



Pro-GREEN-LABs - 101129466

Promoting Green Competences for Integrated Sustainable Development in Architectural Education through Experiential, Lab-based, Active Learning.

D4.1 Developed Curriculum and Qualification Description

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Executive summary

This report represents the deliverable (D4.1), which is the 1st part of the outputs of *WP4-Development II: Modernizing Curricula* of the Pro-GREEN LABs project (PGL). It is designed as a comprehensive document outlining the modernized curriculum for the new Master's program at UOP, including its associated qualification descriptors of learning outcomes, structures, and profiles.

The report aims to document how collaborative efforts involving partner institutions and prior work packages have influenced the development of the new courses in the new master's program at the University of Petra. It outlines the key steps taken to review existing curricula, analyze gaps, and design an improved curriculum framework aligned with international standards. Furthermore, the university's current courses' alignment with the newly developed courses and the implemented changes will be introduced and explained, as well as the collaboration with stakeholders for the newly developed courses.

The report is divided into four sections: (1) the development of the thematic modules, (2) an overview of the new curriculum including learning outcomes and objectives, (3) quality descriptors of the students; and (4) conclusion and next steps.

1. Introduction

The development of the thematic modules – the overarching descriptors of the courses in all SEMED universities – is a crucial step in curriculum modernization for the universities. It is also an important step in connecting the institutions with the industry, different NGOs, and local, regional and global stakeholders. Furthermore, it is through this development that the EU and SEMED universities can share their knowledge with each other and create strong collaborations and networks. Developing new master programs and master courses is a long and iterative process that demands constant revisiting and reassessment; for modernization, it is important that the framework is flexible enough to allow for updating the course contents, objectives, and methodologies to align with the latest research and knowledge.

During the benchmarking visit at POLIMI between 11-15th of November 2024 (Erasmus+ ProGreenLabs, 2024a) a workshop designed to further elaborate the names, and in extension, the content of the thematic modules, was held with all partners. EU partners from Bauhaus Universität Weimar (BWU), Chalmers University of Technology (CTH/CUT) and Politecnico di Milano (POLIMI), together with representatives from Alexandria University (AU), Cairo University (CU), the Arab Academy for Science, Technology, and Maritime Transport (AASTMT), and the University of Petra (UoP) participated in the workshop held by CTH and UoP. The participants decided on the following:

- A name change for the module Cultural Landscaping was revised to *Natural, Heritage and Cultural Landscape*
- GIS for Urban Planning & Design was revised to *Mapping for Urban Planning and Design*
- A new module named *Urban Planning Policy* was added

The consortium also discussed theoretical approaches, methodologies, content, and learning objectives & outcomes, as well as structuring different courses under each module.

By the end of the month, on November 28th, a second didactic workshop was held where CTH provided insights into how different green education initiatives have been implemented in other projects in the EU, and group discussions identified a need for understanding different teaching methodologies and new technology, a need for multidisciplinary approaches to be utilized and allowed in education addressing economic, social and environmental sustainability, as well as a need to focus on fostering a sustainability mindset as well as competences, and the importance of a people-centered approach. Participants also discussed the need for the curriculum to be “robust, iterative, and flexible.” Additionally, global issues have to be addressed on a local scale in the different courses and modules. Finally, the need for networking and

building networks both with stakeholders and industry, but also between the partner universities, was identified (Erasmus+ ProGreenLabs, 2024b).

The aim of this report is to document how these workshops and prior work packages have influenced the development of the new courses in the new master program at the University of Petra. Furthermore, the university's current courses' alignment with the newly developed courses and the implemented changes will be introduced and explained, as well as the collaboration with stakeholders for the newly developed courses.

The report is divided into four subsections, first the development of the thematic modules, second an overview of the new curriculum including learning outcomes and objectives, as well as third, quality descriptors of the students. The report ends with a conclusion of the work and the steps ahead as its fourth part.

2. Development of Thematic Modules & Next Steps

2.1 Detailed account of the eight thematic modules' development process

The development of the thematic modules for the master's program was guided by a collaborative and iterative process involving SEMED and EU partners from the preparational phase in 2022. From the outset, the project adopted a systematic approach, combining needs assessment, stakeholder engagement, and expertise aligning it with the findings of WP2. This began with an extensive data mapping exercise, where SEMED universities identified institutional needs and educational gaps. These findings were refined through a series of workshops and consultations, particularly the 2nd Didactic and the 3rd Didactic Workshops in POLIMI, where SEMED partners proposed thematic courses based on regional priorities. EU partners subsequently contributed to matching their expertise, ensuring the modules reflected best practices while addressing local challenges.

