D2.1 PROJECT-BASED LEARNING MODULES

FTalliance

FTalliance

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D2.1 PROJECT-BASED LEARNING MODULES

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Contributing Partner(s)	-
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Abstract:	The output for the T1.2 Project-based Learning Module is a format/educational model that • describes a method of teaching specified for Fashion-tech courses, • presents students with a problem or challenge to solve in the field of Fashion-Tech, • requires them to gather information from various resources, and • asks them to come up with an original solution that ends in a product or performance. Partners defined the format/educational model through desk research completed with findings deriving from focus groups that mapped, validated, and points up specific features for the E4FT academic curriculum. Besides, partners set up a co-design approach toward defining the learning experiences to test the courses' structure and guidelines in 3 pilots.
Keyword List:	Project-based Learning Module, educational model, challenge-based problem, learning resources, original solution, product, process, performance

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v1	22.02.2021	First draft for review	D. Casciani
V2	30.03.2021	Reviewed version	D. Casciani

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EXECUTIVE SUMMARY

This deliverable provides an overview of the WP2, T2.1 - Design project-based experiences linked to Fashion-Tech market needs and to the developed curriculum. The objective of the task is to co-design multidisciplinary, interdisciplinary, and international learning experiences for the Fashion-Tech sector. The document also includes a description of the innovative pedagogy and teaching methods in the format of an educational model specifically applicable to Fashion-Tech education.

Stemming from the preliminary results gained from WP1 - Knowledge, the format/educational model was informed by emerging topic of interests of companies and research derived from the results of Focus Groups (WP1 – D1.1). Besides, it has been based on desk research about innovative pedagogical models such as challenge-based learning (CBL), Flipped Classroom (FC), and Social Learning (SL).

A co-design process has been implemented from these premises to create learning experiences to satisfy the expected level of competence and innovation according to the field-oriented approach in Fashion-Tech and to be tested in 3 pilot courses. The set of activities developed during the co-design process were aimed to codify informed decisions to define and develop a format/educational model to be tested with students and lecturers from the HEIs partners.

The main features of the developed format/educational model are learning flexibility, from multidisciplinary to interdisciplinary learning, interaction and engagement, common glossary definition, companies' involvement, real-world challenges, personalized learning, and openness.

The deliverable also describes the supportive activities and shareable formats and tools to design, replicate, test, and evaluate the format/educational model in 3 pilot courses to implement the future Fashion-Tech Curriculum. The courses have to boost the creative encounters and allow beneficial and reciprocal exchanges between students, teaching staff, and companies, working in a real laboratory of creativity, responding to open innovation challenges, and delivering proof of concepts related to specific and emerging fashion-tech areas.

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LIST OF ABBREVIATIONS

T	Task
D	Deliverable
WP	Work Package
VLE	Virtual Learning Environments
POLIMI	Politecnico di Milano
TUD	TU/Delft - Industrial Design Engineering Faculty
ESTIA	Ecole supérieure des Technologies industrielles avancées
HB	Hogskolan i Boras - Swedish School of Textiles
UAL	University of the Arts London – London College of Fashion
OER	Open Educational Resources
VLE	Virtual Learning Environment
LO	Learning Objectives
ILO	Intended Learning Outcomes
HEI	High educational institution
SME	Small Medium Enterprise
GDPR	General Data Protection Regulation
E4FT	Edu4Fashion-Tech
CBL	Challenge based learning
FC	Flipped Classroom
SL	Social Learning
MA	Master of Arts
BA	Bachelor of Arts
BSc	Bachelor of Science
MSc	Master of Science
M	Month
TLA	Teaching and learning activities
VLN	Virtual Learning Netiquette
ECTS	European Credit Transfer and Accumulation System
POC	Proof of concept
LMS	Learning management systems
POK	Polimi Open Knowledge
MOOC	Massive open online course
UX	user Experience
UI	user interaction
CX	customer experience

1. INTRODUCTION

Designing and Piloting the Learning Experience

The primary objective of the WP2 T2.1 - Design project-based experiences linked to Fashion-Tech market needs and to the developed curriculum - was to co-design a multidisciplinary, interdisciplinary, and international learning experience for the Fashion-Tech sector.
The output is innovative pedagogy and teaching methods for an accessible and practical format/educational model to guide precisely in the Fashion-Tech education, selecting between the emerging areas of the Fashion-Tech that are nowadays stemming as interesting for future professionals working in the field.

The learning experience design stemmed from the preliminary results gained from WP1 - Knowledge sharing, and is linked to the D1.1 – Integrated industry-relevant Fashion-Tech Curriculum Model. Moreover, the emerging topic of interests of companies and research and so emerging essential skills for the future workforce has been derived from the results of Focus Groups (WP1) among HEIs, SMEs and research centres. Besides, an instructional co-design process has been implemented to create learning experiences to satisfy the expected level of competence and innovation according to the field-oriented approach in Fashion-Tech.
The set of activities developed during the instructional co-design process (T2.1) were aimed to codify informed decisions to define and develop a format/educational model to be tested with students and lecturers from the HEIs partners. This format/educational model should:

- include industry professional's perspectives both in the definition and in the development of 3 pilot courses.
- be based on a digital educational approach through traditional academic interactions (e.g., students learning from teaching staff) and non-traditional ones (e.g., student learning from professional).
- advance subject-specific pedagogical techniques in emerging areas of the fashion-tech that can be used across various learning environments.

Support activities focused on preparing sharable formats and tools to design, replicate, test, and evaluate the format/educational model in 3 pilot courses to implement the future Fashion-Tech Curriculum. The courses have to boost the creative encounters and allow beneficial and reciprocal exchanges between students, teaching staff, and companies, working in a real laboratory of creativity, responding to open innovation challenges, and delivering proof of concepts related to specific and emerging fashion-tech areas.

Digital learning shift due to Covid-19 pandemic emergency

The learning experience and so the educational model has been completely shifted toward digital learning. The more significant pedagogical and technological shifts, mainly derived from the sanitary emergency caused by the Covid-19 pandemic, have represented an attempt to update the way learning does and can take place. Digital technologies have been considered a possible way to solve the limitation of traveling around Europe and taking in-presence courses inside the HEIs. They allow to multiply and diversify how students could learn from teaching staff, professionals, and from each other, interacting via different online channels (e.g., e-mail, chat, forums, video conversation, webinar, collaborative digital boards). Digital learning shifts the teaching and learning experiences toward innovative hands-on digital technological

activities. The online course-management systems are considered a positive way to organize and deliver learning materials. They provide lectures and assignments; encourage a higher level of learning independence (e.g., to learn on own time and pace without direct supervision from teachers), and boost interaction between peers during the challenge-based part. The design of the digital learning experience should be supported by an extensive digital learning structure that has to be prepared strategically before course delivery.

2. METHODOLOGY

This section describes the approach followed by the WP and task leader in collaboration with HEIs and SMEs consortium partners to co-design the framework for the multidisciplinary and interdisciplinary learning experiences for the Fashion-Tech sector.

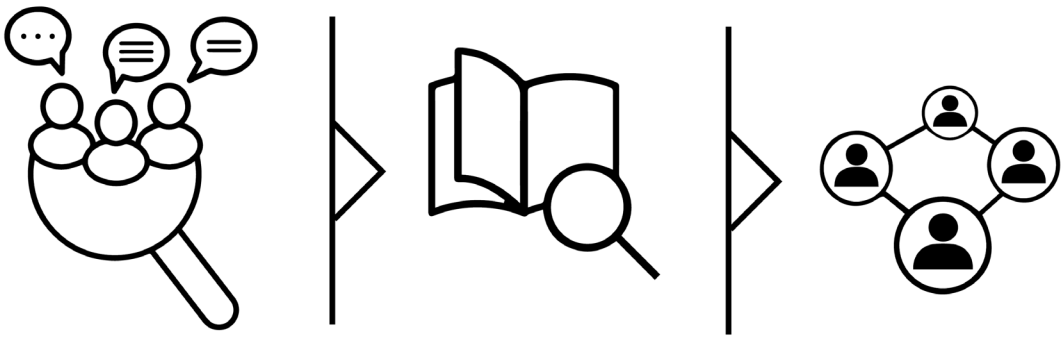

Figure 1 - Methodological approach to define the format/educational model

The courses' contents and recommendations were informed by the results gained from the Focus Groups (WP1) organized to validate and define an integrated curriculum model blending industry competencies and academic knowledge of the Fashion-Tech sector. In particular, the main insights to design the learning modules are included in the D1.1 and are summarized as follows. Learning experiences should focus on the following skills:

- **Fashion-Tech general skills** (e.g., communication, teamwork and interpersonal abilities, creativity and cooperation, serendipity, and an open and innovative mindset).
- **Fashion-Tech Subject-specific skills** (e.g., 3D modelling, 3D pattern design, User Experience, User Interaction, additive and subtractive manufacturing, bio-based/biodegradable materials and chemical processes, circular business models, sustainability and circularity, smart textiles and digital/connected wearable technology, Data collection, interpretation and analysis, data security and privacy, digital storytelling and digital marketing skills, data protection and GDPR, business management)

Learning experiences should include the following features:

- Interdisciplinary courses and teamwork.
- Theoretical pillars for multidisciplinary knowledge exchange and common ground.
- Challenge-based experiences based on learning by doing.
- Fashion-tech SMEs and HEIs co-design of learning experiences.
- Implementation and adaptation of the E4FT Curriculum Model.

Besides, the preparation of the format/educational model has also been informed by desk

research related to the selection of specific innovative pedagogical models to be tested in the three pilot courses: challenge-based learning (CBL), Flipped Classroom (FC), and Social Learning (SL).

Starting with these premises, an instructional co-design process has been designed by the T/WP leader (WP2 - T2.1) together with the partners' contribution, following a participatory decision-making methodology based on quick consensus discussions. This process (organized as a series of joint meetings and workshops amongst HEIs and between HEIs and SMEs partners) aimed at defining:

- the structure of the courses;
- the timing of the courses;
- the identification of the situational constraints;
- the selection criteria for students' participation;
- the articulation of the learning objectives;
- the identification of appropriate instructional strategies;
- the identification of potential assessments;
- the planning of the course content and schedule.
- the structure of the theoretical pillars of the courses (by defining a matrix of contents);
- the learning outcomes of the theoretical pillars;
- a common repository of virtual learning environments (VLE) for the digital courses;
- a shared format, graphic, and guidelines to develop the theoretical pillars;
- a shared format and documents to develop the syllabus of the course;
- a shared format, graphic, and guidelines for course promotion and diffusion.

All the activities, meetings, implemented and shared materials and tools were prepared to reach an agreed definition of the format/educational model to be used and flexibly adapted for the three courses that will be piloted in T2.2.

WP1 informing WP2 toward the Fashion-Tech educational model

The scope of the focus groups was to map and validate the E4FT curriculum, including the fashion-tech SMEs perspective, to ensure that learning and teaching experiences match the academic and industrial expectations in the nowadays emerging areas of the Fashion-Tech. Coherency, good organization, academic alignments of courses, lectures, and learning facilitation were considered essential features in the format/educational model. In particular:
subject-area coherence in the course and across the three pilots. This feature ensures that all teaching staff from different disciplines will work toward the same learning standards and objectives in releasing the lectures. Courses should deliver contents and lectures of different subject-area disciplines, such as design, engineering, business management. Besides, students should also learn a coherent number of contents across the three pilots while receiving an average quality of instruction.

- **cross-disciplinary coherence** across multiple subject areas by focusing on a set of skills and work habits that students need to succeed in any academic course or discipline:
    - **Teamwork** (e.g., collaboration, cooperation, influencing skills, group facilitating, team building, teamwork facility in using virtual workspaces);
    - **Independent work** (e.g., Perseverance, self-direction, planning, self-discipline, initiative);
    - **Problem formulation and solving abilities** (e.g., analytical skills, adaptability, and flexibility, level-headedness, resilience)
    - **Critical thinking** (e.g., ability to carry out analysis and make decisions based on

evaluation of factual evidence to eliminate any possible biases)
- **Creativity and innovation** (e.g., Creativity, artistry, curiosity, imagination, innovation, personal expression)
- **Communication** (e.g., oral and written skills, public speaking and presenting, active listening)
- **Research ability** (e.g., interrogative questioning, analysis, interpretation, synthesizing information)
- **Planning and management** (e.g., Decision-Making Skill, Diagnostic and Analytical Skills, time management skills, conflict resolution skills)
- **Information and communication technology literacy** (e.g., media and internet literacy, data interpretation and analysis, computer programming)

- **Curricula structure** (that includes learning standards or learning objectives students are expected to meet along with information regarding units and lessons, teaching materials, assignments, and assessment) will be based on three main elements:
  - **Multidisciplinary and Interdisciplinary Courses**
  - **Interdisciplinary Teams**
  - **Open Educational Resources teaching materials**
- **Learning Practice** will be based on a double level experience:
  - the **first theoretical part** focused on contents, knowledge, and information (e.g., concepts, theories, principles, methodologies, methods, and tools) that students should gain in the given and emergent subject areas of Fashion-Tech. All students will acquire basic Knowledge as **a common ground during this part and benefit from a self-regulated learning modality.**
  - the second **real-world challenge-based part,** through a **Learning-by-doing modality** with instructors and teaching staff involved in **coaching and mentoring learning-based activities**
- **Networking with Company experts** whose knowledge and competence would be integrated into the brief of the course and the teaching and coaching activities
- **Flexibility** of courses to ease students' broad participation from different backgrounds, accommodate different academic calendars and adapt to a constantly changing fashion-tech sector to update the curriculum, courses, and lectures accordingly.
- **Personalized and bespoke** learning experiences tailored to the students' specific needs, inclinations, and background to both level fashion-tech knowledge and glossary and boost integrated disciplinary competencies.

Pedagogical models

Some specific pedagogical models have been analysed to laid a solid methodological foundation for the format/educational model. A brief definition of the selected approaches and models is presented in the following pages, including a brief explanation of how they will be implemented in the format/educational model.

Challenge-based learning

Challenge-based learning (CBL) is an engaging multidisciplinary educational approach that encourages students to learn while solving real-world challenges. The collaborative and experiential learning framework is based on asking good questions, discovering and solving problems, taking actions, gaining more profound subject-specific knowledge, taking action, developing soft skills, identifying big ideas, and sharing them with the world (Nichols and Cator, 2009, Nichols et al., 2016).

Students work with peers such as their teammates, teachers, and experts through three main phases: (i) engage, moving from a big abstract idea to an actionable challenge through essential questioning; (ii) investigate with the participation of all learners (both students and teachers) to the learning journey; (iii) act the evidence-based solutions that are shared and

evaluated for the results. Along the CBL, students have to document, share and reflect on the experience (Nichols et al., 2016). The active engagement of students in opportunities to learn through solving problems, finding solutions, and making, followed by a reflection on those activities, seems to empower them to apply their theoretical knowledge to practical situations and problem-solving contexts in the classroom and, later on, in the professional world (David, 2008). CBL shares many similarities with Project-Based Learning (PBL), conceived as experiential learning or learning-by-doing based on learning from experiences. It is also very well linked with Design Thinking approaches, particularly in applying the Empathize, Define, Ideate, Prototype, and Test activities in the "act" phase toward realizing the solution. Teaching staff act as facilitators and co-learners throughout the process, discussing/mentoring each choice before students embark in a direction.

Based on this pedagogical model, the three co-created courses will be designed to address real-world problems and issues, defined explicitly through brainstorming and collaboration with fashion-tech companies, partnering with the FTAll project.

The courses will be launched in the form of a challenge that aims to boost creative encounters and reciprocal exchanges between all the participants (students, teachers, experts from companies). First, students will be challenged through a general question to answer via the definition of a brief that could present a problem or an in-depth issue to explore. Then, they have to dive into the issue/problem, investigating and analysing its complexities, interconnections, and ambiguities. The resulting learning experience benefit from a real laboratory of creativity toward open innovation to bring out ideas and proof of concept. Students are required to use and develop a variety of applied skills using multiple technologies, new ways of analysing and processing information such as researching complex issues, interviewing, planning out the process, thinking creatively, designing, managing time, organizing their work, collaborating with other students in teams, public speaking, producing proof of concept and multimedia presentations, while also taking the initiative. The integrated and interdisciplinary nature of CBL helps students make connections across different subjects, rather than perceiving, for example, discrete and distant subjects with little in common. The execution and completion of the project may take several weeks.

The teaching staff provides ongoing instruction, guidance, coaching, mentoring activities, and project development. Professional and expert mentors will be involved either in the design of the challenge, either in mentoring, or evaluating the final results. The scope is for students to boost their skills toward more challenging professional opportunities and for Companies to identify the future talents and involve their employees in participating in an original and resourcing event. Student can present their achieved solution through a variety of methods, such as multimedia presentation, video, portfolios, and rubric/logbook along the process.

CBL will be applied chasing questions and deepening knowledge in the three courses following the phases of:

- launch of the brief, including the challenge,
- research;
- idea generation;
- concept development;
- testing/prototyping of a product/service /system;
- presentation of the final project and reports.

Flipped classroom

Flipped Classroom (FC) is a pedagogical approach based on a dynamic, interactive learning environment where the educator guides students to apply concepts and engage creatively in the subject matter. The flipped classroom improves deep and long-term learning: the first-time exposure to a new subject or content happens before the class meets, and the time in class is

used interactively for questions and answers, exercises, assignments to apply the previously acquired knowledge through professor guidance (Mazur, 2009; Berrett, 2012).
For the proposal of the three co-designed courses, the FC approach will be applied during the theoretical pillar part. Some specific lectures will be aimed to activate reflection and creative learning and to boost interaction among students. FC would work by assigning students activities and exercises elaborated and shared with teaching staff and peers before the class meeting. The learning will then be consolidated during the CBL part. In particular, referring to Bloom's taxonomy, different activities will be proposed according to the objectives to be achieved:

- **remember, understand**: OERs, toolkit and reading documents facing theoretical topics related to basics content knowledge will be provided to students to be consulted before class (e.g., watching a video, answering questions, completing a reading assignment);
- **apply, analyse, evaluate, create**: before class, specific exercises are proposed to apply key concepts to be carried by students interacting among peers. Students will be provided with different requirements to achieve and will provide constructive feedback to their peers;
- **analyse, evaluate:** during class (during the CBL part), knowledge consolidation and evaluation happens during interactions with teaching staff that helps in furthering and reviewing the exercises and use the feedbacks to follow up after class.

