



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

Course	Appropriate Technologies & Digital solutions to Create Resilient Communities to face environmental and health challenges
Organizing Institutions	<p>Organizing Universities: University of Brescia (Italy) Université Cheikh Anta Diop de Dakar (UCAD) (Senegal)</p> <p>Other participating Universities: UGB - University of Gaston Berger, (Senegal) KNUST - Kwame Nkrumah University of Science and Technology, Kumasi, (Ghana) Moi University, Eldoret, (Kenya)</p>
Target participants	PhD students, Master students
Objectives of the course	<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"> - 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. - Explore how to integrate digital technologies in resource-constrained contexts to optimize natural resource management and promote long-term resilience. - 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.
Strategic thematic area	STRATEGIC THEMATIC AREAS:



UNITAFRICA

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	<p>A. Rural development, land management, agrifood and food supply chains;</p> <p>B. Health, water and hygiene, One Health;</p> <p>C. Sustainable Energy, environment and natural resource management.</p> <p>SDGs (Sustainable Development Goals): 3-4-6-7-11-13-15-17</p> <p>Agenda 2063 Goals: 1, 2, 3, 7, 19</p>
Abstract	<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"> 1. Global health 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. 2. Environment (WASH, water sanitation and hygiene) 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. 3. Agriculture and zootechnics 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. 4. Renewable energies: This module will explore solutions for energy systems for domestic use, especially appropriate for rural areas, aimed at improving their efficiency and healthiness. Furthermore, the module will investigate the use of renewables to improve



UNITAFRICA

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	<p>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>
Period	30 June - 4 July 2025
Place	Amphitheater of the new building - Faculty of Literature and Human Sciences (FLHS), UCAD University, Dakar, Senegal.
Teaching delivery mode	<p>In person (for students covered by TNE Funding)</p> <p>The course can be joined also online by Master and PhD students from the Universities included in the 99 partner Universities. For the online participation it is necessary to register to this link by Wednesday 25th June: https://docs.google.com/forms/d/e/1FAIpQLSd-JhcaYjEUwzffgCFMMO86OCeQ7GwWroXYDBLQbfXTO6Y_cQ/viewform?usp=sharing&oid=105876157742256087052</p>
Language	English
Final evaluation	<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>
How to apply	Application to be sent to unitafrica@unibs.it (art. 5 of the call)
Contacts	<p>Sabrina Sorlini unitafrica@unibs.it</p> <p>Gianluca Di Rosario unitafrica@unibs.it</p> <p>Cheikh Abdoul Kadir Diop cheikhak.diop@ucad.edu.sn</p>
Extended Programme	See below



UNITAFRICA

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TNE23-00050 - CUP D81I24000280007

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

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

Speakers/Group work coordinators

Appiah-Effah Eugene (Knust University, Kumasi, Ghana)
 Bertolini Caterina (Italian Embassy in Dakar)
 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)
 Diouf Ismaila (UCAD University, Dakar, Senegal)
 Di Rosario Gianluca (University of Brescia, Italy)
 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)
 Kandji Badara Alioune (UCAD University, Dakar, Senegal)
 Lwande Gerald (Moi University, Eldoret, Kenya)
 Matteelli Alberto (University of Brescia, Italy)
 Mazzola Michele (Ministry of University and Research (MUR), Italy)
 Mazzù Angelo (University of Brescia, Italy)
 Mbengue Ramatoulaye (UCAD University, Dakar, Senegal)
 Rinaldi Stefano (University of Brescia, Italy)
 Sorlini Sabrina (University of Brescia, Italy)
 Tall Mouhamadou Mansour (UAM University, Senegal)
 Tcheheumeni Djanni Axel Laurel (UCAD University, Dakar, Senegal)
 Timera Bouna (UCAD University, Dakar, Senegal)



UNITAFRICA

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TNE23-00050 - CUP D81I24000280007