Description of the Eight Thematic Modules Identified

The collaborative process led to the identification of thematic modules designed to address critical issues in sustainability, smart cities, and urban resilience:

Original Thematic Modules: Initially proposed courses included:

1. Regional Urban Resilience
2. GIS for Urban Planning and Design
3. Cultural Landscaping
4. Participatory Planning and Design
5. Principles of Sustainable and Smart Cities
6. Sustainable Urban Planning and Design
7. Climate Change and the City
8. New Technologies for Sustainable Cities

Revised Thematic Modules: Post-workshop revisions streamlined these themes into eight revised modules, see Figure 3:

1. Climate Change and the City
2. Mapping for Urban Planning and Design

3. Natural, Heritage and Cultural Landscape
4. Methodologies in Urban Planning and Design
5. Sustainable Urban Planning and Design
6. Participatory Planning and Design
7. Principles of Sustainable Cities
8. Urban Planning Policy

The revisions aimed to enhance coherence by refining and merging overlapping themes (reflecting best practices with the identified gaps in SEMED) and proposing new themes such as Urban Planning Policy. After reviewing best practices from EU universities and the needs identified in WP2, the UoP team revised the thematic modules and courses to develop a more cohesive study plan. The first phase involved aligning UoP's existing courses with the consortium-agreed themes (Table 1A). The second phase proposed an enhanced study plan, integrating relevant best practices and identifying courses that could be adopted or merged, while tailoring them to suit the local and regional context (Table 9B). The tables (1A and 1B) outline the outputs that shaped the restructured master's degree study plan.

An online workshop on November 28th guided by Chalmers University of Technology, including all participants, gave some critical inputs and raised questions in the relationship between social sustainability and technological developments as well as the connection between education and urban practice in the SEMED region. Once again, the discussion addressed the question of becoming an educational lab and how this may differ from 'conventional' teaching. It became clear that the continuation of this discourse and future progress of curriculum development in WP4 needs – and has a close connection to – the didactic workshops, simultaneously prepared for in WP5.

Table 1A: Aligning UoP's existing courses with the consortium-agreed themes

Title of module/course		Number of credits (credit hours or any other unified metric)	Compulsory / Elective
Theme	UOP Current Courses		
Climate Change & the City	Climate Change and the City	2	Compulsory
Mapping for Urban Planning and Design	GIS for Urban Design and Planning	3	Elective
Natural, Heritage, and Cultural Landscape	Mitigation of Natural Disaster	3	Elective
	Sustainable Heritage Area Conservation Principle	3	Elective
Methodologies in Urban Planning & Design	Advanced Research Methodologies	3	Compulsory
	Quantitative and Qualitative Urban Analysis	3	Elective
	Seminar	1	Compulsory
Participatory Planning and Design	Sustainable Urban Planning Project	3	Elective
	Urban Slums and Refugee Camps	3	Elective
Sustainable Urban Planning & Design	Sustainable Urban Planning and Design	3	Compulsory
Principles of Sustainable Cities	Principles of Designing Sustainable Cities	3	Compulsory
	BIM and Urban Simulation Tools	3	Elective
Urban Planning Policy	Urban Economics	3	Elective
	Advanced Project Management for Urban Planning and Design	3	Elective

Table 1B: UoP Proposed courses 1

Title of module/course				Number of credits (credit hours or any other unified metric)	Compulsory / Elective
Theme	UOP Current Courses	Best Practices Relevant Courses	UOP Proposed Courses		
Climate Change & the City	Climate Change and the City	- Energy, Climate and Urban Planning - Climate and Hydrology - Sustainability In Architecture and Urban Models - Climate Changes and Urban Hydrological Resilience	Climate Change and the City	2	Compulsory
Mapping for Urban Planning and Design	GIS for Urban Design and Planning	GIS for Urban Design and Planning	GIS for Urban Design and Planning	3	Elective
Natural, Heritage, and Cultural Landscape	Mitigation of Natural Disaster	ARCHITECTURE FOR THE BUILT HERITAGE URBAN HISTORY THEORIES AND HISTORY OF RESTORATION *	Urban Geography	3	Elective
	Sustainable Heritage Area Conservation Principle		HERITAGE management	3	Elective
Methodologies in Urban Planning & Design	Advanced Research Methodologies	Advanced Research Methodologies - POUIM	Advanced Research Methodologies	3	Compulsory
	Quantitative and Qualitative Urban Analysis	Advanced Mapping for Urban Studies & Research	Advanced Mapping for Urban Studies & Research	3	Elective
	Seminar	Research seminar POUIM - everyone	Research Seminar	1	Compulsory
Participatory Planning and Design	Sustainable Urban Planning Project	PLACE MAKING FOR HUMAN CENTERED URBAN DESIGN - POLIMI https://mastertemporaryus.es.wordpress.com/module-2-b/	PLACE MAKING FOR HUMAN CENTERED URBAN DESIGN	3	Elective
	Urban Slums and Refugee Camps	METHODS FOR PARTICIPATORY PLANNING, and CO-DESIGN - POLIMI	METHODS FOR PARTICIPATORY PLANNING, and DESIGN	3	Elective
Sustainable Urban Planning & Design	Sustainable Urban Planning and Design	SMART CITIES AND URBAN INNOVATION	Sustainable Urban Planning and Design	3	Compulsory
Principles of Sustainable Cities	Principles of Designing Sustainable Cities	- SUSTAINABILITY IN ARCHITECTURE AND URBAN MODELS - SUSTAINABLE DEVELOPMENT AND THE DESIGN PROFESSIONS - THE DEBATE ON SUSTAINABILITY: HISTORY, THEORIES AND CONTEMPORARY APPROACHES	- THE DEBATE ON SUSTAINABILITY, SMART, D24 AND CONTEMPORARY APPROACHES	3	Compulsory
	BIM and Urban Simulation Tools	- BIM FUNDAMENTALS AND APPLICATIONS - BIM APPLICATIONS	- BIM FUNDAMENTALS AND SMART APPLICATIONS	3	Elective
Urban Planning Policy	Urban Economics	- POLICY ANALYSIS - STRATEGIC PLANNING AND URBAN POLICIES - URBAN POLICIES DESIGN STUDIO - CRITICAL URBAN POLICY STUDIES: THEORETICAL ISSUES AND EMPIRICAL EXPLORATIONS	- CRITICAL URBAN STUDIES: THEORETICAL ISSUES AND EMPIRICAL EXPLORATIONS	3	Elective
	Advanced Project Management for Urban Planning and Design	- EU POLICIES FOR SUSTAINABILITY AND THE CITY - EUROPEAN URBAN POLICIES & TERRITORIAL GOVERNING STRUCTURES - URBAN ECONOMICS	- POLICIES FOR SUSTAINABILITY AND THE CITY	3	Elective