Social Learning

Social Learning (SL) is a pedagogical model based on the Social Learning Theory codified by Albert Bandura (1997). It emphasized the importance of observing, modelling, and imitating the behaviours, attitudes, and emotional reactions in the learning outputs. Social learning theory explains human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences. In the application of SL, the course will leverage peer learning with students engaged in interaction with other students to reach educational goals. Peer-to-peer learning is exploited both during the theoretical (individually) and the challenge-based learning part (group project activities). In this situation, each student can learn from the other colleagues' experiences and challenges.

The co-design of the Learning Experiences

The co-design of learning modules has been developed during T2.1 (from M2 to M12) as preparatory activities to make decisions that could be considered applicable for the three pilot courses. The learning experience co-design is based on participatory planning through meetings and workshop with participants from HEIs and SMEs consortium partners ahead of the course to decide specific elements such as:

- the structure of the courses;
- the timing of the courses;
- the identification of the situational constraints;
- the selection criteria for students' participation;
- the articulation of the learning objectives;
- the identification of appropriate instructional strategies;
- the identification of potential assessments;
- the planning of the course content and schedule.
- the structure of the theoretical pillars of the courses (by defining a matrix of contents);
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- a shared format and documents to develop the syllabus of the course;

- a shared format, graphic, and guidelines for course promotion and diffusion.

The co-design of the learning experience served to enhance the learning processes that the students will go through to reach the desired learning outcomes while leaving a positive impression during the learning activities (including cognitive, emotional, social, physical, and spiritual aspects). Before the course delivery, the specification and careful planning of these aspects affect their success and facilitate students' learning in a human-centered and goal-oriented way.

Using creative, conceptual, intellectual, and analytical qualities, the WPL and TL have led a co-design process to reach the format/educational model. It is conceived as a framework of guidelines for the courses that consider the different research steps, ideation, conceptualization, prototyping, iteration, and testing to be conducted through the three pilots with students. As stated by Driscoll & Carliner (2005), "design is more than a process; that process, and resulting product, represent a framework of thinking."

More than a systematic process, this co-design process was creative and empirical, based on several hypotheses and assumptions and a certain degree of uncertainty. Passing through iterative cycles, this process will define a crystal-clear learning experience implementation at the end. The framework of guidelines for the courses is focused on "planning outcomes, selecting effective strategies for teaching and learning, choosing relevant technologies, identifying educational media and measuring performance" (Branch & Kopcha, 2014). The output of the learning experience co-design has been developing instructional specifications and processes using learning and instructional theory to ensure the quality of instruction and promote a quality learning experience. It includes:

- the analysis of the learning needs and goals
- the development of instructional materials and activities,
- the try-out and evaluation of all instruction and learner activities.

The co-decisional process, defined through a series of meetings, has been written up systematically, translating the plan of instruction into a set of activities, materials, information, and assessment procedures (Smith and Ragan,1999). The learning experience decisions has been mainly focused on implementing learning outcomes and learning objectives, considering constraints and resources, and defining strategy, activities, and processes by focusing on:

- **people and human-centered learning experience**: by designing the process people go through and define/test what works for them in terms of learning goals. This process is connected to the theory of learning, psychological and cognitive theories, and the pedagogical models to be tested and put into practice to guide the learning experience. Theoretical and practical research in the areas of cognition, educational psychology, and problem-solving are required (Siemens, 2002);
- **goals of the learning experience**: defining practical/functional and appealing features and a good shape/form process that guides toward the learning goals focusing on real-world performance to help students perform the behaviours that will be expected in the real world.
- **medium or technology for the learning experience**: by examining the virtual and digital environment taking into account the social, cultural, and material features to ensure collaboration and educational performance and positive and stimulating participation.

Matrix of Contents

During co-design meetings, one of the preliminary activities was to share an alignment among different HEIs about the disciplines they were primarily focused on and could be considered in delivering the courses and lecture materials. In addition, a preliminary mapping was performed

about teaching activities, course expectations, and learning standards, highlighting interconnections and interrelations, possible gaps, and areas of specialization.

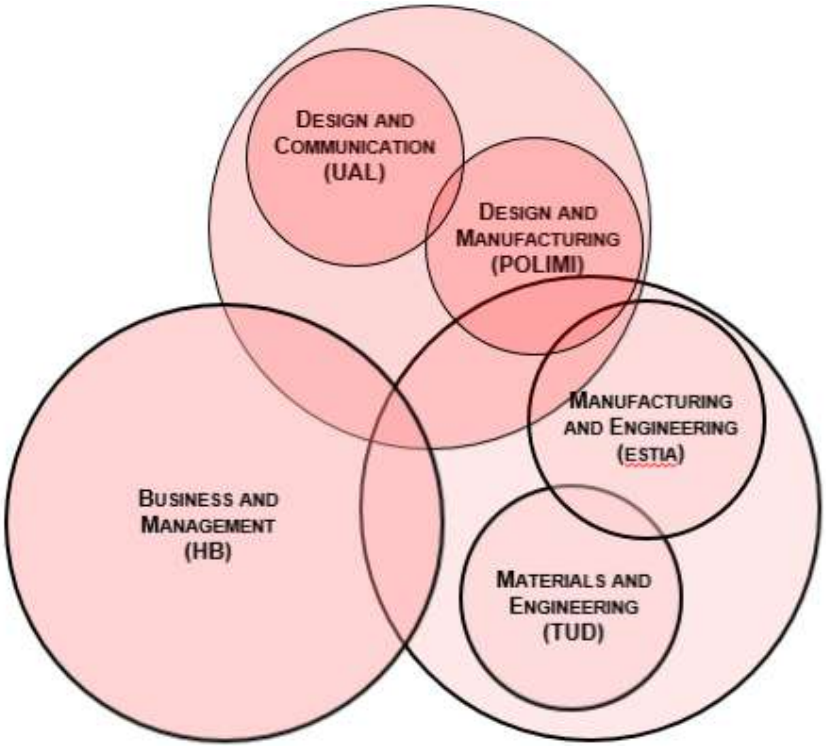


Figure 2 – Mapping about disciplinary teaching expertise, specialization, and interrelations

Consequently, a matrix of contents was co-designed to understand reciprocal HEIs expertise and reliable support better to build the learning materials for the digital learning experiences. Then, theoretical pillars have been extracted for lectures' preparation, making the main structure of the theoretical part of all the courses.

Table 1 Matrix of contents designed and filled to structure the theoretical pillars

		HEIS				
		POLIMI	TUD	UAL	ESTIA	HB
DESIGN AND METADESIGN	**SCENARIO DEVELOPMENT**					
	CONCEPT DEVELOPMENT					
	MOODBOARD AND LIFESTYLE DEVELOPMENT					
	DESIGN METHODOLOGY FOR FASHION-TECH					
RESEARCH METHODOLOGY	USER –CENTERED AND EXPERIENCE RESEARCH					
	BLUE SKY RESEARCH AND DESIGN DIRECTIONS					
	MERCHANDISE ANALYSIS					
	ETHNOGRAPHIC RESEARCH					
	BENCHMARKING RESEARCH					
SPECIFIC TOPICS ABOUT FASHION-TECH	**FASHION-TECH PARADIGM**					
	SUSTAINABLE MANUFACTURING PROCESSES IN FASHION-TECH					
	SMART TEXTILE MATERIALS					
	SMART SYSTEMS COMPONENTS AND TECHNOLOGY					
MAKING AND PROTOTYPING	DIGITAL MANUFACTURING					
	CODING AND PROGRAMMING					
	ADVANCED MANUFACTURING					
	3D SOFTWARES FOR RAPID PROTOTYPING					
	ELECTRONICS (for textiles)					
	DIGITAL PATTERN MAKING					
METHODOLOGY EXPERIMENTING + EXPERIENCING + ASSESSING	VIRTUAL, PHYSICAL AND AUGMENTED PROTOTYPING METHODS AND TOOLS					
	QUALITATIVE AND QUANTITATIVE ANALYSIS OF DATA					
	DESIGN AND MEASURE PRODUCT EXPERIENCE (PROTOTYPING)					
COMMUNICATION	DIGITAL STORYTELLING					
	DIGITAL DRAWING AND SKETCHING					
BUSINESS MANAGEMENT	**FASHION-TECH BUSINESS MODEL**					
	CIRCULAR AND SUSTAINABLE FASHION-TECH BUSINESS MODELS					
	DIGITAL/BIG-DATA DRIVEN VALUE CHAIN					
	SMART TEXTILE MANAGEMENT AND BUSINESS ADMINISTRATION					
	DIGITAL/BIG-DATA DRIVEN VALUE CHAIN					
	DIGITAL PLATFORMS AND SERVICES OF INTEGRATED FASHION VALUE CHAINS					
	DATA-DRIVEN CIRCULARITY ANALYTICS					

This matrix of contents is a starting tool to collect general and fundamental lectures on Fashion-tech. It was used to start defining the contents to be delivered as materials and lectures during the courses and to determine the four main blocks that represent the modular pillars of the theoretical part of the courses: design, methodology, technology, and business management. The matrix of contents is a flexible and adaptable tool expandable depending on the specific topics of each course to be tested.

Academic timing and logistics

One of the preparatory activities held at M2 of the FTall project was to verify the preliminary requirements of the courses with each involved HEI, to draft a shared calendar for the three pilot courses.

A timetable of one year span when the three courses should be tested and piloted was provided to be filled by each HEI with notes, information, and comments to help coordinate the joint calendar for organizing the three pilot courses. The overview of the availability of all the HEIs partners gave a fragmented image of different starting/ending academic calendars and little overlapping, allowing to schedule concurrent activities similarly for each HEI. The proposal of timing for the three courses was made considering at maximum three features:

- flexibility (in terms of credits, formats, and students selection)
- adaptability to all the specific criticalities and constraints of each HEI,
- exploitation of the overlapping schedules where most HEIs could set up a joint course.

Besides, decisions concerned the timing and logistics for the organization of the courses, including the bureaucratic steps needed for internal academic management and acceptance of the courses along with timing for promotion among students to enroll.

Students selection criteria

Preparatory activities were also focused on defining students' attributes (such as age, academic abilities, interest) and selection criteria based on prior competencies. To collect a wider but manageable sample of students for each course, HEIs decided together to select 50 students to make the classroom for each course, divided as follows:

- 10 students from Ecole supérieure des Technologies industrielles avancées (ESTIA).
- 10 students from Hogskolan i Boras - Swedish School of Textiles (HB)
- 10 students from Politecnico di Milano – School of Design (POLIMI)
- 10 students from University of the Arts London – London College of Fashion (UAL-LCF)
- 10 students from TU/Delft - Industrial Design Engineering Faculty (TUD)

Students will work in groups, configuring ten groups of five people from different HEIs and so disciplinary backgrounds. Combining the availability across the one year when the three courses should be tested and piloted, HEIs defined which students' profile would best fit this kind of courses and would be available in that period. According to the differences in terms of disciplinary background and also in terms of course timing, each HEI was able to indicate the suitable students that span from first/second/third year BA in engineering (ESTIA) to first and second-year MA in design, MSc design & engineering, and BSc/MSc students in engineering, economy, and business.

Table 2 – Selected students to participate in the three pilot courses

HEI	Students profile
ESTIA	First, second- and third-year students of Engineering
HB	First and second-year students of the MSc - Master Programme in Textile Value Chain Management The Faculty of Textiles, Engineering, and Business -The Swedish School of Textiles - HOEGSKOLAN I BORAS BSc or MSc in Business Administration, Textile Engineering and Industrial Economy, as well as BSc or MSc in Textile Management (to be decided)
POLIMI	First and second-year students of the MA - DESIGN FOR THE FASHION SYSTEM (School of Design)

UAL-LCF	First year students of the MA Innovative Fashion Production
TUD	MA students from the faculty Industrial Design Engineering at the Delft University of Technology

The prerequisites to follow the course are defined by each HEIs and by the HEI coordinating the course. General prerequisites are:
• problem-solving skills, critical thinking, and creativity;
• ability to work in interdisciplinary and multicultural teams, having developed interpersonal and communication skills in the previous design and work experiences;
• English language skills.
The selection criteria are intended to favor more mature and more team-oriented students with high problem-solving skills and advanced knowledge of English (candidates with a B2 level in the QCER scale will be preferred). Selection is based on the CV and the project portfolio.
Each HEIs will promote the courses inside its institutional channels supported by the WPL and the HEIs in charge of organizing the learning experience. Each HEI will also manage selection procedures following its own organizational and logistic rules.

Learning Objectives (LO)

Learning objectives should be defined for each course in the form of brief statements that describe what students are expected to learn by the end of the course period. LOs are a way for teachers to structure, sequence, and plan out learning goals for a specific instructional period, typically to move students toward the achievement of more extensive, longer-term educational goals. LOs are also a way to establish and articulate academic expectations for students. If clearly communicated, learning objectives are better achieved. Finally, LO can be used in assessing the success of the students, also for the grading process. The Los' statement should be formulated with verbs that pinpoint the learning objective (Bloom et al., 1956).

Intended Learning Outcomes (ILOs)

Detailed explanations of the performance that students are expected to achieve at the end of each course experience are called Intended Learning Outcomes (ILOs). They define the system of knowledge, skills, and competencies to be determined by the teaching experience. ILOs should be defined for each proposed lecture and for each course to articulate its general framework to the acquired skills and the exit profile of students. ILOs can be structured with a verb + a content + an application field + a performance activation context (Sancassani, 2019) based on the revision to Bloom's taxonomy carried out by Anderson and Krathwohl in 2001.
Bloom's taxonomy divided learning into three psychological domains – cognitive (processing information), affective (attitudes and feelings) and psychomotor (physical skills). His taxonomy and model evolved education from being a case of learners just memorizing information they had been taught to first remembering it; then understanding it; then applying it (in exercises); then analysing it and, finally, evaluating it at a complex level. The revised taxonomy indicates that learning may not always progress linearly up through the six levels. Students might move back and forth between different levels depending on the learning situation. The revision focus on four types of knowledge: factual knowledge of details and terminology such as the basic elements of a subject or topic; conceptual knowledge, which deals with classification and categories as well as models, theories, and structures; procedural knowledge that deals with subject-specific skills and methods; metacognitive knowledge focuses on self-knowledge and strategic knowledge. Besides, the rapid expansion of the Internet and digital technology has led education to prioritise digital understanding and hands-on digital technology in the classroom as direct aid to learning. In 2008, a Bloom's digital taxonomy was delivered as a variation and evolution for the modern, digitally-enabled settings where the learning activities and outcomes take a digital form (Andrew Churches, 2008). The verbs associated with each cognitive level

reflect actions in the digital environment (Table 5). Besides, digital taxonomy incorporates a higher degree of collaborative learning, given the nature of the Internet, where students can converse and interact via social media, online forums, chatrooms, surveys, blog platforms, and more.

Table 3 - Andrew Churches Digital Bloom's revised Taxonomy

Level	Verbs/actions	Description	Example
Remembering	Identify, recall, recognize, list, retrieve, access	Be able to retrieve knowledge and information; be able to find and access necessary resources.	As an essential part of this task, the student can identify the correct keywords or phrases to get the most relevant search results. This task tests students' ability to find and access valuable resources, and it is a skill that will be built on and used in all other levels.
Understanding	Predict, clarify, classify, summarize	Be able to construct meaning and build relationships, starting from different sources.	On the Internet, students would be looking for information, building relationships, and construct meaningful content. A suitable digital learning activity at this level could be the bookmarking, labelling and categorising of searched Internet content using a service such as Digital and Social Bookmarks.
Application	Use, implement, provide, respond	Be able to apply learned knowledge or processes to real-world exercises, challenges, or situations	Using digital technology to create posts, documents, and presentations, or conduct online video or audio calls. Activities to develop at this level can be Editing, blogging, podcasting, video conferencing, uploading, and sharing contents
Analysis	Build, integrate, differentiate, select	Process data; determine relationships, make associations, discernments, and comparison between parts.	Students can process data, divide it into parts, determine the relationships between the elements and encapsulate the overall purpose of their task or project. Activities are running surveys, digital analytics, moderating discussions.
Evaluation	Reflect, judge, determine, control	Make criteria-based judgments through the processes of critiquing and checking.	In the digital domain, being able to qualify and evaluate social interactions credibly is a critical skill and reviewing activities.
Creating	Create, design, generate, assemble	Synthesise past knowledge to create a new, coherent product.	The digital environment allows and boosts the creative individuality to originate anything new that can be posted and shared online.

The tool "Learning Outcomes Document" was customized and shared to define and align ILOs for each lecture of each module of the theoretical part of the three courses.

Instructional Strategies: teaching and learning activities (TLA)

Based on the LO, instructional strategies of teaching and learning activities (TLA) were discussed and defined. In particular, decisions focused on the instruction delivery method, selecting from instructor-centered TLA (strategies such as lecture, demonstration, or showing a video) and student-centred TLA (group discussion or cooperative group work) through class participation and teamwork collaboration.
TLAs act as a facilitator to the process of learning. They should be organized by considering the number of students, the availability of time and resources (tools, instruments, digital infrastructure), the former education of students of different disciplinary backgrounds, and hours of study needed to accomplish the learning outcomes. TLAs include theoretical and practical activities, including instruction, assessments, peer interaction, and the final project deliverable and will consist of a balanced mix of individual activities (e.g., study, quiz, practice-based exercises) and group activities (e.g., challenge-based projects, peer learning, peer evaluation).

Learning Environment, Technology, Media, and Materials

Technology, media, and materials that serve to deliver the learning experience were discussed to support the digital courses. A benchmarking repository of virtual and digital learning environments and tools was provided to the partner leading the course as a reference. Besides, a unified and coordinated format for the instructional materials was prepared, including graphics and guidelines to develop the lectures for the theoretical pillars: lectures format, video instruction, video lesson script format, bibliography guidelines and format. These tools were designed and shared to create a graphic common ground among partners when delivering their didactic materials.
A reference graphic format has been provided to partners for structuring the communication of their course (Course diffusion, at page **Errore. Il segnalibro non è definito.**), the lectures (Format, Graphic and Guidelines to Develop the Theoretical Pillars, at page **Errore. Il segnalibro non è definito.**). Besides, a graphic layout has been deliveed to collect the course outputs (Exercise Formats (for students to be filled as final reports),at page **Errore. Il segnalibro non è definito.**). HEIs will also be supported with instructional steps and the preparation and organization of the TLAs and VLE.

Language

The language of instruction is English.

3. FORMAT / EDUCATIONAL MODEL

The development of the format/educational model to be tested in three pilot courses has been based on specified learning objectives and is defined by an organized, sequential selection of components made based on information and data derived from WP1, pedagogical models and theoretical principles, and decisions taken during co-designed sessions. The main features were summarized in a list of guidelines to be tested in real-world situations during course development and course delivery.

