COURSE OUTLINE

(1) GENERAL

SCHOOL	Social Sciences		
ACADEMIC UNIT	Department of Cultural Technology and Communication		
LEVEL OF STUDIES	Postgraduate Studies		
COURSE CODE	UA-MC2	**SEMESTER**	1
COURSE TITLE	Circular Economy and Digital Product Passports		
INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, state the weekly teaching hours and the total credits*		**WEEKLY TEACHING HOURS**	**CREDITS**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail in section (4).		3	8
COURSE TYPE *general background, special background, specialization, general education, skills development*	General background		
PREREQUISITE COURSES	No		
LANGUAGE OF INSTRUCTION AND OF ASSESSMENT	English		
MODE OF TEACHING *in-person (%) synchronous distance learning (%) asynchronous distance learning (%) (In the case of synchronous distance learning, the total weekly duration of teaching is recorded)*	The course is delivered exclusively through synchronous distance learning. Each weekly lecture lasts 180 minutes.		
AVAILABILITY TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	TBA		

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Brief Guide for drafting Learning Outcomes*

After the successful completion of the course, the student will be able to:
In terms of knowledge:

- Critically evaluate the purpose, structure, and enabling role of Digital Product Passports (DPPs) across product lifecycles and circular value chains.
- Outline the regulatory landscape governing digital product platforms (DPPs), and explain the implications for compliance and product sustainability.
- Demonstrate advanced understanding of lifecycle data (e.g., LCA indicators) and explain how these datasets strengthen transparency, traceability, and circularity claims within DPPs.
- Analyse drivers, barriers, and sector-specific dynamics influencing DPP implementation (e.g., batteries, electronics, textiles).

- Explain the principles, data standards, and trust mechanisms underpinning DPP interoperability, confidentiality, and security (e.g., blockchain, zero-knowledge proofs, smart contracts).
- Assess communication risks related to environmental marketing claims and determine how DPP data can mitigate greenwashing.

In terms of skills:

- Introduce traceability, LCA indicators, regulatory requirements and value-chain data flows into the design of DPP architectures for circular decision-making.
- Conceptualise DPP architectures that incorporate traceability, LCA indicators, regulatory requirements, and value-chain data flows for circular decision-making.
- Integrate traceability technologies (RFID, IoT, blockchain) to structure and validate product information across supply-chain actors.
- Evaluate the challenges of organisational adoption, such as interoperability, cost, governance and stakeholder coordination, and develop evidence-based solutions.
- Apply product-service system (PSS) concepts to extend DPPs toward Digital Product Service System Passports (DPSSP) with added circular value.
- Assess communication risks related to environmental marketing claims and determine how DPP data can mitigate greenwashing.

In terms of responsibility and autonomy:

- Facilitate strategic decisions on DPP deployment by balancing regulatory compliance, digital innovation, organisational readiness and circular economy objectives.
- Develop responsible data governance strategies that ensure compliance with the GDPR, the ethical handling of sensitive data and transparent data sharing across supply chains.
- Coordinate DPP projects across interdisciplinary teams, managing stakeholders, technical requirements and regulatory obligations.
- Exercise professional judgement to evaluate trust, confidentiality, and IP-protection challenges in DPP ecosystems and articulate mitigation strategies.
- Take responsibility for shaping credible circularity communications by ensuring DPP-based claims are evidence-driven, transparent, and aligned with EU guidance.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and are stated below), at which of the following does the course aim?

Search, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adaptability to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Other…*
	…….

The current course will enable students to acquire the following competences:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology, as UA-MC2 requires analysing lifecycle data, synthesising traceability information, integrating LCA, and evaluating interoperability, blockchain, and IoT-based systems.
- Ethical, responsible, and sustainable decision-making in business contexts, as the course emphasises on GDPR, data ethics, greenwashing risks, responsible data governance and regulatory compliance.
- Strategic and innovative thinking for managerial problem-solving, as UA-MC2 develops specifically the ability to lead DPP implementation strategies, justify tech choices, solve interoperability and organisational barriers, and last, integrated PSS and DPSSP concepts.
- Working in an interdisciplinary environment, as UA-MC2 requires integrating knowledge from digital technologies, policy landscape, LCA, governance, etc.
- Effective communication and presentation of ideas to diverse professional audiences, as there is an emphasis on communicating verified sustainability claims, prevent greenwashing, presenting compliance strategies, and producing DPP-aligned product information.

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(3) COURSE SYLLABUS

UA-MC2: Circular Economy and Digital Product Passports explores the concept of Digital Product Passports (DPPs), which are critical for product traceability and enabling circularity. After this course, students should be able to understand how DPPs provide transparency in the product lifecycle, enabling businesses to track products from design through use to disposal, and comply with sustainability regulations. The course will also delve into the technical and regulatory aspects of DPPs.