2.2. Contributions from SEMED partners

SEMED universities provided critical insights into the thematic module development through:

- **Needs Assessment:** Conducting data mapping exercises to highlight institutional and regional educational requirements, resulting in the identification of 24 potential courses.
- **Thematic Consolidation:** Proposing course content, teaching methodologies, and Intended Learning Outcomes (ILOs) tailored to their regional contexts.
- **Gap Analysis:** Highlighting the need for modules like "Methodologies in Urban Planning & Design" to address specific educational gaps.

These contributions ensured the curriculum addressed the distinct challenges and opportunities of the SEMED region.

2.3. Integration of EU partners' expertise to shape modules content

EU partners enriched the development process by aligning their expertise with SEMED needs:

- Matched their specialized knowledge areas to the identified modules.
- Provided feedback on refining thematic focuses, merging overlapping content, and introducing advanced methodologies, which is work in progress in the development of the modules content.
- Ensured global best practices and cutting-edge innovations were integrated into the modules (the development of the module content is currently a work in progress which will illustrate these best practices and interdisciplinarity).

3. UoP Curriculum Overview

This section outlines how the new master's program at the University of Petra will be structured. At this stage, Lifelong Learning Modules and Placement Modules are not addressed. These will instead be developed once the final number of Associated Partners are involved in the project, and after training with didactic specialists have been carried out.

3.1 Vision, Mission & Objectives of the master's program

Vision: The University of Petra aspires to be the "University of Choice" for designers, urban planners, and researchers in the field of sustainable smart cities

Mission: Contributing to the development of the Arab city and raising its ability to face challenges through scientific research, qualifying specialists, and providing quality services to various institutions in the field of sustainable smart cities.

Objectives:

- Producing knowledge and encouraging scientific research to improve the natural, social, cultural, and economic conditions of Arab cities.
- Training urban planners and designers on the specialized aspects of sustaining cities based on the most important challenges associated with the Arab city and how to integrate this with the principles of a smart city.
- Providing the labor market with specialized competencies capable of dealing with sustainable development challenges of all dimensions, environmental, social, and economic, through an applied scientific program.
- Serving the community by providing expertise and skills that work with relevant authorities and local institutions to prepare studies to increase the sustainability of cities.
- Providing the skills and experiences necessary for students to succeed in many career paths.

3.2 Program Structure: Overview of semesters, credit hours, and core/elective courses

The program structure, as shown in Tables 2 and 3, are designed to provide a comprehensive and well-rounded educational experience, organized across multiple semesters. Each semester typically includes a mix of core and elective courses, ensuring both foundational knowledge and opportunities for specialization. Credit hours are distributed to balance the workload, with core courses focusing on essential concepts and skills, while electives allow students to tailor their learning to specific interests or career goals. This structured approach fosters a progressive learning journey, enabling students to build expertise while exploring diverse areas within their field.