The course guidelines

Learning Flexibility

The course format has a flexible structure, meant to be either delivered digitally or in a blended mode, easily applicable and adjustable to the needs of each of the three learning experiences. The flexible features may accommodate differences of HEIs in organizational and instructional terms; meanwhile, teaching and learning activities will be implemented according to the learning objectives and outcomes to allow the broader participation and engagement of the students during the entire duration of the course. The theoretical lectures are conceived as modular and optional and would be selected by the students from heterogeneous backgrounds in function of their former knowledge level. Participation aims to acquire a common vocabulary to improve interaction and understanding in the further phases of project development.

Asynchronous learning

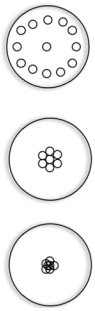
The structure allows forms of education that do not occur in the same place or at the same time due to different academic calendars and academic commitments, among the other HEIs. The asynchronous learning supports the Discovery part of the lectures. It allows teacher-student or student-student learning interactions through various forms of digital online learning in which students are given instruction such as pre-recorded video lessons and assignment tasks that they complete on their own. This format will allow instructional interactions, including email exchanges with teachers, online discussion boards, and forums through a course learning environment that provides feedback and correspondence. A digital literacy catalog made of theoretical units will offer the essential literature in the sector to be consulted asynchronously. The creation and distribution of lectures require an archive to deliver educational materials, contents and assignments requiring students to follow, produce and submit their exercises.

Synchronous learning

The structure allows forms of education occurring at the same time, but not in the same place, through digital and online learning (e.g., educational video conferences, interactive webinars, chat-based online discussions). Students learn from instructors and peers in real-time, but not in person. Synchronous learning supports the design and challenge-based part. Synchronous learning activities (i.e., lectures) could also be recorded to allow its asynchronous experience from students with problems in participation (i.e., due to different time-zones, other

academic commitments, illnesses). Recordings are also important if students want to recall a piece of knowledge later on.

From multidisciplinary to interdisciplinary learning



Courses will be oriented towards teamwork, sharing knowledge and skills between different sectors, disciplines, and HEIs. Each workshop will include students from the other universities sharing diverse expertise and perspective in the Fashion-Tech sector. The courses will be structured with an initial preparatory theoretical part that will level the basic fashion-tech knowledge of students, gaining each other disciplines' perspectives on a common topic. Design and Communication, Technology and Engineering, Business Management will provide interdisciplinary content and implication in specific argument and application of the Fashion-Tech. In this phase, students from different disciplines will approach the problem sharing similar goals but looking at it from their own discipline's point of view to analyse each aspect on a topic by a particular specialty, to increase "integration and modification of the disciplinary contribution" (Stember, 1991) and to negotiate their various disciplinary perspectives (Choi & Pak, 2006). This step allows a multiple disciplinary goal-setting under the same thematic umbrella: it is necessary to gather understanding in complex topics and problems where disciplines are additive and supplementary. At the end of the theoretical part, when the problem and the challenge-based part of the course are launched, students from multiple different disciplines start to work together under the same umbrella to overcome the limitations of singular forms of inquiry and to address the complex problems in societies and organizations (Conklin, 2005). The course starts to include much more integrative and interactive approaches from the disciplinary insights derived side-by-side in the theoretical part. In the challenge-based part, multidimensional problems involving social, cultural, economic, technological, and environmental components are formulated to promote interdisciplinarity: integrating knowledge and methods from different disciplines, using a real synthesis of approaches. Teams integrate information, data, techniques, tools, perspectives, concepts, and theories from different disciplines or specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single domain. Interdisciplinary activities require collaboration and shared knowledge toward the creation of the new interdisciplinary field of the Fashion-tech. Exposure to interdisciplinary courses and teamwork experiences is essential in the academic training phase to get transversal skills for future professionals. They should be equipped with specific and sectoral skills and can collaborate across disciplines with experts in other areas and apply knowledge in areas of expertise other than their own (T-shaped skills).

Teamwork

Courses must be oriented toward teamwork, sharing knowledge and skills between different disciplines. Activities should be performed in groups that include students from various universities with specific expertise and educational backgrounds in the sectors that characterize Fashion-Tech. Collaborative experiences enrich all team members by creating an exchange of knowledge, facilitating learning, and managing different topics that require different specializations. The dialogic/participatory approach in

fashion-tech project development shifts the perspective from a single and partial vision to a choral and inclusive one, allowing shared and integrated solutions and boosting innovation.

Interaction and engagement

An essential part of the learning happens in allowing interaction and engagement among learner-teacher, learner-learner, and learner-content to ensure a connected student experience (Moore, 1989).
With engagement, we intend to focus on "the amount of physical and psychological energy that the student devotes to the academic experience" (Tinto, 2006; Astin, 1984) by enhancing:

- learner-teacher engagement: stimulating student engagement, presenting material, organising the application of the material, evaluating students, making adjustments to student learning as well as counselling and encouraging students;
- learner-learner engagement: interaction with their peers, in pair or in group, with or without the instructor's presence as part of educationally sound learning activities students interacting in groups.
- learner-content engagement: "the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind" (Moore, 1989, p. 2);

This notion of interaction has been central to student engagement (Wallace, 2003; Yates, 2014). While some studies have not found a clear relationship between engagement and learning outcomes (Axelson & Flick, 2010, p. 42), many researchers have argued that there are unequivocal links between engagement and student success, learning and achievement (Kahn, 2014; Zepke, 2014, Hoskins, 2012; Sinatra, Heddy, & Lombardi, 2015).
Engagement is particularly important in on-distance and online educational contexts where high attrition and drop-out are a problem.
In the three courses, it is suggested to boost the three levels of interaction and engagement with several tools, such as discussion forums, chats, and digital classrooms. The discussion forum is an essential tool to share and discuss assignments, exercises, and reflections to create fruitful discussions among students. The forum platform is all about the students showing their work to peers and giving feedback to each other, also during the asynchronous part of the course. It allows students to learn from peers and to interact, also during the asynchronous part. Sharing on the Discussion Forum will also allow teachers to interact with students during the asynchronous part of the course. Other than the assignments that need a peer interaction among students, we suggest sharing experiences on the forum, post questions, and launch discussion during the whole learning experience.

Netiquette

It is important that the students follow a Virtual Learning Netiquette (VLN) in using the forum and the digital classrooms to define a pleasant experience for everyone. Netiquette is a combination of the words network and etiquette and is defined as a set of rules for acceptable online behaviour. Similarly, online ethics focuses on the proper use of online

resources in an online social environment.
The VLN aims to create a safer space for those participating in virtual learning spaces. A list of rules for participants safeguard was defined for the Discussion Forum and the digital classroom sessions. We expect all participants to treat the virtual space as a professional environment.

Discussion Forum

- **Peer respectfulness**
  Show respect to fellow participants. We encourage debate and discussion but only when it is done politely and respectfully. Rude behaviour, condescending or abusive words will not be tolerated. Instances will be reported and removed.
- **Constructiveness in feedback**
  Learning in an online community is about interacting with each other. When commenting or providing feedback on the work of others, be constructive and, whenever possible, provide suggestions for improvement.
- **Sensitiveness to peers' disciplinary background and culture**
  Students will arrive from different countries and different backgrounds. Please be sensitive to this when discussing your own work or the results of others.
- **Content appropriateness**
  Content that violates the Terms of Service is not permitted. Inappropriate or copyrighted content is not allowed as well is forbidden to advertise or promote outside products or organizations or spam the forums with repeat content.

Digital classroom

- **Frontal Lectures (Webinar and presentations)**
  Participants are encouraged to turn off microphones and turn on cameras as and when appropriate/required. It is important to mute the session while the session is taking place when others are talking/presenting.
- **Dialogic activities (interaction and revisions)**
  All virtual sessions are dialogic spaces, supported/defined by a schedule of tasks. Participants are encouraged not to talk over one another, interrupt or shout to allow others to participate safely, use the chat or the hands-on function to ask for interaction. If disruptive behaviour continues repeatedly, then the facilitator will ask the perpetrator to leave the space. Form of discrimination in the virtual face to face sessions will be not tolerated.
- **Privacy and recordings**
  Learning contents might be recorded and shared again within the classroom via the VLEs platform. However, all participants should adhere to the policy of not audio or audiovisually recording the sessions.

Common glossary definition

Teamwork requires sharing a common language, a code of shared basic knowledge that allows the various actors to develop a fruitful interaction. To foster this exchange, courses should have a preliminary phase of glossary exchange and fundamental learning from different disciplines. The courses will start with a propaedeutic / introductory part that allows students from different fields and diverse disciplinary backgrounds to gain basic knowledge about a topic to guarantee successful interaction in the further phases of project development in a team. These theoretical pillars will be helpful to level the basic knowledge so that cross-disciplinary facilitation occurs: students are enabled to see and study each discipline from their perspective. An updatable digital literacy catalog will be created containing various in-depth courses on different topics that students can consult asynchronously, identifying their study plan depending on their expertise and level of knowledge (novice, intermediate, expert).

Entangled educational units (Oxman, 2016) of merged disciplines will be populated with many different lectures covering the topic from different disciplinary points of view to create hybrid knowledge.

This is important to give a complete and holistic view of the addressed topic to students who might have a former education in one specific discipline but would be enabled to understand and handle other disciplines' glossaries and methodologies. The primary learning outcomes are:

- to give a wider overview of the complexity of managing a fashion-tech project
- to combine horizontal and vertical competences
- to disrupt the boundaries between different disciplines.
- to enrich either the process or the intellectual outcomes.
- to enhance the communication abilities to be used in teamwork as facilitator professional in the next working future

The interconnections between design, technology, and business management define complex projects that necessitate an integrated approach through the entire workflow from prototyping to production, sales, and distribution processes to achieve tangible innovation.

Companies involvement

The involvement of companies and professionals in the sector is fundamental to network with real-world challenges. It becomes increasingly crucial to create a synergy between real problems and challenges of companies (such as use and experimentation of specific technologies, cost management, industrial production or sales, very tight deadlines) and the research-oriented vision of universities. Therefore, company experts should be integrated into the course preparation, teaching, and coaching activities.

Real world challenges

The second phase of the course will be characterized by the launch of real-world challenges that will stem from specific requests of the companies in the Fashion-tech sector and will constitute the basis for the challenges to be answered by multidisciplinary and interdisciplinary teamwork. Students will work together throughout the subject as a collaborative group, meeting autonomously and sharing responsibilities as they work towards the co-creation of innovative proof of concept to answer the challenge of the course. Group members can take on complementary professional roles with a multidisciplinary approach: people from different disciplines work together, each drawing on their disciplinary knowledge toward a common goal (Stember, 1991). The expectations are that, by the end of the course, students will be able to integrate knowledge from different disciplines, using a real synthesis of approaches in an interdisciplinary group of study and project development. Ideally, students will integrate knowledge and methods from various disciplines and try to create their holistic perspective based on this.

As stated in the literature (Nichols et al., 2016), CBL is better for long-term retention of material, developing 'replicable' skills, and improving students' attitudes towards learning. Through CBL, students and teachers prove that learning can be deep, engaging, meaningful, and purposeful. The reason is also related to the fact that the challenge spring from the real-world, emerging situation, context of application, problem, and issue.

The advantages of challenge-based learning related to Fashion-Tech are (i) the increased involvement of the participants because they learn through engaging and dynamic experiences that reduce the distance with cryptic themes to approach such as the integration of technologies; (ii) the opportunity to bridge the training gap deriving from an exclusively theoretical approach: learning processes are effective, fast and continuous;(iii) the possibility to contextualize notions, principles and tools learned in real situations; (iv) the test of the skills since students are trained on iteratively design and test what works. The output of the process has not to focus on seemingly well finished end results but in proof of concepts and solutions where the emphasis should be placed on stimulating the process that involves students in problematizing, reframing and iterating upon their project in design, engineering and business management domains (Cross, 2010; Nelson and Stolterman, 2003).

Coaching and mentoring

In CBL, all the stakeholders involved are learners, both students and teaching staff. By moving beyond the traditional academic hierarchy, all stakeholders work together to meet academic objectives while solving real-world challenges. The general goal is to provide a more trustworthy and mature professional learning experience for students, that their learning needs are understood and addressed, and that they receive the social, emotional, and academic support from teachers and staff to succeed academically. Building consistent, supportive, understanding relationships with teachers and adults positively affects learning, emotional growth, and social development. Teaming is one of many strategies educators may use to achieve these ends.

Personalized learning

Personalized learning, or personalization, refers to learning experiences and instructional approaches intended to address individual student's distinct learning needs, interests, aspirations, or cultural backgrounds. Students will be provided with differentiated instruction, following a student-centred learning perspective intended to facilitate each student's academic success. Personalized learning is based on increasing the level of choice, and personal responsibility students have in the instructional process. It also increases the "student voice" and the possibility of students expressing their values, opinions, beliefs, perspectives, choices, interests, passions, and ambitions, and cultural backgrounds.

Students could be allowed to self-design learning experiences in collaboration with the teaching staff in the theoretical part by creating their learning plans, which describe their academic, collegiate, and career goals while mapping out the educational decisions they need to make to achieve their goals. Enabling navigation and selection of learning units and modules of the theoretical part would allow a more bespoke approach to the individual Fashion-Tech learning experience. Students are also encouraged to adjust the process and pace of learning for their personal needs to a certain extend.

In the challenge-based part of the course, students could be invited to select their own way and path by following their interests and aspirations and then providing learning experiences customized for each team/student. Again, CBL puts the students in charge of the process.

To accomplish this goal, teaching staff could modify assignments and instructional strategies in the classroom to customize it for the specific group/individual needs, offering a broader and more diverse selection of learning experiences that reflect the students' interests, career aspirations, or cultural heritage.

Openness

Lectures will be widely accessible via the online community platform of each institution and distributed to international fashion and design education and research organisations to benefit the wider HEI and the wider teaching community. In addition, the partners' educational materials and resources will be released as open educational resources (OERs) for wide and free distribution, access, use, and reuse. Portfolios may also be presented to demonstrate learning, exhibition, or capstone project.

The course structure

The courses will focus on Fashion-Tech, exploring how fashion and technology are interconnected within different domains and how their interconnection transforms the design, prototyping, production, sales, and distribution processes. In addition, the courses will focus on the interrelationship and potential application that are changing the fashion design, supply, and production chains, and the way today's fashion businesses operate for faster, smarter, more efficient, and sustainable garments.
Contents will be delivered through a preliminary theoretical part (DISCOVER) to level the students' knowledge as a prerequisite for the practical challenge-based part of the course (DESIGN).

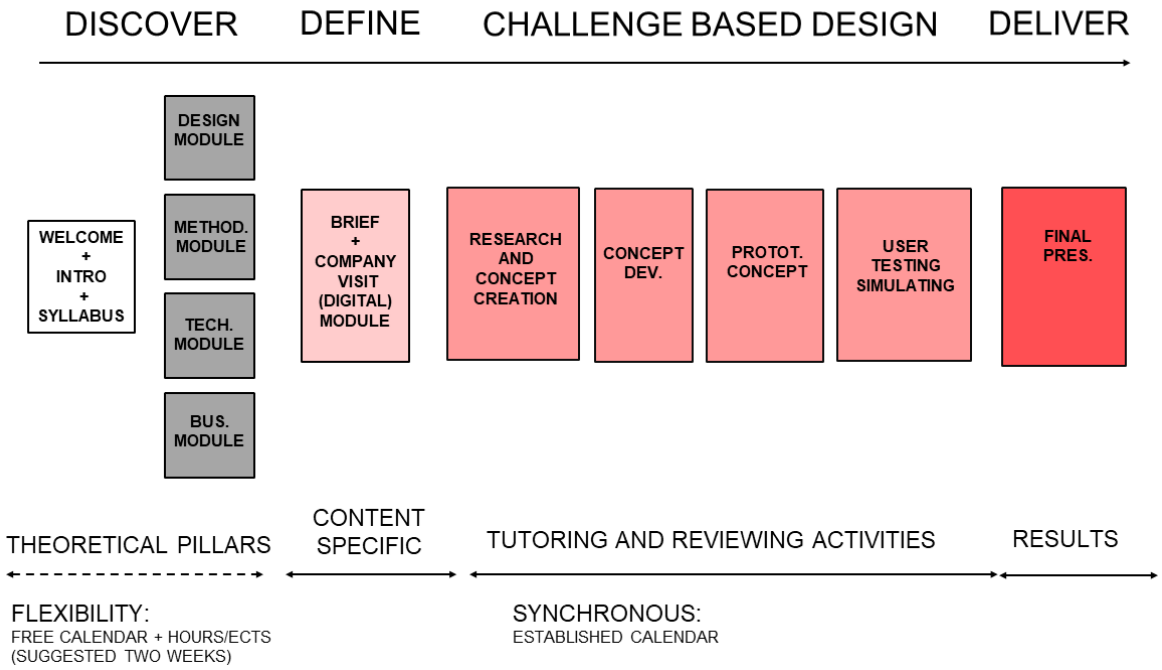


Figure 3- Overview of the courses structure

After a starting kick-off aimed at presenting the overall structure, the 100% digital course develops in 50 study hours and 150 hours of student work (10 weeks) for a total of 6 ECTS that is calculated according to the number of hours.
It will be delivered with a preliminary theoretical part assigned in an asynchronous way (DISCOVER). A variety of lectures about theory and application examples, lectures about tools and software, and preparatory applicative exercises will be delivered in this part.
In a next synchronous challenge-based part (DESIGN), students will have the opportunity to work in interdisciplinary and international groups to experience the process and the methodological approach of a project development activity that includes design, engineering, product management, costing and pricing, research, and materials management.
These two main parts will be divided by presenting the challenge through a brief launch and Companies presentation (DEFINE). On this occasion, students will also be actively involved in ice-breaking exercises and activities to start the teamwork together.
Each HEI has degrees of flexibility in credits to be assigned and study hours according to the specific academic availability and rules. In addition, they can also organize a blended course that could be partially delivered in presence and digitally.

