabrina Sorlini</p>	
<b>MODULE 1: Global Health</b>			
11:00-13:00	Global health challenges and digital innovation	Alberto Matteelli & Gerald Lwande	Lecture
14:00-18:00	Global Health and case study/group works	Alberto Matteelli & Gerald Lwande	Case studies Group work



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### Tuesday 1st July

#### MODULE 2: Environment Water, Sanitation and Hygiene (WASH) and waste management

9:00-11:00	The role of appropriate technologies in drinking water supply	Sabrina Sorlini	Lecture
11:00-13:00	The role of appropriate technologies in sanitation & hygiene	Marta Domini	Lecture
14:00-16:00	Digital tools for WASH resilient solutions	Kwabena Biritwum Nyarko	Lecture
16:00-18:00	Traditional & appropriate solutions for WASH: case study/group work	Mouhamadou Thierno Gueye & Marta Domini	Case studies/ group work

### Wednesday 2nd July

#### MODULE 2: Environment - WASH and waste management

9:00-11:00	The role of appropriate technologies in solid waste management	Ramatoulaye Mbengue	Case studies Interactive lesson
11:00-13:00	Traditional & digital solutions for WASH and waste management: case study/group work	Mouhamadou Thierno Gueye & Marta Domini	Case studies Interactive lesson

#### MODULE 3: Agriculture and animal production

14:00-16:00	Introduction to circularity in agro-ecosystems	Gianni Gilioli & Giulia Ferronato	Lecture
16:00-18:00	Technologies for animal production	Giulia Ferronato	Lecture



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### Thursday 3rd July

9:00-11:00	Technologies for animal production	Giulia Ferronato	Interactive lessons
11:00-13:00	Edge computing for Smart Agriculture: a case study of detection of birds pest in Rice Paddies	Stefano Rinaldi	Case studies
14:00-18:00	Technologies for animal production  Pathways to resilience in semi-arid economies: insights from senegalese livestock value chains	Giulia Ferronato & Assane BEYE	Group work/exercise

### Friday 4th July

#### MODULE 4: Energy

9:00-10:30	Small scale systems for renewable energy production and energy saving	Angelo Mazzù	Interactive lesson  Case studies
10:30-11:30	The Digital Revolution in Renewable Energy Systems	Stefano Rinaldi	Interactive lesson  Case studies
11:30-13:00	Productive uses of renewable energy in Senegal or West Africa	Djicknoum DIOUF	Interactive lesson  Case studies

#### FINAL GROUP WORK & LEARNING VERIFICATION

14:00-18:00	Interactive activities and group work Health Environment Agriculture Appropriate technologies Digital tools	Gerald Lwande Thierno Gueye Assane BEYE Angelo Mazzù Stefano Rinaldi Ramatoulaye Mbengue	Final group work presentation
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