Table 2: The Master's program structure

University of Petra							
(Accredited University) Quality Assurance, Planning & Performance Management Unit				جامعة البتراء		سنواتها 30 (تحت إشراف)	
Advisory Study Plan for a Master Degree in Sustainable Smart Cities Year 2024 - 2025 (Thesis)							
Faculty of Architecture and Design				كلية الهندسة والعمارة			
Study Plan For a Master Degree in :				خطة الدراسة لخطة ماجستير في :			
Sustainable Smart Cities (Thesis)				المدن الذكية المستدامة (مذكرة)			
First Year (18 Cr. Hrs.)							
First Semester				Second Semester			
Course No.	Course Title	Prerequisite	Cr. Hrs.	Course No.	Course Title	Prerequisite	Cr. Hrs.
201711	Advanced Research Methodologies	-	3	201721	Sustainable Urban Planning and Design	-	3
201731	The Debate on Sustainability, Smart and Contemporary Approaches	-	3	201741	Climate Change and the City	-	2
201723	Smart Transportation Planning	-	3		Elective Course		3
				201712	Research Seminar	-	1
Total			9	Total			9
Second Year (15 Cr. Hrs.)							
First Semester				Second Semester			
Course No.	Course Title	Prerequisite	Cr. Hrs.	Course No.	Course Title	Prerequisite	Cr. Hrs.
	Elective Course		3		Master Thesis	201711	6
	Elective Course		3				
	Master Thesis	201711	3				
Total			9	Total			6
Total Hours 33 Credit Hours							
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3.3. Compulsory and elective courses

Table 3: Compulsory and elective courses

Total	Prerequisite	Credit Hours	Course Title (English)	Course Title (Arabic)	Course No.
Compulsory Requirements					
15	-	3	Advanced Research Methodologies		201711
	-	1	Research Seminar		201712
	-	3	Sustainable Urban Planning and Design		201721
	-	3	Smart Transportation Planning		201723
	-	3	The Debate on Sustainability, Smart and Contemporary Approaches		201731
	-	2	Climate Change and the City		201741
Elective Requirements (Group 1: Scientific Research)					
3	201711	3	GIS for Urban Design and Planning		201713
	201711	3	Advanced Mapping for Urban studies & Research		201714
Elective Requirements (Group 2)					
6	201721	3	Place making for Human-Centred Urban Design		201722
	201731	3	Urban Geography		201742
	201731	3	BIM Fundamentals and smart applications		201751
	201731	3	Infrastructure Planning and Urban Hydrology		201752
	201731	3	Sustainability and Environmental Impact Assessment		201753
	201731	3	Methods for participatory planning and design		201754
	201731	3	Policies for Sustainability and the City		201755
	201731	3	Heritage Management		201756
	201731	3	Critical Urban studies: Theoretical Issues and Empirical Explorations		201761
9	201711	9	Master Thesis		
33	Total Hours				

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■ Courses that were altered through the project

■ Courses that remained as original

3.4. Learning Outcomes: Program goals aligned with qualifications and professional standards.

The Smart Sustainable Cities Master Program is structured around diverse knowledge domains, offering a balance of compulsory and elective courses tailored to equip students with advanced expertise in sustainable urban development. Table 4 provides a comprehensive overview of these domains, detailing the courses offered, their classification as compulsory or elective, and the distribution of credit hours between theoretical and practical components. The program integrates scientific research, urban planning principles, sustainability dimensions, and professional skills, culminating in a master thesis to showcase students' research and practical capabilities. This holistic approach ensures graduates are well-prepared to contribute to the development of smart, sustainable urban environments.

Table 4: Knowledge Domains and Courses for Smart Sustainable Cities Master Program

Practic e	Theor y	Credi t Hour s	Compulsory/Electiv e	Course name	Cours e ID	Knowledge Domain
0	3	3	Compulsory	Advanced Research Methodologies	201711	Scientific Research
1	0	1	Compulsory	Research Seminar	201712	
2	1	3	Elective	GIS for Urban Design and Planning	201713	
1	2	3	Elective	Advanced Mapping for Urban studies & Research	201714	
1	2	3	Compulsory	Sustainable Urban Planning and Design	201721	Principles of Urban Planning and Design
2	1	3	Elective	Place making for Human-Centred Urban Design	201722	
1	2	3	Compulsory	Smart Transportation Planning	201723	
0	3	3	Compulsory	The Debate on Sustainability, Smart and Contemporary Approaches	201731	Sustainable and Smart Cities
0	2	2	Compulsory	Climate Change and the City	201741	Climate Change and Disaster Management
1	2	3	Elective	Urban Geography	201742	
						Sustainability
2	1	3	Elective	BIM Fundamentals and smart applications	201751	Environmental Sustainability
0	3	3	Elective	Infrastructure Planning and Urban Hydrology	201752	

0	3	3	Elective	Sustainability and Environmental Impact Assessment	201753	
0	3	3	Elective	Methods for participatory planning and design	201754	Social Sustainability
0	3	3	Elective	Policies for Sustainability and the City	201755	Economic Sustainability
1	2	3	Elective	Heritage Management	201756	Cultural Sustainability
0	3	3	Elective	Critical Urban studies: Theoretical Issues and Empirical Explorations	201761	Professional Skills
0	9	9	Compulsory	Master Thesis		Thesis

■ Courses that were altered through the project

■ Courses that remained as original

3.5. Description of program-level learning outcomes.

The program-level learning outcomes define the knowledge, skills, and competencies students are expected to achieve upon completing the Smart Sustainable Cities Master Program. These outcomes are structured to ensure graduates possess a deep understanding of sustainability and smart city concepts, alongside the intellectual, practical, and transferable skills needed to address complex urban challenges.