Table 4 – Example of the 100% Digital Course structure

SYLLABUS DRAFT 1: 100% digital
50 hours // 6 ECTS // **10 WEEKS – 2 MONTHS (UP TO 13 WEEKS – 3 MONTHS)**

14 hours // 1.5 ECTS // **2 WEEKS // ASYNCHRONOUS**
DISCOVER: Theoretical part
Materials: Webcast + podcast + multimedia presentations + assignments (with deadlines)

6 hours // 0.5 ECTS // **1 WEEK // SYNCHRONOUS**
DEFINE: Students icebreaking activities + Brief presentation + Company introduction:
Materials: Webinar + Company digital visit + Brief Launch + Team Presentations and activities

30 hours // 4 ECTS // **7 UP TO 10 WEEKS // 6/8 HOURS/WEEK // SYNCHRONOUS**
Practical challenge-based part:
Modules: Research and analysis Development, Concept Development, Project Development
Materials: Plenary reviews and tutoring from experts from the 5 HEIs – midterms deadlines.

Besides, students will also be introduced to innovative teaching methods based on digital tools to deliver the course and develop project-work and group collaboration between teammates.

The course Kick-off

The course will be introduced in two hours recorded presentation that will welcome the students in the experience and explain the course syllabus in all its aspects. Video recordings and the published syllabus will allow students who have not the possibility to follow due to other commitments to acknowledge autonomously about the course activities.

Suggestions

Course presentation
Students will be provided with an overview of the entire course and will be guided through materials of the lectures, assessment, and deadlines with tutorials of VLE and learning platforms. The teacher presents the course ILOs, assessment strategy and assignments, structure and calendar, general rules, and guidelines that will be used to set up interdisciplinary groups. It is suggested to launch a preliminary survey to assess students' skills to develop the drafts of the teams.
This overview of the course aims to establish transparent and effective teaching and learning experience. The formative agreement between the teacher and the students is established since the first lesson.

Theoretical pillars: discover phase.

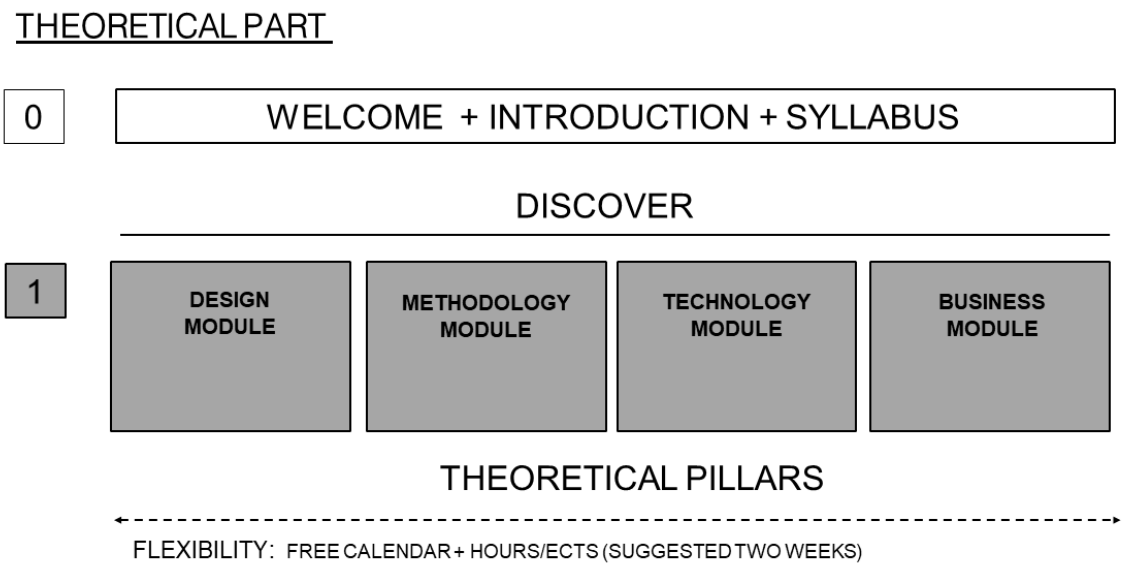


Figure 4 – Structure of the modules of the theoretical part

The preliminary theoretical part of the course is divided into modules of clearly defined disciplinary didactic contents that can be participated asynchronously by the students. The contents of the theoretical part will be delivered through lectures, preparatory exercises, and applicative sessions to level students' knowledge in the four different disciplinary domains of the project: design, methodology, technology and engineering, product and business management. The amount and weight of each module over the others have to be balanced concerning disciplinary complementarity and specific course contents. The modules are vertically aligned and vertically coherent: what students learn in one lesson prepares them for the next lesson or level. The learning progression into the same subject ensures that teaching materials are purposefully structured and logically sequenced. Students build on what they have previously learned to prepare them for more challenging, higher-level work progressively. This part of the course could last about 14 hours.

Students will access the Discover part of the course asynchronously: online recorded lessons, digital materials, and resources such as webcast or podcast, documents, readings, and multimedia presentations. This initial theoretical part will be participated in an individual and self-paced modality: they are enabled to progress through their education, at a faster or slower pace, based on their ability to learn the required material and demonstrate proficiency. Students must follow the lectures and carry out small tests, assignments, and exercises at the end of each module to assess their achievements and preparation on the specified topics with a very tight schedule to keep pace with the course. This preliminary preparation needs to be achieved due to a deadline that will be common to all the participating students from the different HEIs. In addition, students will be guided through the module's selection by their HEIs tutors to have insights into which modules are mandatory, optional, and individually selectable.

The modules and lectures' digital archival will create the theoretical backbone for students to go back to lectures during the challenge-based part in case they need to apply/revise specific contents. In addition, teaching comprises interactive activities such as written assignments in the form of short critical and reflective essays to be shared with peers that should review them in interactive forum activities. In this phase, students are also required to participate in different activities of interaction that will consist of chat, blogs, forums for a curated online discussion. Interaction aims at communicating with course peers during this individual phase to exchange course materials, information, insights, results of the assignments and start to know each other. Students should easily understand the contents of each module so to be able to select them in

their study plan. For this reason, it has to be clear the amount of time required to complete the module, the provided materials in each module, the assignments, and the learning objectives and outcomes.
As a suggestion, the following teaching and learning methods are employed to support the integrated achievement of this part of the course outcomes:

- Learning materials with extra readings to deep the knowledge
- Self-assessment quiz to check the learning achievements.
- Peer to peer interaction
- (e.g., chat, blogs, forums)

Brief launch and Companies' webinars

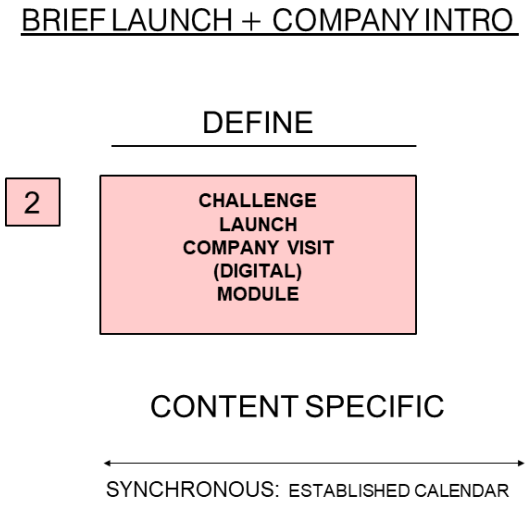


Figure 5 – Brief Launch of the Course + Company Webinars and students ice-breaking exercises

In the following (third) week, the course continues with a synchronous class session to present the brief of the challenge-based part, inviting industry experts and professionals from Companies and Startups for webinars and presentations. Students will be allowed to gather direct information and ask questions/interact with professionals and experts.
On this occasion, students are allowed to participate in a synchronous modality and could be an opportune moment where they introduce each other in working teams: it is suggested to organize get–to–know activities for presentations and ice-breaking. This part of the course could be of about 6 hours.
Students' activities as a team could be started with some exercises of active and collaborative learning by flipping the class. Then, they will be assigned to work together on simple tasks through application exercises, discussion-based activities, team-based learning before the challenge-based activities to familiarize themselves with the technology and the different working modalities of each team component.
As a suggestion, the following teaching and learning methods are employed to support the integrated achievement of this part of the course outcomes:

- Brainstorming sessions
- Teambuilding sessions
- Webinar
- Flipped classroom activities
- (through interactive activities requiring critical thinking)

Suggestions

Icebreaking Quiz activities and Exercises

Students are requested to take part in a live session to assess the students' background, their expectations on the course, and their previous knowledge. These activities are aimed to get to know each other and start to discover the group work dynamics. Short pitches will follow iterative sessions of timed exercises developed in the group from the achieved results.

Challenge-based part: design phase

PRACTICAL CHALLENGE BASED PART

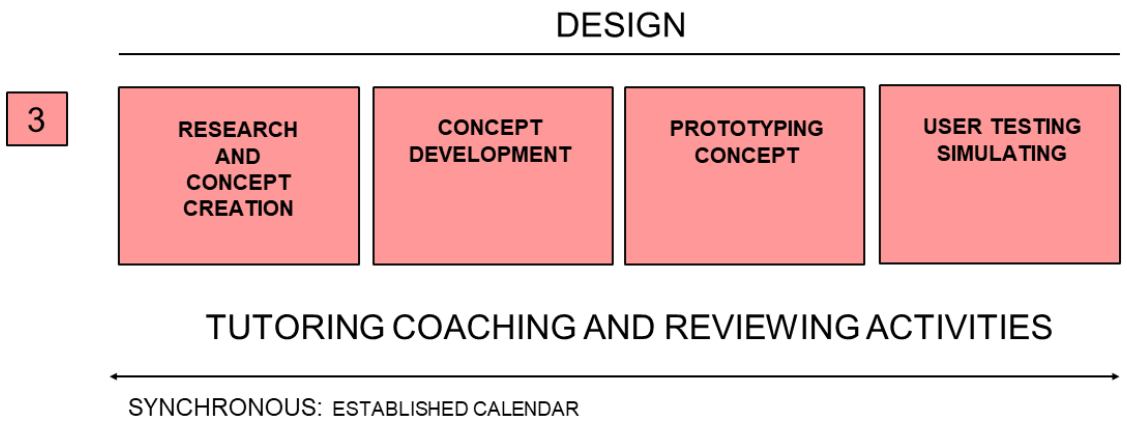


Figure 6 – Design / challenge-based learning part

The next part of the course is practice and challenge-based. It will be divided into four different modules: Research and analysis Development, Concept Development, Project Development, Experimenting and Testing toward elaborating proof of concepts (POC), and early stages prototypes to be delivered at the final exam/presentation. Teamwork will be tutored and supported by a team composed of teaching staff from each HEIs to review the students' work from different disciplines and perspectives. This part of the course will be for 4/8 hours/week (approximately 30 hours).

In the challenge-based part of the course, students will work in a group to develop a comprehensive solution, tackling design, material management, engineering, project management, and business development issues. Students would work synchronically and synergistically in multidisciplinary and interdisciplinary international groups with a practical assignment to be developed (Design). They will participate in group-paced activities using Internet-based technologies, which allow better remote collaboration. The VLEs are required to work together remotely, set up a remote team culture, manage the project, and deliver it, passing through iterative phases of research, concept development, project development, prototyping, and testing. On the platform, students are working together and are supported by tutors for reviewing the project phases.

During the overall duration of the course, teachers will be academics and professionals from the Company. In addition, tutors from each HEIs will support the reviews to cover different topics and disciplines. The final exam will be delivered digitally and remotely by groups as a digital exhibit and presentation.

The following teaching and learning methods are employed to support the integrated

achievement of this part of the course outcomes:

- Brainstorming sessions
- Coaching through questions and feedback
- Collaborative group project work
- Preparing materials such as multi-media presentation
- Pitching and presenting

Deliver

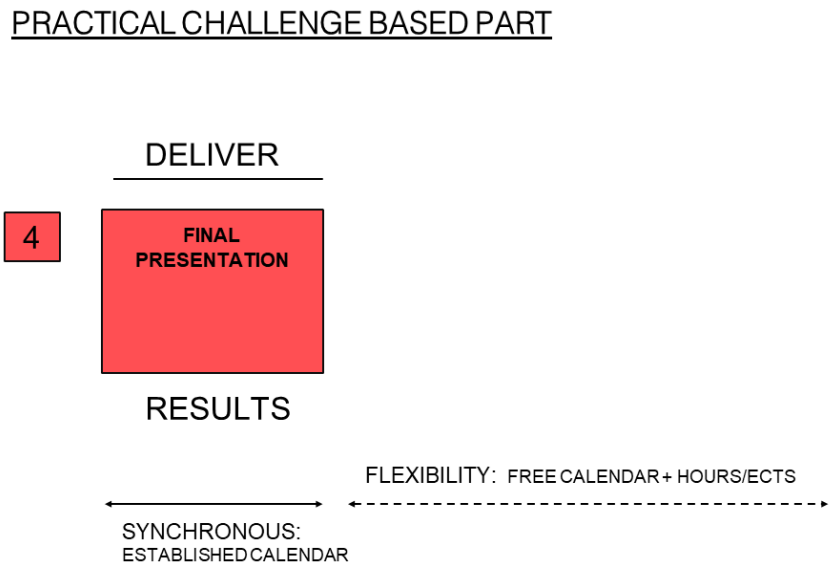


Figure 7 – Deliver part of the course: proof of concept and early prototypes are presented

The "Deliver part" of the course will be structured with internal and external participants to listen to the presentation and exhibition of the solutions realized in the shape of Proof of Concepts (POCs) and early prototypes and delivered through multi-media presentations. Feedback from each participant and peers would be collected and reflected upon at the end of the presentation. The following teaching and learning methods are employed to support the integrated achievement of this part of the course outcomes:

- Pitching and presenting
- Public speaking
- Preparation of multi-media presentations

Learning Objectives

The general purpose of the courses is to train professionals who can employ the potentials of digital technologies in the domain of fashion to drive design processes in multidisciplinary and interdisciplinary contexts. To this end, through an innovative way of teaching, the LOs are:

- to train adaptive professionals who can collaborate and interact with other professionals,
- to employ the potentials of design, business, and technologies in the domain of fashion-tech,
- to drive design processes in multidisciplinary and interdisciplinary contexts.

The learning experiences will provide students with valuable tools and skills to critically interpret the project dimension within the broader context of social, cultural, and technological contemporary shifts (new lifestyles and needs, new typological configurations and innovative technological scenarios).

In particular, digital theoretical lessons, preparatory exercises, and applicative sessions will be

delivered to transfer student's knowledge on how fashion and digital technologies are interconnected. The scope is to unveil the potential as well as the limitations of this interconnection that is transforming the entire value chain, from ideation to production, from retail to communication. Furthermore, the exchange of different perspectives and multiple disciplines will be useful to establish a shared glossary that could be facilitating the activities in the challenge-based part.
The challenge-based part of the course will be addressed to explore the potential of interdisciplinary teamwork practice activities. Students will be asked to develop a project from product ideation, design, and engineering phases, to business model strategy development. Hence, the challenge-based phase aims to train adaptive professionals to collaborate to deliver a project in the field of fashion-tech, as in those sectors requiring the combination of a creative attitude and knowledge on technical materials and innovative technologies, interacting with other professionals.

Assessment Strategy

Students would work either individually (in the asynchronous part: DISCOVER) and in teams (in the synchronous part: DEFINE, DESIGN and DELIVER). Separately, they must follow the lectures, participate in experts webinar, and carry out individual assignments such as small exercises and tests. The individual work will be evaluated through individual assignments.
In teams, they must develop a Fashion-Tech project, participate in reviews and deliver the final project. During working hours, each team will meet professors, experts, and teaching assistants to present their work-in-progress. Sometimes these meetings would be informal reviews to help the development of the project. Some other meetings will have the shape of mid-term assessment to verify if the main project milestones are achieved and if some needs or problems occurred. The teamwork will be evaluated with a final presentation on a digital platform. The final exam will be held in the form of a digital exhibition/presentation.
Students will pass the course if they succeed in the following activities:

- Attending the theoretical modules
- Completing the quiz and evaluation tests
- Participating actively in the available platforms for peer interaction
- Completing the assignments timely and qualitatively
- Participating in the review's sessions
- Delivering the final project (exam)
- Each HEI will formulate the modality of evaluation of the course for its students.

Besides, to assess the achieved knowledge/skills/competencies of students through the teaching/learning experience, a combination of the following activities could be implemented:

- **Previous Knowledge Evaluation**: to be conducted at the beginning of the course to allow teaching staff to understand each student's starting point. It is also beneficial to create teams with balanced skills;

- **Formative Assessment**: the teaching staff monitor students' progress along the learning path to assess the ILO's and TLA's efficacy throughout the learning activities. This assessment provides adequate feedback to guide the following steps and support the teaching and learning experience along the way. It gives both teachers and students invaluable information about what students understand and what they don't. Formative assessment provides ongoing feedback that is useful for instructors to improve their teaching, giving feedback regarding the subjects students are struggling with, to address problems immediately. Students may enhance their learning because formative assessment identifies strengths and weaknesses and targets areas that need work,

improving overall performance and constancy in preparation. Formative assessment should be frequent, quick, and informal. Some preliminary assessments, such as an online quiz or brief assignment, may be used to gauge student understanding and tailor instructional plans before class.

Suggestions

Students should constantly receive feedback on their performance during class and within the entire course. Therefore, the formative strategy considers activities regarding:

- **Previous Knowledge Tests;**
- **Quizzes with multiple choice answers** followed by self-evaluation information.
- **Takeaway Tests**;
- **peer-assessment on exercise documentation** as a peer-to-peer assessment that should be developed during the realization of the module and is intended to build shared knowledge inside the classroom.

- **Summative Assessment**: allows teachers to observe if and how the ILOs have been achieved at the course end. The summative assessments are intended to be applied in moments of summary or conclusion inside the course, such as midterm exams or final project assessment. They should take medium-long time in their application and respond to formality.

Suggestions

Students will be required to deliver:

- a **final Project Work** that is a group assessment passing through different steps: research and analysis, concept and project development, proof of concept (POF) definition. They will produce exhaustive documentation, including the measures, problems, solutions, and challenges to support the replication and improvement of the project. The POF should be prototyped in its early stage through mock-ups, simulations, and tests.
- a **final presentation** in form of a pitch from which all the contributions of the students are evidenced
- a **series of disciplinary reports** (as required) deepen the disciplinary perspective and reflect on interdisciplinary processes and contributions.

Quality Evaluation

Before the end or at the very end of the course, all the involved stakeholders (students, professionals from companies, and teaching staff) will be required to complete a questionnaire for course evaluation. This will ask opinions related to the overall experience to understand their perspective in terms of Context-Specific Quality, Knowledge sharing efficacy, Quality of coaching and Satisfaction within the learning experience. Part of the questionnaire will also focus on the importance of the course for learning and applying acquired knowledge and skills in students' future professions. It focuses on asking students' perspectives in terms of

Improved skills and competencies and the relevance of skills for future career and employability.