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
Monday 30th June				
	9:00-11:00	Welcome speech & introduction Greetings from the Dean of the Faculty of Sciences and Techniques Greetings from the Dean of the Faculty of Human Sciences Speech from the Italian Ambassador in Dakar Opening speech Greetings from the Rector of UCAD Initiatives to promote Italy-Senegal collaboration in higher education, research and innovation Greetings from MUR (online) Presentation of UNITAFRICA Project	Cheikh Abdoul Khadir Diop Ismaila Diouf Bouna Timera Caterina Bertolini Francesco Castelli Kandji Badara Alioune Eugenio Cavallo Michele Mazzola Sabrina Sorlini	(In person and online)
	11:00-11:30	Coffee break		
MODULE 1: Global Health				
	11:30-13:30	Global health challenges and digital innovation	Alberto Matteelli & Gerald Lwande	Lecture (in person and online)
	13:30-14:30	Lunch		
	14:30-15:00	Presentations of in-person attendees		
	15:00-18:00	Global Health and case study/group works	Alberto Matteelli & Gerald Lwande	Case studies (in person and online) Group work (in person only)



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TNE23-00050 - CUP D81I24000280007

Tuesday 1st July

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

9:00-10:00	The role of appropriate technologies in drinking water supply	Sabrina Sorlini	Lecture (in person and online)
10:00-11:30	The role of appropriate technologies in sanitation & hygiene	Marta Domini	Lecture (in person and online)
11:30-12:00	Coffee break		
12:00-13:00	Remote-real time water monitoring in Saraya City	Axel Laurel Tcheheumeni Djanni	Lecture (in person and online)
13:00-14:00	Lunch		
14:00-16:00	Digital tools for WASH resilient solutions	Appiah-Effah Eugene	Lecture (in person and online)
16:00-18:00	Traditional & appropriate solutions for WASH: case study/group work	Mouhamadou Thierno Gueye & Marta Domini	Case studies (in person and online) Group work (in person only)

Wednesday 2nd July

MODULE 2: Environment - WASH and waste management

	9:00-10:30	The role of appropriate technologies in solid waste management	Ramatoulaye Mbengue & Mouhamadou Mansour Tall	Case studies Interactive Lesson (in person and online)
	10:30-11:00	Coffee break		
	11:00-13:00	Traditional & digital solutions for WASH and waste management: case study/group work	Mouhamadou Thierno Gueye & Marta Domini	Group work/exercise (In person only)
	13:00-14:00	Lunch		
MODULE 3: Agriculture and animal production				
	14:00-16:00	Introduction to circularity in agro-ecosystems	Gianni Gilioli & Giulia Ferronato	Lecture (in person and online)
	16:00-18:00	Technologies for animal production	Giulia Ferronato	Lecture (in person and online)



UNITAFRICA

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TNE23-00050 - CUP D81I24000280007

Thursday 3rd July

9:00-11:00	Technologies for animal production	Giulia Ferronato	Interactive Lessons (in person and online)
11:00-11:30	Coffee break		
11:30-13:00	Edge computing for Smart Agriculture: a case study of detection of birds pest in Rice Paddies	Stefano Rinaldi	Case studies (in person and online)
13:00-14:00	Lunch		
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 (in person only)

Friday 4th July

MODULE 4: Energy

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 (in person and online)
	10:30-11:30	The Digital Revolution in Renewable Energy Systems	Stefano Rinaldi	Interactive lesson Case studies (in person and online)
	11:30-12:00	Coffee break		
	12:00-13:00	Productive uses of renewable energy in Senegal or West Africa	Djicknoum DIOUF	Interactive lesson Case studies (in person and online)
	13:00-14:00	Lunch		
FINAL GROUP WORK & LEARNING VERIFICATION				
	14:00-18:00	Interactive activities and group work Health Environment Agriculture Appropriate technologies Digital tools	Marta Domini, Gianluca Di Rosario Gerald Lwande Thierno Gueye, Ramatoulaye Mbengue Assane BEYE, Giulia Ferronato Angelo Mazzù Stefano Rinaldi	Final group work presentation (in person only)