Table 5 outlines the program learning outcomes (PLOs), categorized into four domains: Knowledge Skills (K) for understanding theoretical and practical principles, Intellectual Skills (I) for critical analysis and evaluation, Practical Skills (P) for applying methodologies and tools, and Transferable Skills (T) for collaborative problem-solving and effective communication. Each PLO is further detailed with corresponding course-level outcomes (CLOs), linking theoretical understanding to practical application.

Additionally, Table 6 highlights the core competencies graduates will develop, such as project management, decision-making, and the ability to transfer and apply diagnostic and creative skills across diverse contexts. This integrated framework ensures students are well-prepared for leadership roles in sustainable and smart urban development. Table 4 illustrates the alignment between the Program Learning Outcomes (PLOs) and Course Learning Outcomes (CLOs), demonstrating how each course within the study plan contributes to the development of knowledge, intellectual, practical, and transferable skills. This mapping ensures a cohesive learning experience, enabling students to achieve the diverse competencies outlined in Table 7, such as interdisciplinary thinking, critical analysis, and technology-driven problem-solving. It is worth mentioning that the learning outcomes will develop in accordance with the development of the courses' content as the project progresses.

Table 5: Program Learning Outcomes (PLOs)

Program Learning Outcomes (PLOs)	
Knowledge Skills (K)	
•	PLO #1 (K-1): Understanding Urban Sustainability and Smart City Concepts: Students can demonstrate a deep understanding of sustainability goals, smart city pillars, and their integration with digital technologies, particularly in urban environments, including Arab cities.

CLO #	Course Learning Outcomes
K (1.1)	The student can explain sustainability goals for cities, with a particular focus on Arab cities, and their relationship to digital technology.
K (1.2)	The student understands the core pillars of smart cities, relevant tools, and cutting-edge case studies worldwide.
K (1.3)	The student grasps various theories related to the design and planning of sustainable and smart urban environments.
K (1.4)	The student can demonstrate knowledge of sustainable design standards in urban planning across environmental, social, cultural, and economic dimensions.

• **PLO # 2 (K-2):**

Theoretical and Design Knowledge in Urban Planning and Resilience Strategies: Students can comprehend key theories, sustainable design standards, and planning methodologies that address the environmental, social, cultural, and economic dimensions of sustainability in urban settings; resilience, including preparing for climate change and disasters; and the design of smart cities.

CLO #	Course Learning Outcomes
K (2.1)	The student is familiar with preparing for climate change and disasters and understands how to develop relevant plans.
K (2.2)	The student understands data collection and analysis methodologies necessary for conducting studies on sustainable and smart cities.

Intellectual Skills (I)

• **PLO # 3 (I-1):**

Data-Driven Urban Analysis: Students can critically analyze urban conditions and identify sustainable and smart solutions for complex urban challenges.

CLO #	Course Learning Outcomes
I (1.1)	The student connects sustainability goals with the core components of smart city development to identify pathways to their achievement.
I (1.2)	The student assesses urban environments using data-driven analysis and critical thinking to propose solutions that align with sustainability and smart city objectives.

• **PLO # 4 (I-2):**

Impact Prediction and Evaluation: Students can predict and evaluate the social, environmental, and economic impacts of urban development projects on local communities, considering sustainability and resilience.

CLO #	Course Learning Outcomes
I (2.1)	The student forecasts the social, environmental, and economic outcomes of local communities.
I (2.2)	The student identifies and applies suitable methodologies for designing sustainable and smart urban systems.
I (2.3)	The student differentiates possible interventions to address environmental challenges, including climate change and disaster impacts.

Practical Skills (P)• **PLO # 5 (P):**

Methodology Application for Sustainable and Smart Urban Planning: Students can apply appropriate methodologies, tools, and techniques to design, plan, and manage sustainable and smart city projects, incorporating state-of-the-art practices and case studies from global examples.

CLO #	Course Learning Outcomes
P (1)	The student implements theories related to sustainable urban design and smart city concepts.
P (2)	The student identifies and selects optimal solutions for environmental, social, and economic challenges based on well-founded research.
P (3)	The student designs cities and urban spaces and rehabilitates existing areas following sustainability standards and the principles of smart cities.
P (4)	The student utilizes relevant performance indicators and methodologies to measure urban outcomes effectively.

Transferable Skills (T)• **PLO # 6 (T):**

Collaborative Problem-Solving and Technology Integration: Students can effectively manage time, work in teams, and use information technology tools to conduct studies and produce comprehensive reports that support sustainable and smart city development.