The course delivery

Virtual Learning Environment and toolkit

This section investigates a range of virtual learning environments and tools. It considers their affordances and limitations to be included in the three courses to support the delivery of learning and teaching materials and enhance the three forms of interaction and engagement: peer-to-peer, peer-to-content, and peer-to-instructor.
The learning experience conducted in an e-learning ecosystem or digital learning environment provides both individualized learning and enhanced collaborative opportunities.

Learning management tools

Learning management systems (LMS) are useful to allow communication, deliver contents, boost students' interaction, run course assessment, and automatically send feedback and grade students in a password-protected web environment. These systems are designed to provide a consistent, coherent, and efficient experience for instructors and students. Besides, there is the possibility to use a series of distributed tools designed to handle a component or subset of learning management goals. Digital tools currently available allow:

- real-time and asynchronous text, voice, and video communication.
- basic project management activities, like task management, calendaring, workflow planning, and routing, and time tracking;
- co-creation by enabling groups to modify the output in real-time or asynchronously;
- consensus-building and facilitation through group discussions and polling;
- simplification and streamline resource management in terms of essential file-sharing;
- local and remote presentation, archiving of completed projects.

For the sake of simplicity, we divided the tools into distinct ones by presenting them as separate. However, we acknowledge that their use will be not linear in all the phases but indistinct and mixed. The collaborative efforts require a specific type of activities and features included in one or more tools to help the digital learning experience positively.

Course space and repository

Several VLEs allow the lectures repository, archival, and fruition from students and their digital participation in remote digital modality. These tools also allow the course management and are useful to handle the logistical aspects of planning, scheduling, calendaring, and delivering content. They are also suitable resource management repositories, giving students access to a shared common space where lecture's materials are located to be selected upon each own study plan. In some cases, these tools allow for assignments to be included and track students' activities, use, progress, and give direct feedback on the assignments.

Collaboration tools for student teamwork

Tools for student collaboration are essential for people to derive a meaningful body of knowledge, work together to solve a problem, and co-design a product/service/system to solve the challenge-based part. They are successfully used for supporting:

- the facilitation of real-time and asynchronous communication;
- the assistance in project management activities;
- the co-creation, enabling groups to modify the output in real-time or asynchronously;
- the facilitation of consensus-building;

- the archive of local and remote presentation of projects

The facilitation and management of effective communication among team members are ensured by tools that allow virtual meetings, instant messaging, screen sharing, voice/video conferencing. Furthermore, the team definition and the team participants will be supported by tools that allow to share information about the team members and to exchange expertise and availability.
The task management-related tools are used to help in managing the workflow of activities, reminding milestones and time in a shared calendar.
The resource management tool help in sharing an archive and storage space for project files that all group components can access, including the possibility of the multiple identical versions of the same document (version tracking).
The co-creation and ideation tools facilitate the interaction between team members on the goals or desired outcomes of the project, directly editing or building the project artefact using tools like virtual whiteboards that allow concept mapping, real-time collaborative editing, and consensus building.
The presentation and archiving would allow the team to present outcomes to the instructor, to a project client, or to the general public. Communication tools also factor heavily into this phase of project-based collaborative learning.

E-classrooms

E-classroom is a digital learning environment that should support the learning goals. Tools for connecting remotely and interacting synchronously, potentially lending themselves to support educational goals like, for example, meeting with students outside of class time are tools like Skype, Microsoft teams, Zoom, Webex, Adobe Connect. Beside the main plenary classroom where teaching and coaching can occur, students should be given a free space to work in groups autonomously. This space should be freely reached by students and will allow free collaboration between students.

The courses achievements

Student Outcomes

The course defined students' outcomes as the knowledge, skills, and work habits that students are expected to acquire by the end of the instructional period for each of the three pilot courses. Students' achievement implies education-specific results related to subject specific skills and the general/soft skills that were mapped and validated during the focus groups of WP1.

Soft / general skills for future fashion-tech professionals

Communication, teamwork, and interpersonal abilities will emerge from working in groups during the CBL part of the course. They will be useful when interdisciplinary working is adopted among different divisions in the same Company for opinionated but diplomatic discussion, where best ideas need to emerge and thrive.
Creativity and cooperation applied during the co-design activities of the CBL will enhance the capacity of collaborating with different professionals to achieve integrated innovative results. Collaboration might boost "interdisciplinary facilitator" skills that allow bridging the gaps between different specialized disciplines along the design process (prototyping, production, and sales). A shared glossary and an open and innovative mindset were defined as helpful in a more agile/fluid working modality related to fashion-tech projects.
Competence renewal/upskilling was considered essential to understanding the fashion and tech side of projects from different and divergent disciplines and perspectives, working in cross-

disciplinary teams to solve specific tasks for limited periods of time and gain new hybrid skills.

Subject specific skills for future fashion-tech professionals

A series of subject specific skills were mentioned as necessary between the three disciplinary areas of design, technology and engineering, and project/business management.

In between Design and Technology, future fashion-tech professionals will be asked to have the skills related to Digital Modelling, by enhancing 3D design and visualization expertise: 3D pattern design, CAD drawing, 3D modelling via 3D platforms and software. These skills apply to product development and prototyping, to buying space (digital platform) and buying experiences design (skills in digital and omnichannel narration and storytelling, user experience (UX), user interaction (UI) and customer experience (CX), skills of experimenting and designing the customer journey experience in omnichannel, e-commerce platforms through online, digital apps and showrooms). Besides, in the Making and Prototyping competencies of the future, a 3D printing specialist should handle 3D modelling hardware and software for additive and subtractive manufacturing and the abilities to plan a local production and sourcing of materials in the forms of micro-factories to decrease environmental costs of supply.

Other skills should focus on programme management, data science (e.g., data collection, interpretation, analysis, management, and governance). Artificial Intelligence integrated with a sensibility to fashion, textile process, or end-user/customer needs to achieve sustainability, make intelligent use of data for forecasting trends, and improve the integration inside the entire project workflow. Data science is also connected to data security, data protection, and privacy. Besides, policy-making-related skills, both at the governmental/national and corporate levels, were mentioned as necessary for facilitating fashion-tech business model innovations.

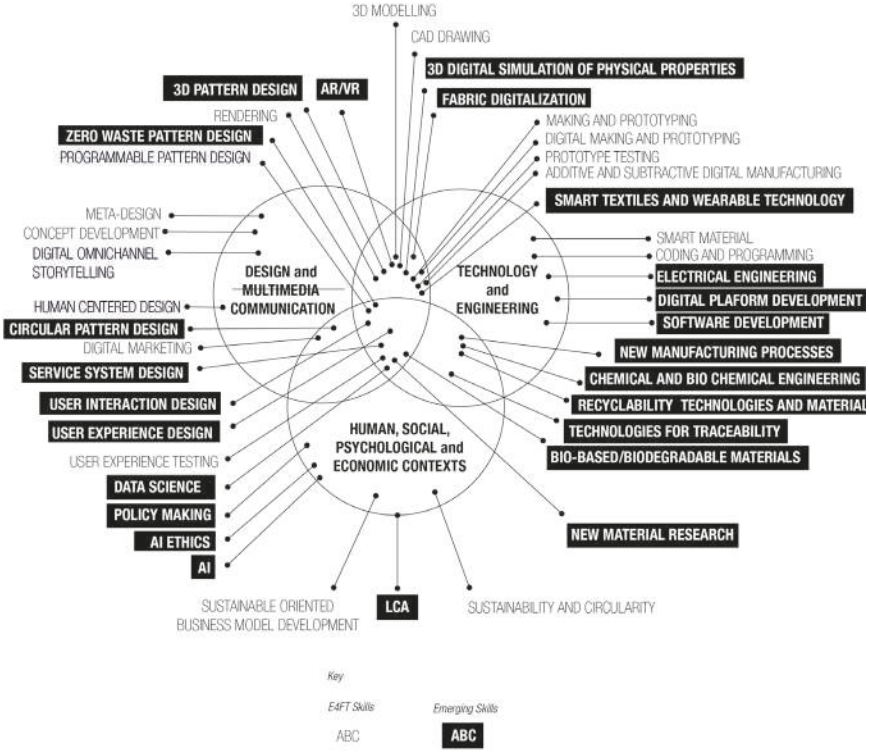


Figure 8 – Overview of the Subject-specific Skills as resulting from the three focus groups that should be considered integrated into the three pilot courses

Courses should also focus on bio-based/biodegradable materials and chemical processes, increasing chemical and biochemical engineering expertise.

Skills related to a circular design, engineering, and management of the fashion products emerged (knowledge of Life Cycle Assessment, Design, and Circularity, zero waste pattern

design, recyclability technologies and materials, technologies for management traceability in the supply chain, new circular business models).
Skills related to design of smart textiles and digital/connected wearable technology were considered essential and emerging in the far future. In this domain, the importance of user experience testing and material tinkering with sensor integrated projects was highlighted.
Meta-design skills were referred to by participants as an indispensable part of future F-Tech skills, considering the importance of research and product development and as a system design skill since it can complement the innovative business model and digital storytelling design and digital marketing skills.

Student Engagement (intellectual, emotional, social, behavioural, cultural)

Student engagement should be an instructional objective achieved by the three courses. Student engagement refers to the degree of non-cognitive skills (e.g., motivation, interest, curiosity, responsibility, determination, perseverance, attitude, work habits, self-regulation, social skills, etc.) shown by students when they are learning. It is believed that certain intellectual, emotional, behavioural, physical, and social factors influence positively both the learning process, the learning results (e.g., improved academic performance, test scores, information recall, skill acquisition, etc.), and social development. In particular, the 3 pilot courses should achieve intellectual engagement by creating lessons, assignments, or projects that stimulate students' curiosity. Emotional and behavioural engagement should be achieved by fostering behaviours more conducive to learning. Finally, social and cultural engagement should be achieved through social interactions that welcome and value cultural diverse backgrounds.

Portfolio of Proof of concepts

A POF portfolio made of at least 25 projects as a compilation of academic work and other forms of educational evidence will be delivered from the three courses. The portfolio will be used to evaluate coursework quality, learning progress, and academic achievement. It will be useful to:

- determine whether students have met learning standards or other academic requirements for courses, grade-level promotion;
- to help students reflect on their academic goals and progress as learners;
- to create a lasting archive of academic work products, accomplishments, and other documentation.

The evaluation of student portfolios structured through compiling, comparing and reviewing, group work can provide a richer, deeper, and more accurate picture of what students have learned and can do.
Proof of concepts elaborated from students will be a digital collection of group works that could be structured in many forms depending on the course topic. They will be constituted of:

- multimedia presentations filled with documents, notes, and graphics,
- student-created videos
- online digital archives and student-created websites/blogs,
- summarizing written reports
- physical /digital prototypes and models
- and other material evidence of learning progress and academic accomplishment.

Open Educational Resources (OER)

According to UNESCO (2016), Open Educational Resources (OER) are "any type of educational materials that are in the public domain or introduced with an open license. The nature of these open materials means that anyone can legally and freely copy, use, adapt and re-share them. OERs range from textbooks to curricula, syllabi, lecture notes, assignments, tests, projects, audio, video and animation."

The three pilot courses will release OER, including teaching, learning, and research materials in digital format to be shared in the public domain. They will have the shape of video lectures to be released under an open license that permits no-cost access, use, adaptation, and redistribution by others with no or limited restrictions. They will be selected among the materials used for the courses to guarantee that lectures are informing all possible interested stakeholders in emerging issues of the Fashion-tech sector.
The teaching/learning resources and content selected amongst all the materials produced for the courses will be made available under Creative Commons-Share Alike 4.0. Users are free to share, copy and redistribute the material in any medium or format and adapt, remix, transform, and build upon the material for any purpose, even commercially. Under the following terms, users must give appropriate credit, provide a link to the license, and indicate if changes were made. If users remix, transform or build upon the material, they must distribute the contributions under the same license as the original (Sharealike). No additional legal or technological restrictions should be associated with the materials provided.
This guarantees and boosts the content use and reuse by the partner HEIs and other European or international HEIs. Learning resources will be shared through the online FTall website for students and teachers interested in fashion-tech lectures at the university level. In addition to the FTall website, other open-source educational content repositories could be used, in formats suitable to guarantee interoperability with state-of-the-art open learning management systems.

4. THE THREE PILOT COURSES

The three pilot courses will occur with a temporal timeframe that allows to test features and differentiate the contents provided to students iteratively. As evidenced from Table 7, the first course was launched in January 2021 to test the format/educational model at the initial stage of its formulation. The information, evaluations, and critical reflection deriving from this very first course will be introduced in the upcoming two ones that will be launched contemporarily in September 2021.

Table 5 – Overview of the 3 pilot courses

COURSE	#	TITLE (DRAFT)	PARTNER	RESP.
FIRST COURSE **ASYNCHRONOUS PART** 7 January 2021 – 21 January 2021 **BRIEF LAUNCH** 25/26 January 2021 **SYNCHRONOUS PART** 27 January 2021 – 3 March 2021	**1**	**Fashion-Tech Interline** The virtual dimension of fashion design ABSTRACT The digital course aims to advance students' knowledge on how digitalization and virtualization of the design process affect the entire value chain management, including concept development and prototyping, production, supply chain operations, and business model innovation for faster, smarter, more efficient, and sustainable garments.	PESPOW GZE - WEARFITS THRILL DIGITAL IL3X	POLIMI

SECOND AND THIRD COURSE **ASYNCHRONOUS PART** 13 September 2021 **BRIEF LAUNCH** 6 October 2021 **SYNCHRONOUS PART** 3 November 2021 **FINAL PRESENTATION** 1 December 2021	**2**	**The secret life of clohing:** Tracking and Sensing in Smart Fashion ABSTRACT How can data revealed by worn objects be ethically utilised to create environmentally, socially, and economically sustainable, interactive experiences? Fashion wearable technologies are often designed for novelty and status display, meaning they are only used for a short time before obsolescence and disposal. This is not sustainable for the planet or their designers, whose business ventures often fail. They can also capture very personal data, which users have little control over. This course explores how to do things differently!	PAULINE VAN DONGEN - SEFLEURIA	UAL-LCF
	3	**Scalability of multidisciplinary F-Tech solutions:** addressing future sustainability challenges ABSTRACT The course focuses on the field of Fashion Tech and their value chains, aiming to advance students' knowledge on identifying future sustainable development challenges and how these can be solved by developing inter-disciplinary and scalable fashion-tech solutions (covering design, technology, management aspects). The course will discuss scalability from social innovation perspective in terms of scaling-out, scaling-deep and scaling-up dimensions.	WE LOVE YOU COMMUNICATION CENTEXBEL	HB

More details about the courses will be provided in the D2.2.

Course 1: FASHION-TECH Interline The virtual dimension of fashion design

Figure 9 – Fashion-tech Inteline Course

Deriving contents from the focus group, the first course focus on the opportunities of the digitalization of fashion considering both digital and virtual fashion design in the impact on the whole fashion system, including design, production, selling, consumption.
The course aims to understand the impact of digital technologies in the Fashion sector, focusing on the way today's fashion businesses can be transformed toward faster, smarter, more efficient, and sustainable garments.
As was highlighted in the focus groups, two particular strands of future knowledge and abilities to deepen in the Companies and so in the educational experiences in HEIS were sustainability (materials, processes, design, business) and digitalization (design, testing, simulating, visualizing, fitting, experiencing). These skills are interconnected and interlaced, allowing to create meaningful didactic experiences that build on more propaedeutic arguments toward more complex applications and implications.
For example, 3D Modelling has a broad perspective of applications in the Digital Shift and Twin phenomena. The digital twin toward 3D applications in fashion has been recently accelerated due to the COVID-19 pandemic emergency that has transformed radically the manual and often handcraftsmanship-based methodology of pattern construction. It has also changed the mock-up, prototyping, distribution, and showcase and selling processes within a digital/virtual formula. 3D design, modelling, prototyping, and 3D rendering and visualisation, body scanning, or morphology body measure allow for better personalization and fitting simulation in the collection development, and finally virtual showrooms and shows in the selling and commercial side. 3D garments can be designed, simulated, prototyped, modified, personalized, and tailored in a digital world before becoming physical products with increased accuracy and design

capabilities and a shorter timeframe.
Furthermore, designing digital garments has become more complex and engineered, including materials, geometry, manufacturing processes specifications that can be carefully defined beforehand, thus facilitating innovation. More than solely design, this transformation has impacted the whole product development process by cutting costs, changing the value-chain, decreasing the time-to-market for the development of the collection, increasing the sustainability of the entire fashion value chain, and impacting the organization and the business model of companies. Consequently, new roles and skills are required in the fashion companies facing this massive rapid transformation. This digital shift and digital twin also have implications in new skills related to user experience design on the digital/virtual online platforms and, consequently, data management for trend analysis and forecasting. In particular, data management, protection, and security in both online and offline products/systems that interact with users' data should be enhanced. In this user experience and interaction, research and testing were also focused in the course. This interdisciplinary course aims to include also focus on the sustainable practices related to design (e.g., circular pattern design), technologies (e.g., material recyclability, micro-scale/on-demand/local manufacturing), and business models (e.g., circularity, re-commerce, etc.) inside the Fashion-tech domain. The set of skills explicitly referring to facilitating new business models and entrepreneurship/intrapreneurship in the Fashion-Tech sector were also addressed in the course.

5. THE COURSE TOOLKIT

This part of the report describes a series of toolkits to organize, implement, and design the digital interdisciplinary and international learning experiences. These toolkits are useful to support and enforce the co-designing process and exchange information among participating partners. They were organized, implemented, and tested during the first course delivered for WP2 - Designing and Piloting the Learning Experience and were collated in this document as a guide for the organization of the second and third learning experiences toward the responsible HEIs organizing the courses.