The course consists of 13 lectures, as presented below:

1. **DPPs Fundamentals (Instructor: E-Circular).** This lecture introduces the regulatory context, core requirements, and design principles of Digital Product Passports. It traces their evolution from policy tools to broader digital systems supporting transparency, circularity, and competitiveness.
2. **Challenges and opportunities in DPP adoption (instructor: UAEGEAN).** This lecture examines the organisational barriers to implementing Digital Product Passports, including interoperability, cost, and regulatory complexity. It also highlights opportunities for innovation, transparency, and competitive advantage, using real-world cases to explore adoption strategies and maximising value.
3. **Developing a DPP: an example from the textile sector (instructor: POLIMI).** The lecture will introduce the basic standards to develop a DPP proposed by past EU projects and by the EU commission based on dedicated document. As an example, to guide the students in this development process, it will be proposed a DPP development method employed for the textile case.
4. **Integrating LCA into Digital Product Passports (instructor: UM).** This lecture introduces how LCA provides the environmental performance data increasingly required in DPPs under emerging EU regulations. Students learn how LCA indicators (e.g., carbon footprint, resource use, recyclability) can be embedded into DPPs to support regulations and improve product transparency. Cases demonstrate how linking verified LCA data with digital systems strengthens transparency and reporting.
5. **Drivers and barriers for the development of DPPs (instructor: UiO).** This lecture identifies key drivers and barriers influencing the development of DPPs across sectors such as batteries, electronics, and textiles. It focuses on the current dynamics shaping DPP implementation.
6. **Extension of DPP to Product Service Systems (instructor: ATB).** This lecture introduces Product Service Systems (PSS) and their extension into Digital Product Service System Passports (DPSSP). It examines benefits, implementation approaches, and obstacles for integrating PSS data into DPPs.
7. **Digital Product Passports and traceability in circular value chains (instructor: CEA).** This lecture explores DPPs as tools for transparency and material traceability across circular value chains, examining data standards and interoperability. It emphasises lifecycle tracking, data ethics, and cross-sector collaboration for circular innovation.
8. **Product Traceability (instructor: UNINOVA).** This lecture explains how traceability supports the DPP framework by enabling access to verified product-origin, composition, and lifecycle information. It covers technologies such as RFID, IoT, and blockchain, and discusses interoperability, data quality, and confidentiality challenges.
9. **Digital Product Passports and EU regulatory compliance: a legal-policy perspective (instructor: CEF).** This lecture examines the EU regulatory landscape governing DPPs, including the ESPR, Right to Repair, Data Act, and AI Act. Students learn to identify legal obligations, align DPP design with compliance requirements, and anticipate regulatory impacts.
10. **Communicating circularity: labelling, marketing claims, and greenwashing risks (instructor: CEF).** This lecture explores how DPPs support credible environmental communication and

prevent greenwashing. It covers EU rules on green claims and labelling and analyses real cases to show how transparency strengthens sustainability communication.

11. **Digital Product Passports in practice: solutions, data and stakeholders (instructor: SmartUse).** This lecture showcases practical DPP and traceability solutions, demonstrating how lifecycle data is structured and shared across value-chain actors. Students examine concrete examples to see how DPPs create value and support circular strategies.
12. **Implementation approaches for DPPs: Blockchain (instructor: Zelus).** This lecture presents blockchain as an implementation option for Digital Product Passports, explaining its advantages and limitations. Practical cases illustrate when blockchain is an appropriate solution for industry-specific DPP needs.
13. **Trust mechanisms for the Circular Economy (instructor: CIRCULARISE).** This lecture explores how to build trust in DPP systems when sharing sensitive or confidential data. Students learn about technological trust mechanisms (blockchain, zero-knowledge proofs, encryption) and social mechanisms for enabling collaboration across value chains.

(4) TEACHING AND LEARNING METHODS - ASSESSMENT

MODE OF TEACHING *Face-to-face, distance learning, etc.*	Distance Learning
MODE AND FREQUENCY OF COMMUNICATION WITH THE STUDENTS	Synchronous distance communication on a weekly basis, asynchronous on a daily basis through LMS platform
ENSURING THE MODE OF COMMUNICATION AMONG STUDENTS *Team assignments and discussions, collaborative learning platforms with the use of AI, video conference, QA sessions, κ.α.*	Weekly assignments, discussions through dedicated discussion forum, dedicated space per module on the learning platform, schedule video conference meetings through MS Teams, dedicated QA sessions per module
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, in laboratory training, in the communication with students*	Use of ICT in Teaching, Communication with students Online Platforms will be used for teaching, tutorials, students' guidance, students' self-assessment and support on group projects
TECHNOLOGICAL EQUIPMENT REQUIREMENTS	PC /laptop for video conference meeting
PLAGIARISM POLICY/ PLAGIARISM DETECTION TOOLS	Gradescope, Turnitin
ARTIFICIAL INTELLIGENCE POLICY *(1) The use of Artificial Intelligence is prohibited in all circumstances* *(2) The use of Artificial Intelligence is allowed only with the permission of the instructor* *(3) The use of Artificial Intelligence is allowed only with an explicit reference to the literature* *(4) Students are free to use Artificial Intelligence*	The use of Artificial Intelligence is allowed only with an explicit reference to the literature. Additionally, students are free to use AI provided by the master programmes for contacting stimulations, practicing purposes, etc.
ORGANISATION OF TEACHING *The mode and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, work placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artworks, etc.* *The student's study hours for each learning activity are stated, as well as the hours of independent study, according to the principles of the ECTS.*	
STUDENT ASSESSMENT	

Activity	*Semester workload*
Lectures	39
Participation in forum discussions	20
Study, analysis of bibliography and supplementary consolidation activities	111
Self-Assessment Evaluations	30
Course total	**200**

Description of the assessment method *Language of assessment, methods of assessment, formative or summative assessment, multiple choice questions test, short answer questions, essay questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory assignment, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Students will be evaluated following multiple-choice, short-answer, and open-ended questions. The assessment formula is the following: Self-Assessment Evaluations: 50% Final Assessment: 50%

(5) RECOMMENDED BIBLIOGRAPHY

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