CLO #	Course Learning Outcomes
T (1)	The student can effectively plan and prioritize tasks to meet project deadlines and manage multiple responsibilities in urban design and planning, ensuring efficient resource use and timely completion of deliverables.
T (2)	The student can prepare detailed, well-structured reports that clearly communicate their findings and recommendations to diverse stakeholders.
T (3)	The student can proficiently use modern information technologies, including data analysis tools and software, to support urban planning, design, and decision-making processes.
T (4)	The student can demonstrate the ability to work collaboratively in interdisciplinary teams, leveraging collective expertise to solve complex urban challenges while contributing effectively to group discussions, decision-making, and project execution.

Table 6: Graduates' Competencies

Competencies

C1: Management of design activities and projects

C2: Taking responsibility for making decisions in work or study contexts

C3: Taking responsibility for making decisions in work or study contexts

C4: Transferring and applying diagnostic and creative skills in a range of contexts

Table 7: Description of program-level learning outcomes

Linking Program Learning Outcomes (PLOs) and Course Learning Outcomes (CLOs) with the Modules of the Study Plan						
Program Learning Outcomes (PLOs)	Knowledge Skills (K)		Intellectual Skills (I)		Practical Skills (P)	Transferable Skills (T)
	PLO # 1 (K-1): Understanding Urban Sustainability and Smart City Concepts	PLO # 2 (K-2): Theoretical and Design Knowledge in Urban Planning and Resilience Strategies	PLO # 3 (I-1): Data-Driven Urban Analysis	PLO # 4 (I-2): Impact Prediction and Evaluation	PLO # 5 (P): Methodology Application for Sustainable and Smart Urban Planning	PLO # 6 (T): Collaborative Problem-Solving and Technology Integration
Compulsory Requirements						
<u>201711</u> Advanced Research Methodologies		K (2.2)				T (2)
<u>201712</u> Research Seminar			I (1.2)	I (2.1)	P (4)	T (2)
<u>201721</u> Sustainable Urban Planning and Design	K (1.3) K (1.4)	K (2.2)	I (1.2)			
<u>201723</u> Smart Transportation Planning	K (1.2) K (1.3)		I (1.1) I (1.2)	I (2.2)		T (3)
<u>201731</u> The Debate on Sustainability, Smart and Contemporary Approaches	K (1.1) K (1.2)		I (1.1)			
<u>201741</u> Climate Change and the City		K (2.1)		I (2.3)		

Elective Requirements (Group 1: Scientific Research)						
<u>201713</u> GIS for Urban Design and Planning		K (2.2)	I (1.2)	I (2.1)	P (4)	T (3)
<u>201714</u> Advanced Mapping for Urban studies & Research		K (2.2)	I (1.2)	I (2.1)	P (4)	T (3)
Elective Requirements (Group 2)						
<u>201722</u> Place making for Human-Centred Urban Design			I (1.1)	I (2.2)	P (1) P (2) P (3)	
<u>201742</u>		K (2.1)		I (2.3)	P (2)	T (2)

Urban Geography						
201751 BIM Fundamentals and Smart Applications	K (1.1)		I (1.2)		P (4)	T (3)
201752 Infrastructure Planning and Urban Hydrology	K (1.4)	K (2.1)	I (1.2)	I (2.3)	P (2)	T (3)
201753 Sustainability and Environmental Impact Assessment	K (1.4)	K (2.1)	I (1.2)	I (2.3)	P (2)	T (3)
201754 Methods for participatory planning and design	K (1.4)	K (2.1)	I (1.2)	I (2.1)	P (2)	T (2) T (4)
201755 Policies for Sustainability and the City	K (1.4)		I (1.2)	I (2.1)	P (2)	
201756 Heritage management	K (1.4)	K (2.2)	I (1.2)	I (2.3)	P (3)	T (2)
201761 Critical Urban studies: Theoretical Issues and Empirical Explorations	K (1.4)	K (2.1) K (2.2)	I (1.2)	I (2.1)	P (2)	T (1) T (2) T (3)

3.6. Teaching and Learning Approaches

The teaching and learning approaches for the Sustainable Smart Cities program are designed to foster a dynamic and engaging educational experience, combining theoretical knowledge with practical application. A diverse range of teaching methods, including in-person instruction, asynchronous learning, and online sessions, ensures flexibility and accessibility for students. Courses emphasize interactive and interdisciplinary techniques, such as case studies, collaborative projects, and experiential learning, to bridge theory with real-world urban challenges. Assessment methods are carefully tailored to align with course-specific learning objectives, promoting a comprehensive understanding of sustainable and smart urban planning principles. Table 8 provides an overview of the program's course structure and corresponding teaching methodologies. It is worth mentioning that the teaching and learning approaches will develop in accordance with the development of the courses' content as the project progresses.