This document includes:

. Toolkit to organize the digital learning experience
. Toolkit to prepare the lectures for the theoretical based part
. Toolkit to aid the challenge based part of the course
. Toolkit to support the course promotion and diffusion

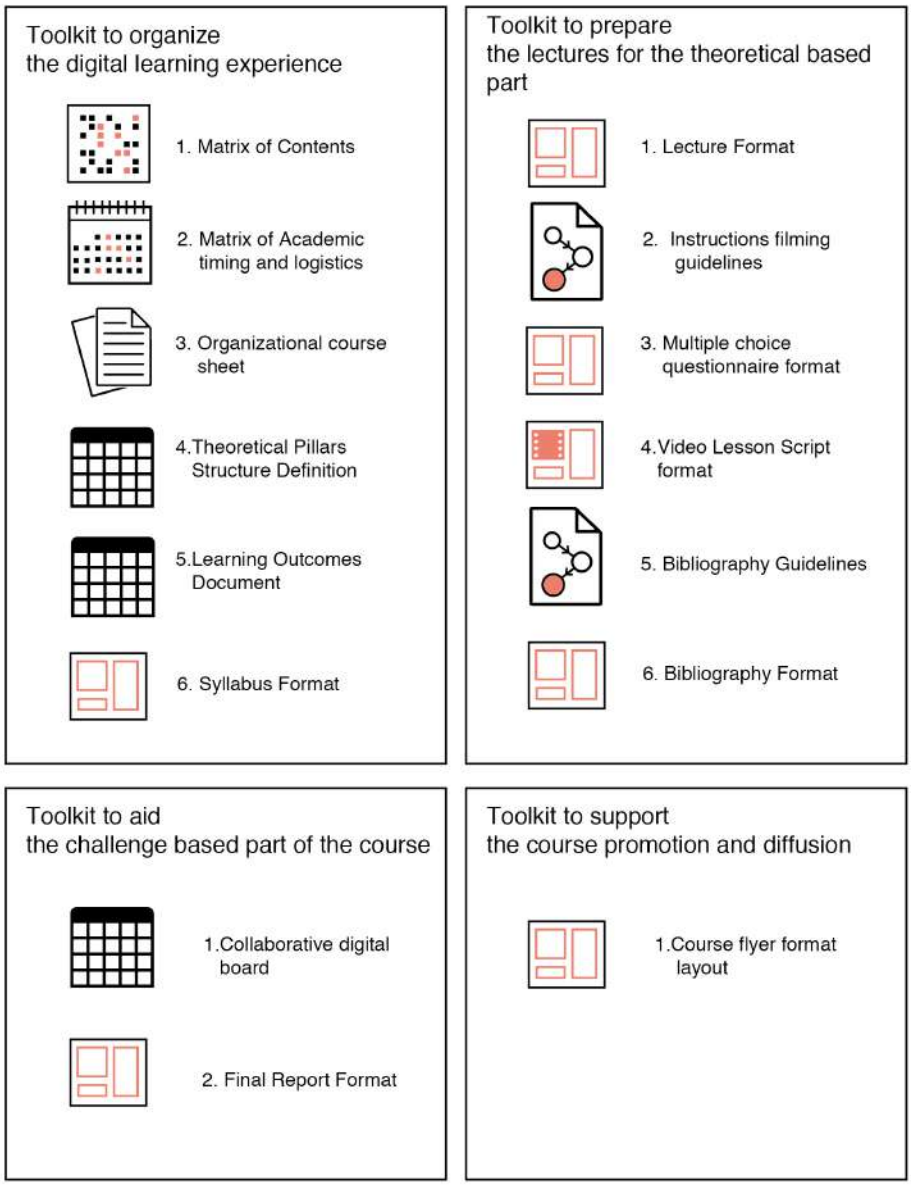


Figure 10 – The course toolkit legend

Toolkit to organize and implement the courses

1. Matrix of Contents

The matrix of contents is a tool implemented to co-design and understand reciprocal HEIs expertise and reliable support to build the learning materials for the digital learning experiences. It is a starting tool to collect general and fundamental information related to all the possible lectures on Fashion-tech that could form the available Open Educational Resources generated for the courses. It could be used to start defining the contents to be delivered as materials and lectures during the courses about the main four modular pillars of the theoretical part of the courses: design, methodology, technology, and business management. It is also conceived as a flexible and adaptable tool to be expanded depending on the specific topics inherent each course.

Table 6 - Matrix of contents designed and filled to structure the theoretical pillars

		HEIS				
		POLIMI	TUD	UAL	ESTIA	HB
DESIGN AND METADESIGN	**SCENARIO DEVELOPMENT**					
	CONCEPT DEVELOPMENT					
	MOODBOARD AND LIFETYLE DEVELOPMENT					
	DESIGN METHODOLOGY FOR FASHION-TECH					
RESEARCH METHODOLOGY	USER –CENTERED AND EXPERIENCE RESEARCH					
	BLUE SKY RESARCH AND DESIGN DIRECTIONS					
	MERCHANDISE ANALYSIS					
	ETHNOGRAPHIC RESEARCH					
	BENHMARKING RESEARCH					
SPECIFIC TOPICS ABOUT FASHION-TECH	**FASHION TECH PARADIGM**					
	SUSTAINABLE MANUFACTURING PROCESSES IN FASHION-TECH					
	SMART TEXTILE MATERIALS					
	SMART SYSTEMS COMPONENTS AND TECHNOLOGY					
MAKING AND PROTOTYPING	DIGITAL MANUFACTURING					
	CODING AND PROGRAMMING					
	ADVANCED MANUFACTURING					
	3D SOFTWARES FOR RAPID PROTOTYPING					
	ELECTRONICS (for textiles)					
	DIGITAL PATTERN MAKING					
METHDOLOGY EXPERIMENTING + EXPERIENCING + ASSESSING	VIRTUAL, PHYSICAL AND AUGMENTED PROTOTYPING METHODS AND TOOLS					
	QUALITATIVE AND QUANTITATIVE ANALYSIS OF DATA					
	DESIGN AND MEASURE PRODUCT EXPERIENCE (PROTOTYPING)					
COMMUNICATION	DIGITAL STORYTELLING					
	DIGITAL DRAWING AND SKETCHING					
BUSINESS MANAGEMENT	**FASHION-TECH BUSINESS MODEL**					
	CIRCULAR AND SUSTAINABLE FASHION-TECH BUSINESS MODELS					
	DIGITAL/BIG-DATA DRIVEN VALUE CHAIN					

	SMART TEXTILE MANAGEMENT AND BUSINESS ADMINISTRATION					
	DIGITAL/BIG-DATA DRIVEN VALUE CHAIN					
	DIGITAL PLATFORMS AND SERVICES OF INTEGRATED FASHION VALUE CHAINS					
	DATA-DRIVEN CIRCULARITY ANALYTICS					

How to use the tool

HEIs could use this tool to decide the essential theoretical topics covered by lectures that should be provided to support the background knowledge in each specific course, depending on its contents. During plenary meetings amongst different HEIs, the matrix could be discussed and extended, filling the central units related to design and meta-design, research methodology, fashion-tech-related topics, making and prototyping, etc. Each HEI can contribute with its expertise to each specific unit and topic, trying to match competencies and disciplinary perspective in multi-interdisciplinary lectures creation.

2. Matrix of Academic timing and logistics

This tool is useful to aid the preparatory activities of courses' organization. It aims to share information in terms of academic timing and bureaucratic logistics, verify the preliminary requirements of the courses with each involved HEI, draft a preliminary calendar, and define the timing of the three pilot courses.

The tool includes two tables. The first one is a timetable of one year span to be filled by each HEI collaborating to define courses with notes, information, and comments to help schedule a joint calendar for organizing the three pilot courses.

The table should be filled providing information about:

- Typology of the course (curricular course, elective course, extracurricular course, etc.),
- Duration of lectures and students' study (hours/days),
- Credits,
- Available students to be recruited.

By filling the table, HEIs will gain information regarding the level of flexibility the course should have (in terms of credits, formats, and student selection), adaptability to all the specific criticalities and constraints of each university. Besides, they can gain information on exploiting the overlapping schedules where most HEIs can set up a joint course.

	January 2021	February 2021	March 2021	April 2021	May 2021	June 2021	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021
POLIMI												
HB												
UAL - LCF												
TUD												
ESTIA												

Figure 11 - Matrix of Academic timing

The second table informs HEIs about the logistic and bureaucratic timing to set-up a course in each institution. It includes information regarding

- by when a course should be organized providing all the information related to the syllabus to be approved;
- when students selection for enrolment should start/end;
- when the courses promotion and launch should be done for the students to know the main contents.

This matrix should be filled by each HEI. It will give information on the deadline for course approval (and so for the draft and concise Syllabus discussion and sharing among the partners) and the deadline for preparing promotional materials to recruit students to be enrolled in the courses.

	Period of organization and approval of the courses (by when)	Launch / promotion of the courses (start/end)	Period of selection of students for enrolment (start/end)
POLIMI			
HB			
UAL - LCF			
TUD			
ESTIA			

Figure 12 - Matrix of Academic logistic for course organization, approval, promotion and students selection

3. Organizational course sheet

This tool is a starting organizational co-design document used by the responsible HEI of the course and the companies participating in the course organization to brainstorm together and define a summarized proposal to be shared and distributed amongst consortium partners:

The document includes information regarding:

- the title of the course;
- a short abstract describing the main contents of the course;
- the course shared/agreed timing;
- the involved academic and professional tutors;
- the company partners;
- the topics covered;
- the course objectives;
- the expected learning outcomes;
- the shared/agreed assessment method;
- some images (copyright free) related to the project;
- a starting outline/calendar of the course;
- shared/approved information related to student enrolment and prerequisite;

Once filled in before the syllabus definition, this document is useful to start the communication activities of the HEIs partners to recruit teaching staff and students and promote the courses on the social media and the website platform of the project and each specific HEI's platform.

How to use the tool

The HEI leading the course could use this tool to define and share information with the partner companies to brainstorm together and collaborate in designing the brief of the challenge-based part of the course.
The HEI leading the course should share this document with the collaborating HEIs for discussing/sharing organizational details such as timing, calendar, topics, required effort.

Annex 1 – Organizational Course Sheet (p. 61)

4. Theoretical Pillars Structure Definition

This tool is useful for HEIs collaboration in the definition of the lectures for the theoretical pillars. This excel format serves to include the specific information about the lectures focusing in particular on:

- the main topics that the theoretical pillar will cover through a table of content or a short abstract/description,
- timing of the lectures,
- the tools/ materials/activities provided for the lectures (e.g., Video lectures and subtitles or transcripts and main takeaways, Multi-media presentations with detailed descriptions or notes, readings such as documents, papers, books, Videos / Movies, Databases, software, website),
- the tools for discussion/interaction/peer revision (e.g., interaction through chat, peer evaluation, peer collaboration, forum participation, collaborative exercises to be conducted in the theoretical part),

- test and assessment (e.g., a comprehensive set of quizzes, tests, propaedeutic exercises, peer evaluation).

All this information is provided for each theoretical pillar in the design, methodology, technology and engineering, and business management and innovation sides.

How to use the tool

The HEI leading the course could use this tool to collect all the information related to the theoretical pillar that has been previously decided with the tool "Matrix of contents." By collecting this information preliminary to the delivery of the effective lectures materials from each HEI, the HEI leading the course can understand how to structure the modules of the theoretical pillars and size the theoretical part's timing. In addition, all this information can be used to start working on the syllabus and structure the digital platform.

PILLAR TITLE	
AREA	DESIGN/METHODOLOGY/TECHNOLOGY/BUSINESS
INSTITUTION	POLIMI/UAL/ESTIA/TUD/HB

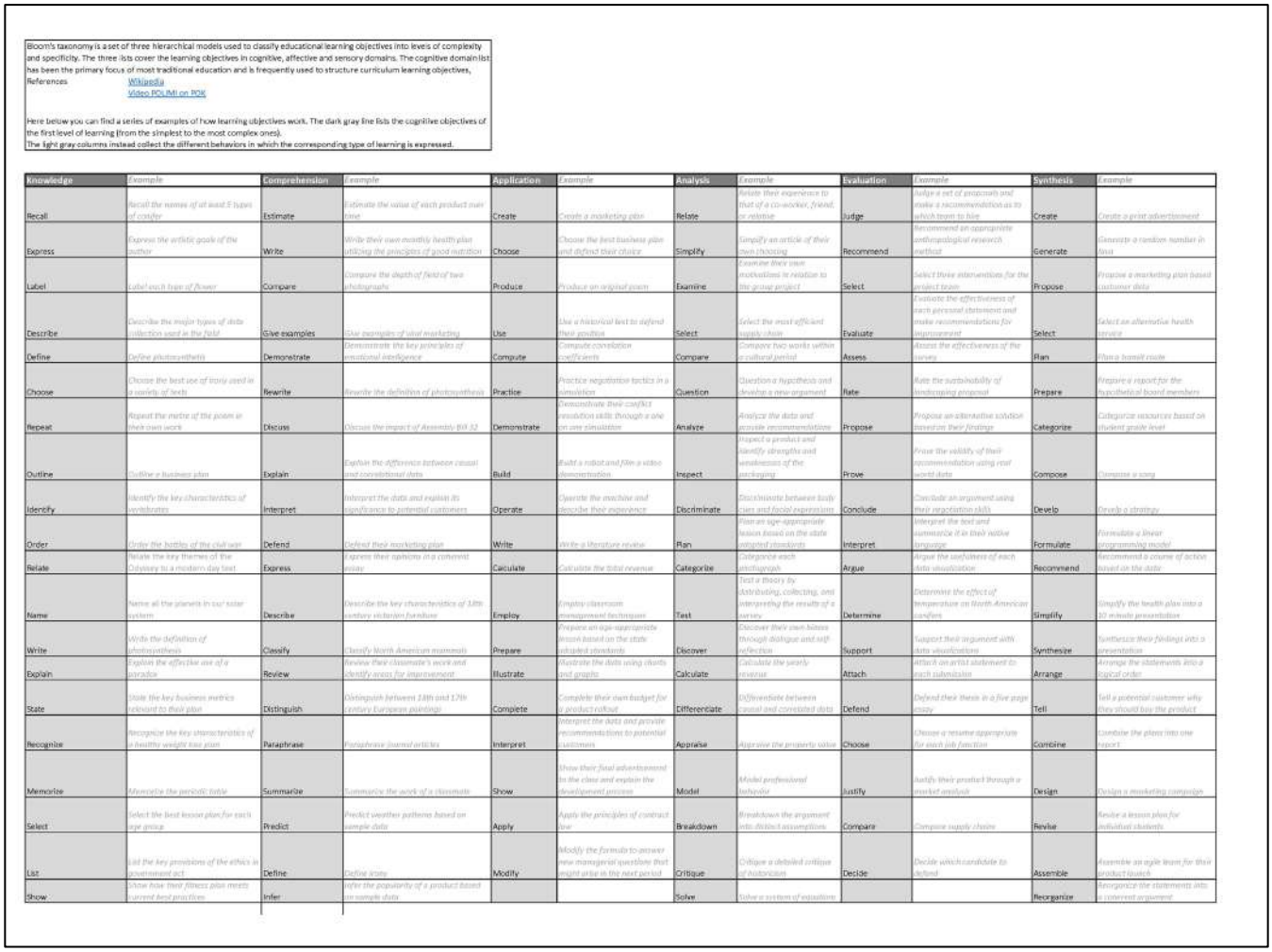
Please indicate the main topics that the theoretical pillar will cover (table of content), describing shortly what you mean to teach. You can add or erase rows according to the need - and mark with a cross the didactic tools/activities required/expected to deliver it. In other please describe what kind of format / typology you would like to deliver.

			Lecture								Discussion and Interaction						Test and Assessment				
TOPICS COVERED	Short Description (table of content)	lecture duration (minutes)	Video lectures and subtitles (transcripts) and main takeways	Multi-media presentations with detailed descriptions (notes)	Readings (documents, papers, books)	Videos / Movies	Database	Software	Websites	other	Peer interaction chat	Peer evaluation	Peer collaboration	Forum participation	Small participatory exercises such as: world cloud - mindmapping	Other	A comprehensive set of quizzes	Assessment tests	Assignments to be evaluated	Propedeutical exercises	other
TOPIC 1: TITLE																					
TOPIC 2: TITLE																					
TOPIC 3: TITLE																					
TOPIC 4: TITLE																					
TOPIC 5: TITLE																					
TOPIC 6: TITLE																					
TOPIC N: TITLE*																					

Figure 13 – Theoretical pillars structure definition tool

5. Learning Outcomes Document

This tool is useful to set learning outcomes for each lecture and material provided by the teaching staff to students. It is based on the six cognitive phases of Bloom's taxonomy and requires the teaching staff to define a verb and a description for each cognitive step (Sancassani, 2019). Detailed explanations of the performance that students are expected to achieve are defined in terms of the system of knowledge, skills and competencies that the teaching experience should determine. Through this tool, learning outcomes could be defined for each proposed lecture and then collected for each module of the course to articulate the general framework of the acquired skills and the exit profile of students. Based on the revision to Bloom's taxonomy carried out by Anderson and Krathwohl in 2001, this tool helps in defining the cognitive (processing information), affective (attitudes and feelings), and psychomotor (physical skills) learning outcomes. A table of examples is provided to help in filling the tool. The learning outcomes documents have been readapted from the structure provided to create the MOOC for POK (Polimi Open Knowledge).



Bloom's taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three lists cover the learning objectives in cognitive, affective and sensory domains. The cognitive domain list has been the primary focus of most traditional education and is frequently used to structure curriculum learning objectives.
References
Wikipedia
Video POLIMI on POK

Here below you can find a series of examples of how learning objectives work. The dark gray line lists the cognitive objectives of the first level of learning (from the simplest to the most complex ones).
The light gray columns instead collect the different behaviors in which the corresponding type of learning is expressed.

