UNIVERSITÄT SIEGEN

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Erasmus+ SkoPS

<Course Plan Template (General structure of courses)>

Project Title	Empowering the European Workforce Development through Online/Virtual Skills Training for Digital Transformation towards Mitigating the Impact of Pandemic Situations (SkoPS)		
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Contact Person	Ali Behravan	**Organisation**	USI
Phone	-	**E-Mail**	Ali.Behravan@uni-siegen.de
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UNIVERSITÄT SIEGEN Petanux Universitat d'Alacant European Institute for Local Development

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Contributors

Name	Organization
Bahareh Kiamanesh	USI
Ali Behravan	USI
Shahab	UA

Disclaimer

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1 Introduction

The Course Plan Template can help the partners to prepare the course materials that helps us to organize the materials and contents of courses in the SkoPS project in common form. There are also some other Forms and templates for the student's assessment Plan and Evaluation Questionaries Plan for each course that can be also added to this Template.

1.1 Abstract

The methodology in creating the SkoPS courses will be as follows: Each partner is mainly responsible for preparing their own materials. All other partners and reviewers based on the table of reviewers in the project management handbook will review the prepared materials and will provide feedback in order to improve the quality of the materials. A recurring review process with all partners involved will further enhance the quality of the courses. Right at the beginning of the project (directly after the kick-off meeting), a requirement analysis will be carried out by all project partners in order to precise the content of the courses which are outlined in this proposal. A second meeting will be conducted six months after the kick-off meeting as an internal course development Hackathon. Each partner will invite one or two external experts for this Hackathon to get their feedback for improving the quality of the course. To ensure the quality and to narrow down the courses to the requirements of the industry, SkoPS will create an advisory board with experts from industry and research. Each partner will invite at least one expert to the scientific advisory board. Furthermore, the scientific advisory board will provide guidelines for the course materials.

1.2 Purpose of the document

The purpose of this document is having the same template for all courses. In this Template for each course some features are considered.

1.3 Relation to other deliverables

This Report is part of the D0.18 which is General structure of each course.

2 Template

Course Plan Template			
Course ID and Title:	O4- Smart Cities and IoT		
Course Duration:	45 h	**Course ECTS:**	1.5
Leading Organization:	UA		
Course Media:	Text, videos		
Laboratory (Yes/No)	Yes		
Course Description:			
This course focuses on the architectures, methods, standards, and applications of IoT in smart cities. The course material will be complemented with several use-cases and examples from current projects and initiatives that the project team is involved in (especially through the industrial links in the group's activities). This grounds theoretical concepts and technology related to Smart Cities in current institutional and industrial requirements, providing instant examples to the students of how the taught material is relevant in the real world. This module will provide an introduction and overview of recent initiatives bringing together smart city projects: (a) collecting smart city data (b) outline of current citizen-oriented initiatives, (c) core technology enabling initiatives (d) practical aspects related to the enhancement of entrepreneurship. This module generally targets activists, investors, and policymakers of this field annually to inform various groups involved in urban affairs of the opportunities and challenges ahead with the prospect of building a smart city for citizens. Furthermore, it could be beneficial and have impacted the presence of government representatives, representatives of cities, private companies, experts, and enthusiasts of this field. The course will cover topics such as (1) where is the smart city? (2) what are the needs of a smart city? (3) what the need for intelligence is? (4) who is the smart city trustee? (5) what is the infrastructure of this city? (6) how have our cities come up to today, and why should they go? These are part of the questions that the course participants will seek to find the right answer for it as the foundation stone for building smart cities. In addition, the module will also focus on (1) intelligent City (2) intelligent Facilities, (3) intelligent City Services and Its Requirements (4) Challenges and Strategies for Interoperability Smart City Development (5) Content Delivery Network (6) Smart Intelligence Network Sensors in smart cities Fiber and Datacenter (7) Consolidation in the City Smart Familiarity with Innovative Business Models for the Development of Smart City Services (8) Applied Technologies in Smart Cities. Considering the stated topics, the course will have significant impacts on the future of the digital world and will provide the basics for understanding revolutionary smart cities. Moreover, the course content is highly innovative in terms of IoT application in the digital transformation of business processes in the smart cities concept.			
Course Materials and Equipment (Prerequisite)			
• Azure service account: Students need a credit card number to access their Azure account, but no fee will be deducted from their account. With an azure account, they will be able to access Azure services for one year • A computer connected to the Internet • Headphones and microphone			
Teaching and Learning Activities:			