Table 8: Program's course structure and corresponding teaching methodologies

Sustainable Smart Cities							
Total CH	Teaching Method	Prerequisite	Practice	Lectures	Credit Hours	Course Title (English)	Course No.
Compulsory Requirements							
15	In person	-	0	3	3	Advanced Research Methodologies	201711
	In person	-	1	0	1	Research Seminar	201712
	In person	-	1	2	3	Sustainable Urban Planning and Design	201721
	In person	-	1	2	3	Smart Transportation Planning	201723
	In person	-	0	3	3	The Debate on Sustainability, Smart and Contemporary Approaches	201731
	In person	-	0	2	2	Climate Change and the City	201741
Elective Requirements (Group 1: Scientific Research)							
3	Asynchronous	201711	2	1	3	GIS for Urban Design and Planning	201713
	Asynchronous	201711	1	2	3	Advanced Mapping for Urban studies & Research	201714
Elective Requirements (Group 2)							
6	Asynchronous	201721	2	1	3	Place making for Human-Centred Urban Design	201722
	Asynchronous	201731	1	2	3	Urban Geography	201742
	Asynchronous	201731	2	1	3	BIM Fundamentals and Smart applications	201751
	Asynchronous	201731	0	3	3	Infrastructure Planning and Urban Hydrology	201752
	Online	201731	0	3	3	Sustainability and Environmental Impact Assessment	201753
	Online	201731	0	3	3	Methods for participatory planning and design	201754
	Online	201731	0	3	3	Policies for Sustainability and the City	201755
	Asynchronous	201731	1	2	3	Heritage Management	201756
	Online	201731	0	3	3	Critical Urban studies: Theoretical Issues and Empirical Explorations	201761
9	Asynchronous	201711			9	Master Thesis	
33		Total Hours					



3.7. Interdisciplinary and Practical Focus

Future course development within WP4 will emphasize incorporating interdisciplinary approaches and practical, real-world applications into the curriculum. This will include designing modules or course elements that integrate knowledge and methods from multiple disciplines, fostering a holistic understanding of complex issues. Additionally, the syllabi will be designed to include case studies, collaborative projects, and experiential learning opportunities to ensure students can apply theoretical knowledge to real-world scenarios effectively.

4. Qualification Description

4.1 Graduate Profile: Key skills, competencies, employability

The Characteristics of Graduates from the Smart Sustainable Cities Master Program reflect a well-rounded profile of professionals equipped to lead in the continuously changing field of sustainable urban development. These characteristics encompass intellectual, technical, and interpersonal qualities, highlighting graduates' ability to think critically and creatively, embrace interdisciplinary approaches, and leverage cutting-edge technologies to address urban challenges. With a deep commitment to sustainability, cultural awareness, and ethical leadership, they prioritize community engagement and policy-conscious decision-making. Furthermore, their passion for lifelong learning and global citizenship ensures they remain adaptive and innovative in shaping resilient and inclusive urban environments. The following points below highlight these attributes, showcasing the diverse and influential qualities that characterize program graduates.

Characteristics of Graduates

1. **Interdisciplinary Thinker:** Students have a natural curiosity about various fields and an ability to connect concepts across disciplines, seeing the bigger picture in urban studies.
2. **Critical Analyzer:** Students question assumptions and dive deep into urban issues, often approaching problems with a critical and reflective mindset.
3. **Innovator and Technology Expert:** Students naturally gravitate toward technology, embracing new tools and solutions to improve urban environments and enhance sustainability efforts.
4. **Research Enthusiast:** Students are passionate about knowledge and inquiry, often dedicating themselves to exploring and uncovering insights into urban challenges and sustainable practices.
5. **Sustainability Advocate:** Students demonstrate a strong commitment to environmental stewardship and social equity, always seeking ways to promote sustainability principles in their actions and decisions.
6. **Culturally Aware:** Students are sensitive to the socio-cultural dynamics of urban settings, displaying respect and appreciation for diverse community values and traditions.
7. **Effective Communicator:** Students can express their ideas and insights clearly, enabling them to engage with diverse audiences and share their visions for sustainable cities.
8. **Collaborative Team Player:** Students value teamwork and thrive in group settings; understanding collaboration leads to richer solutions when addressing urban challenges.
9. **Creative Problem Solver:** Students possess an imaginative spirit, often approaching urban issues with a fresh perspective and a knack for thinking outside conventional boundaries.
10. **Organized Planner:** Students display a talent for organization, often taking initiative in structuring their projects and managing various components of urban planning efforts.
11. **Policy-Conscious Citizen:** Students are deeply aware of the interplay between urban policies and community well-being, actively considering how regulations affect sustainability initiatives.
12. **Community-Oriented:** Students prioritize engagement with local communities and understand the importance of participation and representation in urban development.

- 13. Lifelong Learner:** Students constantly seek new knowledge and experiences to enrich their understanding of sustainable urban practices.
- 14. Ethical Leader:** Students uphold a strong ethical compass, often advocating for social justice and equity and ensuring everyone's voice is heard in urban development discussions.
- 15. Global Citizens:** Students possess a broad worldview, appreciate the interconnectedness of urban issues, and often draw inspiration from global practices while applying them to local contexts.

4.2. How outcomes align with qualifications and professional standards

The alignment of the program's learning outcomes with recognized qualifications and professional standards ensures that graduates possess the competencies required to excel in sustainable and smart urban development. This relationship is illustrated in Table 9, showing how the Program Learning Outcomes (PLOs) connect with graduate characteristics and core competencies to build a robust and industry-relevant skill set.