Knowledge	Example	Comprehension	Example	Application	Example	Analysis	Example	Evaluation	Example	Synthesis	Example
Recall	Recall the names of at least 5 types of cosplay	Estimate	Estimate the value of each product over time	Create	Create a marketing plan	Relate	Relate their experience to that of a co-worker, friend, or relative	Judge	Judge a set of proposals and make a recommendation as to which team to hire	Create	Create a print advertisement
Express	Express the artistic goals of the author	Write	Write their own monthly health plan utilizing the principles of good nutrition	Choose	Choose the best business plan and defend their choice	Simplify	Simplify an article of their own choosing	Recommend	Recommend an appropriate anthropological research method	Generate	Generate a random number in Java
Label	Label each type of flower	Compare	Compare the depth of field of two photographs	Produce	Produce an original poem	Examine	Examine their own motivations in relation to the group project	Select	Select three interventions for the project team	Propose	Propose a marketing plan based customer data
Describe	Describe the major types of data collection used in the field	Give examples	Give examples of viral marketing	Use	Use a historical text to defend their position	Select	Select the most efficient supply chain	Evaluate	Evaluate the effectiveness of each personal statement and make recommendations for improvement	Select	Select an alternative health service
Define	Define photosynthesis	Demonstrate	Demonstrate the key principles of emotional intelligence	Compute	Compute correlation coefficients	Compare	Compare two works within a cultural period	Assess	Assess the effectiveness of the survey	Plan	Plan a hamlet route
Choose	Choose the best use of irons used in a variety of tests	Rewrite	Rewrite the definition of photosynthesis	Practice	Practice negotiation tactics in a simulation	Question	Question a hypothesis and develop a new argument	Rate	Rate the sustainability of landscaping proposal	Prepare	Prepare a report for the hypothetical board members
Repeat	Repeat the metre of the poem in their own work	Discuss	Discuss the impact of Assembly Bill 32	Demonstrate	Demonstrate their conflict resolution skills through a one on one simulation	Analyze	Analyze the data and provide recommendations	Propose	Propose an alternative solution based on their findings	Categorize	Categorize resources based on student grade level
Outline	Outline a business plan	Explain	Explain the difference between causal and correlational data	Build	Built a robot and film a video demonstration	Inspect	Inspect a product and identify strengths and weaknesses of the packaging	Prove	Prove the validity of their recommendation using real world data	Compose	Compose a song
Identify	Identify the key characteristics of vertebrates	Interpret	Interpret the data and explain its significance to potential customers	Operate	Operate the machine and describe their experience	Discriminate	Discriminate between body cues and facial expressions	Conclude	Conclude an argument using their negotiation skills	Develo	Develo a strategy
Order	Order the battles of the civil war	Defend	Defend their marketing plan	Write	Write a literature review	Plan	Plan an age-appropriate lesson based on the state adopted standards	Interpret	Interpret the text and summarize it in their native language	Formulate	Formulate a linear programming model
Relate	Relate the key themes of the Odyssey to a modern day text	Express	Express their opinions in a columnist essay	Calculate	Calculate the total revenue	Categorize	Categorize each photograph	Argue	Argue the usefulness of each data visualization	Recommend	Recommend a course of action based on the data
Name	Name all the planets in our solar system	Describe	Describe the key characteristics of 18th century victorian furniture	Employ	Employ classroom management techniques	Test	Test a theory by distributing, collecting, and interpreting the results of a survey	Determine	Determine the effect of temperature on North American conifers	Simplify	Simplify the health plan into a 10 minute presentation
Write	Write the definition of photosynthesis	Classify	Classify North American mammals	Prepare	Prepare an age-appropriate lesson based on the state adopted standards	Discover	Discover their own biases through dialogue and self reflection	Support	Support their argument with data visualizations	Synthesize	Synthesize their findings into a presentation
Explain	Explain the effective use of a paradox	Review	Review their classmate's work and identify areas for improvement	Illustrate	Illustrate the data using charts and graphs	Calculate	Calculate the yearly revenue	Attach	Attach an artist statement to each submission	Arrange	Arrange the statements into a logical order
State	State the key business metrics relevant to their plan	Distinguish	Distinguish between 18th and 17th century European paintings	Complete	Complete their own budget for a product rollout	Differentiate	Differentiate between causal and correlated data	Defend	Defend their thesis in a five page essay	Tell	Tell a potential customer why they should buy the product
Recognize	Recognize the key characteristics of a healthy weight loss plan	Paraphrase	Paraphrase journal articles	Interpret	Interpret the data and provide recommendations to potential customers	Appraise	Appraise the property value	Choose	Choose a resume appropriate for each job function	Combine	Combine the plans into one report
Memorize	Memorize the periodic table	Summarize	Summarize the work of a classmate	Show	Show their final advertisement to the class and explain the development process	Model	Model professional behavior	Justify	Justify their product through a market analysis	Design	Design a marketing campaign
Select	Select the best lesson plan for each age group	Predict	Predict weather patterns based on sample data	Apply	Apply the principles of contract law	Breakdown	Breakdown the argument into distinct assumptions	Compare	Compare supply chains	Revise	Revise a lesson plan for individual students
List	List the key provisions of the ethics in government act	Define	Define irony	Modify	Modify the formula to answer new managerial questions that might arise in the next period	Critique	Critique a detailed critique of historicism	Decide	Decide which candidate to defend	Assemble	Assemble an agile team for their product launch
Show	Show how their fitness plan meets current best practices	Infer	Infer the popularity of a product based on sample data			Solve	Solve a system of equations			Reorganize	Reorganize the statements into a coherent argument

Figure 14 - Learning outcomes examples of verbs + description

Use the table below as an aid in defining the learning objectives of each lesson you are designing.
The table consists in 3 rows for all six levels of Bloom's Taxonomy (LEVEL 1 column): modify the table according to your needs.
You can delete or add rows according to the objectives of the designed lesso

LEVEL 1 column	For each lesson, keep the levels you are interested in working on
LEVEL 2 column	**for each level, choose which actions correspond to the learning outcomes you want your students to achieve. Select the verb from the drop-down menu**
Description	**enter a clear sentence that describes the learning objective in detail**
NB	to display the drop-down menu click on the cell of the LEVEL 2 column on which you want to work: an arrow will appear to the right of the cell which, selected, will show

		Learning outcomes		
PILLAR TITLE				
		Level 1	**Level 2**	**Description**
	1	Knowledge	Describe	Describe the main characteristics of the ....
	1	Knowledge		...
	1	Knowledge		...
	2	Comprehension	Give examples	Give examples of the different applications...
	2	Comprehension		....
	2	Comprehension		....
	3	Application	Complete	Complete a program ...
	3	Application		....
	3	Application		...
	4	Analysis	Examine	Examine different articles....
	4	Analysis		...
	4	Analysis		....
	5	Evaluation	Select	Select the appropriate method for ...
	5	Evaluation		....
	5	Evaluation		....
	6	Synthesis	Propose	Propose a solution ...
	6	Synthesis		....
	6	Synthesis		...
PILLAR TITLE				
		Level 1	**Level 2**	**Description**
	1	Knowledge	Describe	Describe the main characteristics of the ....
	1	Knowledge		...
	1	Knowledge		...
	2	Comprehension	Give examples	Give examples of the different applications...
	2	Comprehension		....
	2	Comprehension		....
	3	Application	Complete	Complete a program ...
	3	Application		....
	3	Application		...
	4	Analysis	Examine	Examine different articles....
	4	Analysis		...
	4	Analysis		....
	5	Evaluation	Select	Select the appropriate method for ...
	5	Evaluation		....
	5	Evaluation		....
	6	Synthesis	Propose	Propose a solution ...
	6	Synthesis		....
	6	Synthesis		...

Figure 15 – Learning outcomes documents

How to use the tool

Each teaching member providing learning materials for the course should fill this Learning Outcomes Document that is meant to collect information on the learning outcomes of each specific lecture. Collecting the data, the HEIs leading the course can work on the syllabus and structure the digital platform, including this information for each module of the course.

6. Syllabus format

The syllabus is the document that welcomes and guides the students in the learning experience by explaining the contents and logistics of the course. A shared format to develop the syllabus is provided, including pre-filled parts to be edited and customized for each specific course. The format includes all the possible aspects that should be described to present the course. It is divided into four parts:

Part 1: Course Information

- Course Description
- Course Timing
- Background
- Course structure
- Indicative contents
- Learning and teaching methods
- Language
- Virtual Learning environment
- Course Requirements
    - System requirements
    - Software for digital and remote co-working
    - Software for project development
- Course Calendar
- Course Materials
- Teaching staff Information

Part 2: Course Objectives

- Learning Outcomes

Part 3: Topic Outline/Schedule

- Welcome
- Discover
- Define
- Design
- Deliver
- Interact

Part 4: Assessment method

    - POLITECNICO DI MILANO – SCHOOL OF DESIGN
    - UNIVERSITY OF THE ARTS LONDON – LONDON COLLEGE OF FASHION
    - HOGSKOLAN I BORAS - SWEDISH SCHOOL OF TEXTILES
    - TU/DELFT - INDUSTRIAL DESIGN ENGINEERING FACULTY
    - ECOLE SUPÉRIEURE DES TECHNOLOGIES INDUSTRIELLES AVANCÉES
- Course Quality Evaluation

Annex 2 – Syllabus Format (p.63)

Toolkit to prepare the lectures for the theoretical based part

This toolkit includes formats and instructions to produce learning materials supporting the lectures of the theoretical part. It is suggested to provide multiple materials such as:

- Presentation;
- Video;
- Script of the video lecture;
- Extra materials for deepening the course learning information;
- Peer review exercises tests;
- Multiple-choices questionnaire;
- Bibliography.

The teaching staff is invited to follow the format and instructions to provide a recognizable and uniform coordinated image of the provided materials to be used under the FTalliance project and shared as Open Educational Resources.

1. Lecture format

This tool is based on a .ppt presentation with graphic guidelines to layout the courses' lectures in a coordinated and recognizable format. It includes information regarding the structure of the lectures that could contain:

- one initial slide with the title of the lecture, the name of the speaker/teacher, and the affiliation;
- one presentation slide for the speaker/teacher to introduce her/himself;
- the table of contents of the lecture;
- the many possibilities of including contents (e.g., quotation, bullet points, descriptions, images, videos, etc.)

This presentation provides detailed information regarding the visual guidelines to be used in terms of a common format (16:9), colour codes, font guidelines and hierarchy (title, subtitle, texts), and the correct use of logos.

These guidelines will guarantee that each teacher/speaker will produce recognizable lecture material for the FTalliance three courses. In addition, an editing process will uniform more the materials for lectures to be included on the FTalliance platform as Open Educational Resources (OER).

For the final videos as OER, a short teaser has been designed and implemented to be included as an introduction to the lectures. This gives the opportunity to recognize every lecture as part of the materials provided by the FTalliance project with a recognizable graphic and format and provide the basic information about the activities and aims of the project. The teaser will be included once the educational materials has been selected and refined for publication on the FTalliance website.

Annex 3 – Lecture format (p.65)

2. Instructions filming guidelines

This document is intended to be a guide for the recording of the video lesson for the FTall

courses. It contains guidelines for the video settings and suggestions on how to set the environment for filming. The video recordings for the lecture materials will be archived in the Vimeo/YouTube channels and linked to the FTalliance website. Videos will be shot in a simple style to focus on contents, ensuring maximum cost efficiency.

Annex 4 - Instructions filming guidelines (p.67)

3. Multiple-choice questionnaire format

During the theoretical pillars, students should constantly receive feedback on their performance during class and within the entire course to feel the engagement on the lectures (even if asynchronous). The formative strategy considers activities regarding:

- Previous Knowledge Tests;
- Quizzes with multiple choice answers followed by self-evaluation information;
- Takeaway Tests;
- peer-assessment on exercise documentation that is a peer-to-peer assessment that should be developed during the realization of the module and is intended to build shared knowledge inside the classroom.

This format is for the teacher to include the three questions for each lecture to be followed by multiple-choice answers (with the indicated correct answer). The leading HEI should collect all these questions and create a questionnaire that is implemented to send direct self-evaluation information to students to their level of understanding of the lecture.

Annex 5 - Multiple Choice questionnaire (p. 69)

4. Video Lesson Script format

Extra materials to support and describe the lectures and video lectures could be provided to students using a common format. This in particular is useful to include the scripts of the video lectures. Furthermore, students could use this format to study the contents in an off-line mode and better understand the contents of a spoken lecture in case videos are not subtitled, and the speaker is not English – mother tongue.

Annex 6 - Video Lesson Script Format (p.70)

5. Bibliography Guidelines and Format

The documents have been provided to format the bibliographic references to be redacted in the same way by different teachers and lectures materials.

Annex 7 – Bibliography Guidelines and Format (p.71)

Toolkit to aid the challenge based part of the course

1. Collaborative digital board

This tool aims at student collaboration in a digital collective space to co-create shared and meaningful body of knowledge, interact to brainstorm, and creatively co-design a product/service/system (e.g. Miro, Mural, Conceptboard, Ziteboard, Whiteboard fox, Stormboard). These visual digital whiteboards are successfully used as project management tools to control the workflow of activities, as ideation tools to map and visualize ideas in early creative stages, and as co-design tools, allowing groups to modify output and edit in real-time or asynchronously and to facilitate consensus buildings.

A structure to guide the reviews and the tutoring activities during the challenge-based part has been provided to include materials of the courses (e.g., the logo of the project and header of the course, brief of the course, course calendar, brief presentations, and tutorials, teaching staff and invited committee and tutors). This aims to guide students during the different moments of tutoring, structuring what is required and supporting with extra didactic materials) and controlling the process of co-design among international and interdisciplinary groups' teammates and archiving the progress of these activities.

On the left side of the tool, in the column, there is the information related to the course. On the right side, a working area for students is organized in linear row for each group. From left to right, in chronological order, there are a series of charts to be filled before the reviews and to be shown during the reviews:

- Phase 0 - Icebreaking games for groups introduction and first activities together
- Phase 1 - Research, trend, and concept
- Phase 2 – Concept and project development
- Phase 3a - 3D modelling and virtual prototyping
- Phase 3b - Business management and innovation
- Mid-term review – presentation space
- Phase 4 – Developing, experimenting, testing
- Phase 5 – Finalising
- Final exam presentation space

For each review activity, the scopes and requests are evidenced through a series of pre-organized tables to be filled by students. There are also unstructured spaces left for open-brainstorming and students' collaboration and a space for writing / archiving feedback of both students and tutors during and after the reviews. The collaborative digital board (in Miro) is also important for students to work asynchronously when they have different academic commitments or time zones and for teaching staff from HEI and companies. They can leave their feedback in the specified space. The provided format is a structure that could be customized to fit the necessities (contents, structures, number of reviews, etc.) of every digital interdisciplinary and international learning experience. Some examples have been left from the previous course as guidance and explanation on how to use the template.

Operatively, since the boards will be filled with students' materials, we suggest leaving the graphic very basic. Besides, we suggest deciding the structure in the first row and repeating it by copying and pasting in the following rows that have been prepared for five groups. Once finalized the first board, we suggest to duplicate the board for the other five groups. The boards should be two for a total of 10 groups since the materials included in the board could be very heavy once filled to reduce the ability for students to effectively work together.

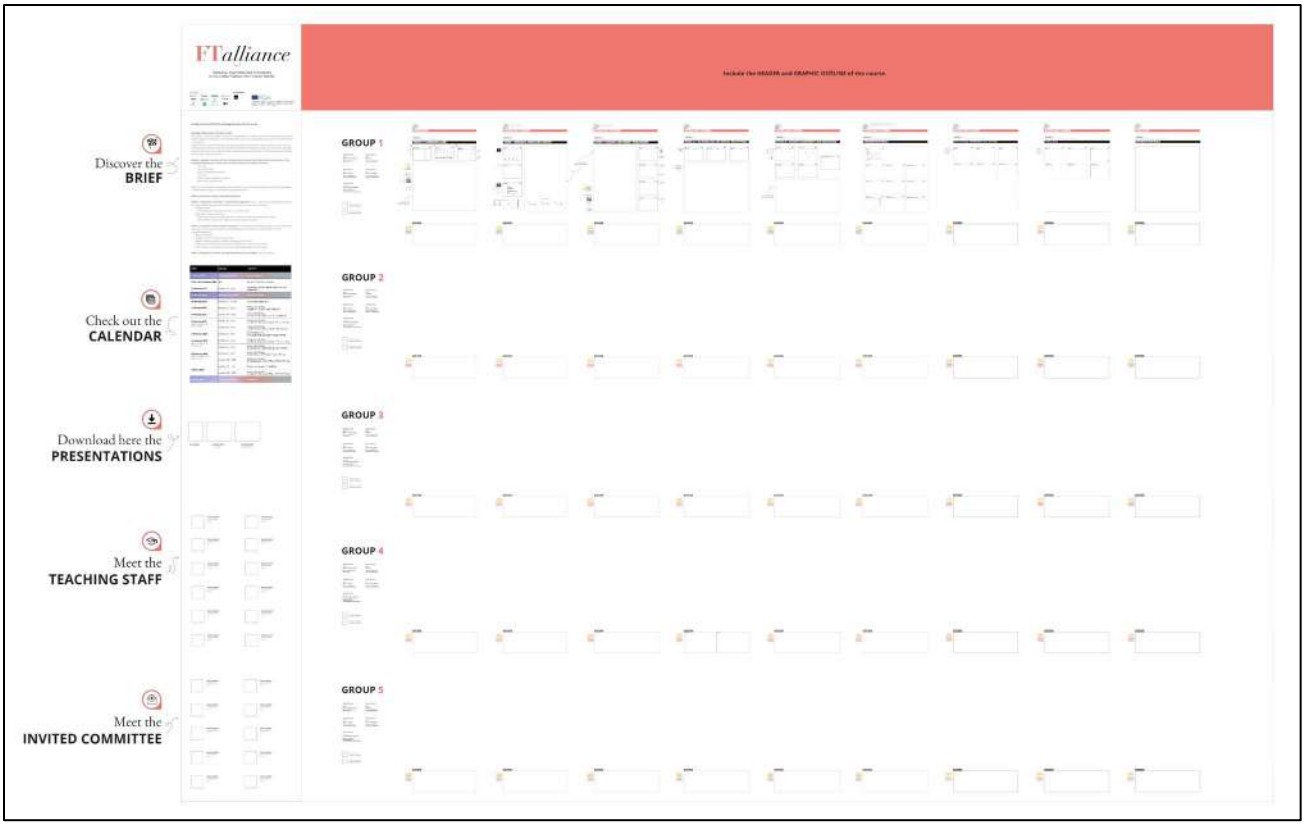


Figure 16 – Overview of the MIRO structure to be further customize for each course

Annex 8 – Miro board collaborative canvas structure (p. 73)

2. Final Report Format

This report format includes the contents necessary to be collected from each leading HEI to have recorded information of students' final results during the challenge-based part and the process they have followed. The format can be transformed, customized, and duplicated for different disciplines that are the main focus of the course. Different information can be collected according to what is necessary to describe the results of the course. The graphic is unique for the various reports of other disciplines (e.g., design, engineering, business management).

The design report is extensive and includes an abstract and images of the final results and the preliminary stages (including moodboard and sketches). It also asks for some pictures of the design process to be included in the report and some reflection at the end of the report focusing on the personal learning experience by different group members.

The design report is mandatory for student to conclude the course. The information contained in the report will be used not only to define the students' learning outcomes (and comparing different output from students) and to derive information for social media activities, the FTalliance platform, and the reporting of the FTalliance project.