The teaching and learning activities include:

- Forums
- Quizzes
- Reading material
- Educational videos
- Virtual lab sessions

Course activities:

The course includes different types of activities:

- Participating in forums

- Reading materials

- Watching educational videos

- Carrying out practical assignments

- Answering quizzes with questions raised from the descriptive text.

Course Objectives:

As cities move towards smartening, the fundamental objective of this course is fostering the student's familiarity with the new technology of smart cities and creating a culture of using it. Also, by giving several examples, an attempt has been made to cover all side issues to encourage technology development in smart cities. The course will transfer and teach new and standard topics about Smart cities and present and teach new tools.

Course Summary:

The educational process is divided into four chapters containing the most updated content of smart cities, including the infrastructure and technologies described in practice and theory, which are transmitted to the student through written text or video. This course emphasizes the importance of learning smart cities and how to deal with them technically. It also seeks to provide information from reputable sources, including researched sources from companies such as Microsoft or Cisco.

Table of Contents:

- **Smart Cities**
    - What is a Smart City?
    - Smart City infrastructure
    - Ontology for Smart Cities
    - IoT applications in the Smart City
    - References
    - Quizz

- **IoT for Smart Cities**
    - The concept of the IoT and its properties in today's world
    - History of the IoT
    - How does the IoT work?
    - The benefits of the IoT for smart cities
    - IoT architecture
    - IoT requirements for smart cities
    - IoT Challenges for achieving smart cities
    - Quizz
    - What is Azure IoT Central?
    - Develop IoT solutions with Azure IoT Central
        - Create a custom IoT Central app
    - What is a device template?
        - Create a device template
        - Create a dashboard
        - Create a real device
        - The development environment and Azure Maps Account
        - Create a device application
        - Connection testing

Laboratory Description and Equipment:

- **Digital Twins**
  - The concept of Digital Twins
  - History of Digital Twins
  - How does Digital Twin technology work?
  - Types of Digital Twins
  - The benefits of using Digital Twins
  - Application of Digital Twins
  - Quizz
  - What is Azure Digital Twins?
  - Digital Twins Definition Language
    - Build an Azure Digital Twins graph
    - Querying a digital twins graph
    - Create an instance of Azure Digital Twins

- **The implementation of Smart Cities**
  - The Scenario of the confectionery industry
  - Inject data into Azure Digital Twins
    - Get ready to work with Azure Digital Twins
    - Models and how to create them
  - What is the Azure CLI?
    - Install, run and work with the Azure CLI
    - Azure functions and the CLI
  - What is Azure IoT Hub?
  - How IoT Hub works and when to use it
    - Create and setup Azure IoT Hub
  - REST APIs and authentication
    - How to implement REST APIs into Azure Digital Twins
  - What is Azure Logic Apps
    - Create and use Azure Logic Apps
  - Send data to consumers
    - Build and simulate the confectionery factory twin
    - Create a route
    - Azure function and its configuration
    - Visualize the data

Course References:

Main course references :

https://azure.microsoft.com/en-us/services/digital-twins/ (Micoroft Digital Twins)

https://www.microsoft.com/es-es/industry/government/smart-cities (Micorosft Smart City)

https://azure.microsoft.com/es-es/services/iot-hub/ (Microsoft Azure IoT Hub)
https://azure.microsoft.com/es-es/services/iot-central/ (Microsfot IoT Central)

Additional references will be included in the course materials.
Evaluation and Assessment Methods:
- Quizzes (self-assessment) **- Collaborative assessment of virtual labs (peer or self assessment, depending on the synchronous/asynchronous nature of the course)**
The tasks lead to the production of the intellectual output and the applied methodology.

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