Table 9: How outcomes align with qualifications and professional standards

Graduates' Characteristics and Competencies of the Master Program of Sustainable Smart Cities at the University of Petra						
Skills	Knowledge Skills (K)		Intellectual Skills (I)		Practical Skills (P)	Transferable Skills (T)
	PLO # 1 (K-1): Understanding Urban Sustainability and Smart City Concepts	PLO # 2 (K-2): Theoretical and Design Knowledge in Urban Planning and Resilience Strategies	PLO # 3 (I-1): Data-Driven Urban Analysis	PLO # 4 (I-2): Impact Prediction and Evaluation	PLO # 5 (P): Methodology Application for Sustainable and Smart Urban Planning	PLO # 6 (T): Collaborative Problem-Solving and Technology Integration
Competencies	C1	C1	C1, C2	C1, C2	C2, C4	C3, C4
Graduates' characteristics	1, 4, 5	2, 13, 15	6, 11, 12	3, 6, 11, 12	3, 9, 10, 14	3, 7, 8, 9, 10

Competencies	Graduates' characteristics	
C1: Management of activities and projects	1. Interdisciplinary Thinker	8. Collaborative Team Player
C2: Taking responsibility for making decisions in work or study contexts	2. Critical Analyzer	9. Creative Problem Solver
C3: Taking responsibility for making decisions in work or study contexts	3. Innovator and Technology Expert	10. Organized Planner
C4: Transferring and applying diagnostic and creative skills in a range of contexts	4. Research Enthusiast	11. Policy-Conscious Citizen
	5. Sustainability Advocate	12. Community-Oriented
	6. Culturally Aware	13. Lifelong Learner
	7. Effective Communicator	14. Ethical Leader
		15. Global Citizens

5. Future Steps and Implementation

1. Finalization and Detailed Design of Each Thematic Module
 - Develop comprehensive course outlines, including clear learning outcomes, credit structures, and module descriptions.
 - Incorporate feedback from both SEMED and EU partners to ensure relevance and quality.
2. Development of Course Content and Teaching Materials
 - Create detailed teaching resources, such as blended learning tools, case studies, and real projects content.
 - Ensure alignment with national and international qualifications frameworks.
3. Clarification and Development of LLL Modules and Placement Modules
 - The development of LLL in alignment with the feedback and expertise of all partners (including associated partners).

6. Conclusions / Initial Findings

The concluding summary is divided into two subsections – the first targeting current weaknesses and the second giving directions for the work ahead.

6.1 Holistic perspectives on sustainability

The ‘green competencies’ that are pointed out in the name of the project need to be further defined for the curriculum to develop in alignment with sustainability aspects, not only on a surface level. As pointed out in the introduction, the framework of the modules and aligning courses need to be robust, while the content needs to be iterative and flexible. It is important to account for that in this stage of course development since courses must be able to be revised and adapted to future conditions once they are implemented and give space for a multiplicity of assignments. This is both due to the ever-changing discourse on sustainability action, and the importance of an agile approach, and the fast-changing pace of technology. Moreover, a holistic understanding of green competencies needs to be implemented, and all scales of the urban environment need to be addressed.

Program learning outcomes are divided into knowledge skills, theoretical and design skills, intellectual skills, impact prediction and evaluation, practical skills, and lastly transferable skills. These skills are not strictly tied to ‘green competencies’, instead each course is meant to give theoretical and practical learning outcomes that are connected to specific topics of each course. While the program as a whole is structured around diverse knowledge domains, it is important that each course is also structured with multidisciplinary approaches at its core(s) and that a combination of soft and hard sciences is included in each module and course.

6.2 Continued Work

In the upcoming months, the courses connected to each module will be developed by all universities independently where they will be implemented. This means that each university will have to choose which modules to include in their education program and then develop the courses they wish to connect to that module. The EU partner’s expertise will be aligned to the course development. Due to time constraints, the course development work by the SEMED universities, as well as the review of the work by the EU partners, will be done iteratively.

The development of the modules and courses are tightly connected to the work in *WP5 – Academic trainers*, and some alterations will most likely be done in regard to the specialists comments. Additionally, Lifelong Learning (LLL) modules and placement modules will be developed in the upcoming stages, ensuring continuous professional development.

At this stage of the development process, the (Lifelong Learning modules (LLL) and the Placement modules (PM) are not developed due to the ongoing alignment of frameworks, and the need for further input from all Associated Partners and participating universities. In the upcoming stages, these modules will be collaboratively developed, ensuring they align with the evolving goals of the project and the diverse needs of stakeholders.

7. References

Erasmus+ ProGreenLabs (2024a) *D3.1 Benchmarking Visit Report*. Cairo University.

Erasmus+ ProGreenLabs (2024b). *Third Didactic Workshop - Transcripts*. Chalmers University of Technology.