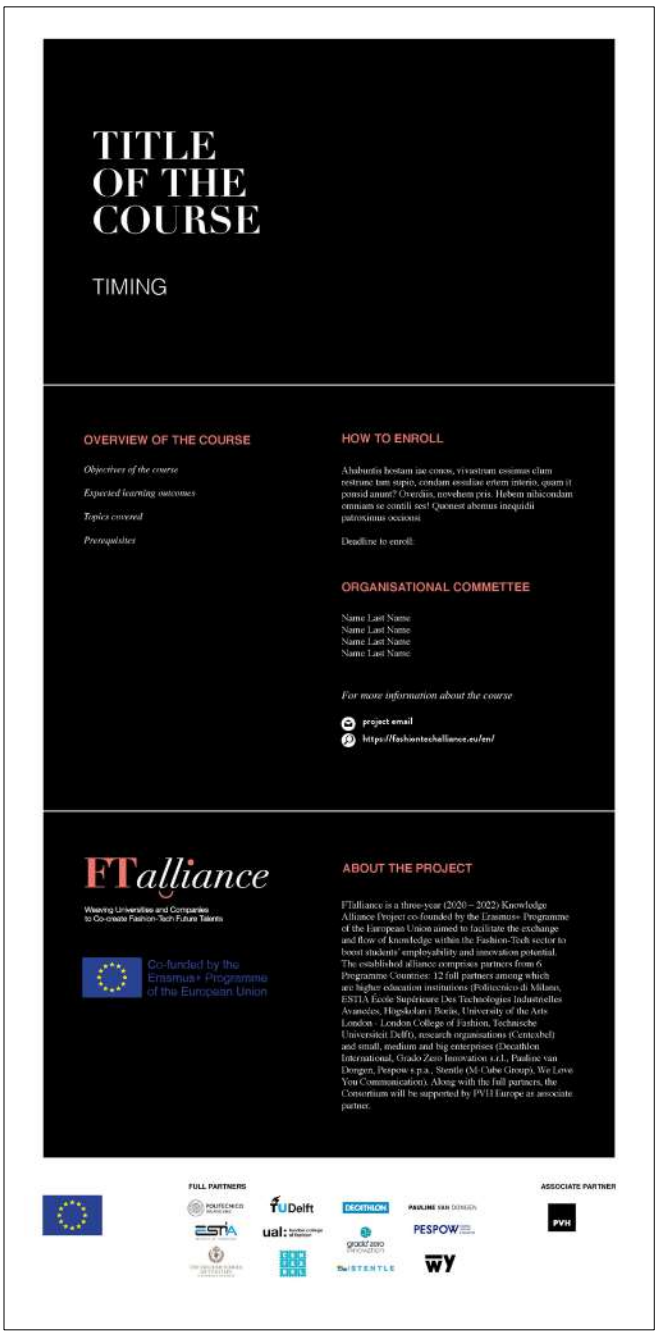
Annex 9 – Final report Format (p.86)

Toolkit to support the course promotion and diffusion

1. Course flyer format layout

This format aims to guide in the creation of the flyer for the promotion and diffusion of the courses to include general and shared information for all the HEIs such as the overview of the course and information regarding the modality of students enrolment that can change for the different HEIs and so customizable (e.g., credits, education cycle, main field of study, disciplinary domain, prerequisites, subject areas, grading scale, how to apply, number of students and the deadline for enrolment).

Here on the left side, the course flyer's format layout and, on the right side, an example of customizing the first course and a specific HEI. In addition, the indesign source file is provided for the second one for customization of the information and graphic of other courses.



REFERENCES

Anderson L.W. and Krathwohl D.R. (2001), A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives Edition: 1stPublisher: New York: Longman

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of college student personnel 25*(4), 297-308.

Axelson, R. D., & Flick, A. (2010). Defining Student Engagement. *Change: The Magazine of Higher Learning, 43*(1), 38-43. doi: 10.1080/00091383.2011.533096.

Bandura, A. (1977). Social Learning Theory. New York: General Learning Press.

Berrett D (2012). How 'flipping' the classroom can improve the traditional lecture. The Chronicle of Higher Education, Feb. 19, 2012.

Bloom, B. S.; Engelhart, M. D.; Furst, E. J.; Hill, W. H.; Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York: David McKay Company.

Branch, R. M., & Kopcha, T. J. (2014). Instructional design models. In Handbook of research on educational communications and technology (pp. 77-87). Springer New York.

Choi, B. C. K., & Pak, A. W. P. (2006). Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness. Clinical & Investigative Medicine, 29(6), 351–364.

Churches A. (2008) Bloom's Digital Taxonomy, https://www.pdst.ie/sites/default/files/BloomDigitalTaxonomy-AndrewChurches.pdf

Conklin, Jeff. 2005. Wicked Problems and Social Complexity. In from Dialogue Mapping: Building Shared Understanding of Wicked Problems:Wiley

Cross N. (2010), Designerly ways of knowing. London: Springer.

David, J. L. (2008) What Research Says About/Project-Based Learning, Educational Leadership Teaching Students to Think, 65(5), 80-82.

Driscoll, M., Carliner, S. (2005) Advanced Web-Based Training : Adapting Real World Strategies in Your Online Learning, Pfeiffer. ISBN 0787969796 p.9.

Hoskins, B. J. (2012). Connections, Engagement, and Presence. *The Journal of Continuing Higher Education, 60*(1), 51-53. doi:10.1080/07377363.2012.650573.

Kahn, P. E. (2014). Theorising student engagement in higher education. *British Educational Research Journal, 40*(6), 1005-1018. doi: 10.1002/berj.3121

Mazur E. (2009). Farewell, Lecture Science 323: 50-51.

Miao, F., Mishra, S.; McGreal, R, (2016). Open educational resources: policy, costs, transformation. Paris, UNESCO. pp. 8, 17, 20–21. ISBN 978-92-3-100158-1.

Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education, 3*(2), 1-7. doi: 10.1080/08923648909526659

Nelson H. and Stolterman E. (2003) "The design way: Intentional change in an unpredictable world: Foundations and fundamentals of design competence", Educational Technology.

Nichols, M. H., Cator, K. (2009), Challenge Based Learning White Paper. Cupertino, California: Apple, Inc.

Nichols, M. H., Cator, K., Torres, M. and Henderson, D. (2016) Challenge Based Learner User Guide. Redwood City, CA: Digital Promise.

Oxman N., "Age of Entanglement", Journal of Design and Science. 2016 Available: https://doi.org/10.21428/7e0583ad

Sancassani, S. et al. (2019). Progettare l'innovazione didattica. Pearson. Milano

Siemens, G. (2002). Instructional design in elearning. Retrieved January, 21

Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The Challenges of Defining and Measuring Student Engagement in Science. *Educational Psychologist, 50*(1), 1-13. doi: 10.1080/00461520.2014.1002924.

Smith, P. L., & Ragan, T. J. (2005). Instructional Design (Third ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Stember, M. (1991). Advancing the social sciences through the interdisciplinary enterprise. The Social Science Journal, 28(1), 1–14. https://doi.org/10.1016/0362-3319(91)90040-B

Tinto, V. (2006). Research and practice of student retention: what next?. *Journal of College Student Retention: Research, Theory & Practice, 8*(1), 1-19.

Yates, J. (2014). Synchronous online CPD: empirical support for the value of webinars in career settings. *British Journal of Guidance & Counselling, 42*(3), 245-260. doi: 10.1080/03069885.2014.880829

Wallace, R. M. (2003). Online Learning in Higher Education: a review of research on interactions among teachers and students. *Education, Communication & Information, 3*(2), 241-280. doi: 10.1080/14636310303143

Zepke, N. (2014). Student engagement research in higher education: questioning an academic orthodoxy. *Teaching in Higher Education, 19*(6), 697-708. doi: 10.1080/13562517.2014.901956

ANNEX

Annex 1 – Organizational Course Sheet

Project Number 612662-EPP-1-2019-1-IT-EPPKA2-KA - FTall
Course Sheet

FTalliance

ORGANIZATIONAL COURSE SHEET

To be filled by each Institution leading the Course

About the course

Title of the course *	
Abstract of the course / Course description (250 words) *	
Course Timing (from/to)*	
Institution leading the course organization *	
Organization committee Name Surname (Role) *	
Participating Institutions *	
Academic Instructors and Tutors Name Surname – Role - Expertise	
Company Partners * Name Surname – Role - Expertise	
Topics covered *	
Objectives of the course *	
Expected learning outcomes *	
Assessment method	
Bibliography	
Website bibliography	
Video bibliography	

1

Co-funded by the Erasmus+ Programme of the European Union

Project Number 612662-EPP-1-2019-1-IT-EPPKA2-KA - FTall
Course Sheet

FTalliance

Graphic Material *:

Please include 3 images to be used for the course advertisement and for the Website
(High resolution version - 300 dpi x 15 cm –to be uploaded here: https://bit.ly/2AbInta)

About the Course Outline /Schedule

Weeks	Modules	Topics	Activities	Synch (S) / asynch (A)	Teaching/tutoring Hours	Learning / Studying Hours

About the students

How to enroll	
Prerequisites and background knowledge	

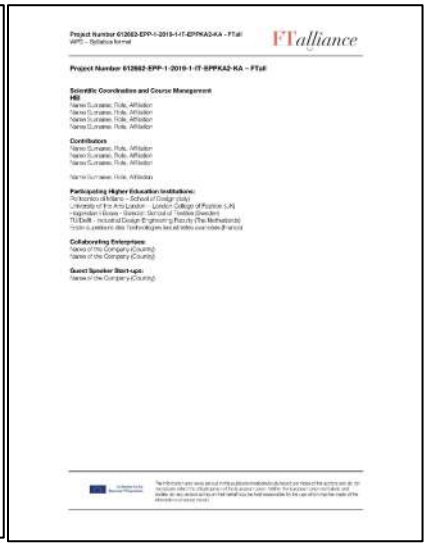
* basic information required to start the promotion of the courses on-line

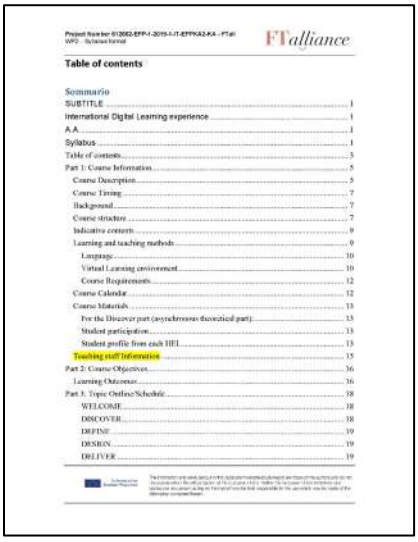
2

Co-funded by the Erasmus+ Programme of the European Union

Annex 2 – Syllabus Format


TITLE OF THE COURSE
SUBTITLE
International Digital Learning experience
A.A.
Syllabus


Project Number 612662-EPP-1-2019-1-IT-EPPKA2-KA – FTall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Part 1: Course Information

Course Description

The course focuses on the field of Fashion-Tech exploring how fashion and technology are interconnected within different domains, and how their interconnection is transforming the design, prototyping, production, sales and distribution processes. The course aims to understand the impact of digital co-creation technologies in the Fashion sector, focusing on the potential application of Cloud-based technologies, that are changing the fashion design, supply and production chains and the way today's fashion businesses operate, for faster, smarter, more efficient and sustainable garments.
Contents will be delivered through a preliminary theoretical part aimed to level the knowledge of the students as a prerequisite for the practical and challenge-based part of the course.
The course develops in 10 hours (8 weeks) delivering the knowledge and understanding of new ways to design a fashion product that integrates and interfaces with digital technologies of various types through lectures about theory and application examples, lectures about tools and software to be used, and preparatory applicative exercises about the following topics: digital modelling and prototyping, materials digitalization (including smart and eco-sustainable materials), garment's style and functions simulation, advanced manufacturing, wearable sensors and technology.
Students have the opportunity to work in interdisciplinary and international groups to experience the process and the methodological approach of a project development activity that includes design, engineering, product life management, costing and pricing, research and materials management. Students will be selected from

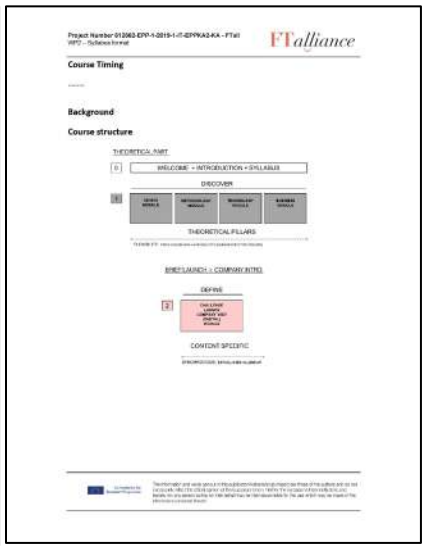
- Politecnico di Milano – School of Design (Italy),
- University of the Arts London – London College of Fashion (UK),
- Högskolan i Borås - Swedish School of Textiles (Sweden),
- TU/Delft - Industrial Design Engineering Faculty (The Netherlands)
- Ecole supérieure des Technologies industrielles avancées (France).

Besides, students will also be introduced to innovative ways of teaching that are based on digital tools used both to deliver the course and to develop project-work and group collaboration between teammates.

SUPPORTING AND COLLABORATING COMPANIES
The course is partnered with....

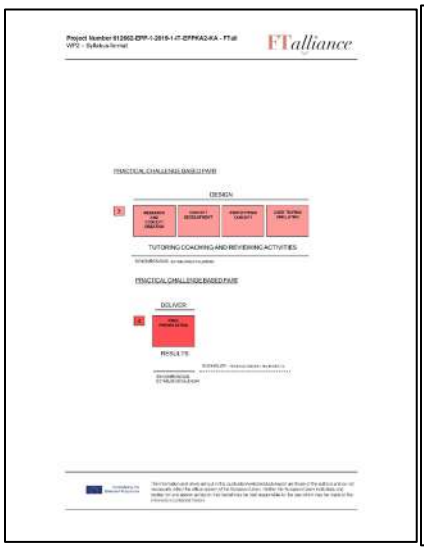
Partner description

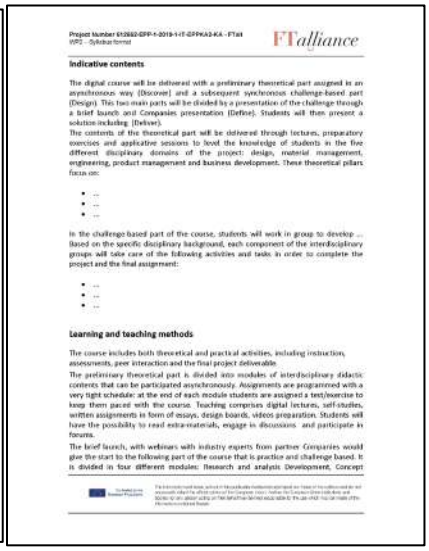
Other participants


Course Timing

Background

Course structure




Indicative contents

The digital course will be delivered with a preliminary theoretical part assigned in an asynchronous way (Discover) and a subsequent synchronous challenge-based part (Design). This two-main parts will be divided by a presentation of the challenge through a brief launch and Companies presentation (Define). Students will then present a solution including (Deliver).
The contents of the theoretical part will be delivered through lectures, preparatory exercises and applicative sessions to level the knowledge of students in the five different disciplinary domains of the project: design, material management, engineering, product management and business development. These theoretical pillars focus on:

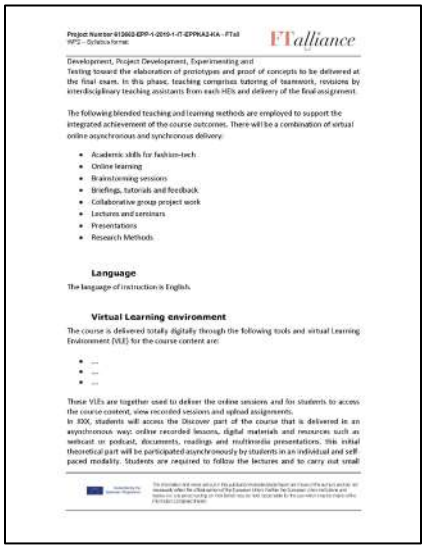
- ...
- ...
- ...

In the challenge based part of the course, students will work in group to develop ... based on the specific disciplinary background, each component of the interdisciplinary groups will take care of the following activities and tasks in order to complete the project and the final assignment:

- ...
- ...
- ...

Learning and teaching methods

The course includes both theoretical and practical activities, including instruction, assessments, peer interaction and the final project deliverable.
The preliminary theoretical part is divided into modules of interdisciplinary didactic contents that can be participated asynchronously. Assignments are programmed with a very tight schedule: at the end of each module students are assigned a test/exercise to keep them paced with the course. Teaching comprises digital lectures, self-studies, written assignments in form of essays, design boards, videos preparation. Students will have the possibility to read extra-materials, engage in discussions and participate in forums.
The brief launch, with webinars with industry experts from partner Companies would give the start to the following part of the course that is practice and challenge based. It is divided in four different modules: Research and analysis Development, Concept


Development, Project Development, Experimenting and
Testing toward the elaboration of prototypes and proof of concepts to be delivered at the final exam. In this phase, teaching comprises tutoring of teamwork, revisions by interdisciplinary teaching assistants from each HEIs and delivery of the final assignment.

The following blended teaching and learning methods are employed to support the integrated achievement of the course outcomes. There will be a combination of virtual online asynchronous and synchronous delivery:

- Academic skills for fashion-tech
- Online learning
- Brainstorming sessions
- Briefings, tutorials and feedback
- Collaborative group project work
- Lectures and seminars
- Presentations
- Research Methods

Language
The language of instruction is English.

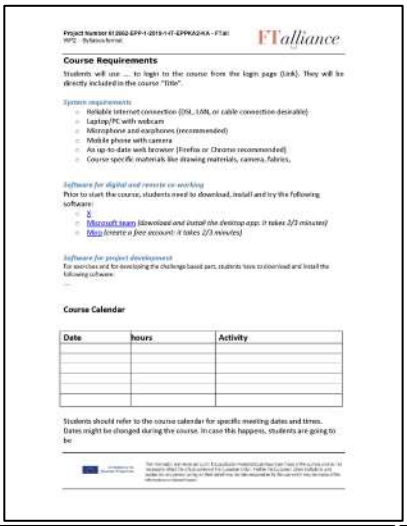
Virtual Learning environment
The course is delivered totally digitally through the following tools and virtual Learning Environment (VLE) for the course content are:

- ...
- ...
- ...

These VLEs are together used to deliver the online sessions and for students to access the course content, view recorded sessions and upload assignments.
In XXX, students will access the Discover part of the course that is delivered in an asynchronous way: online recorded lessons, digital materials and resources such as webcast or podcast, documents, readings and multimedia presentations. This initial theoretical part will be participated asynchronously by students in an individual and self-paced modality. Students are required to follow the lectures and to carry out small


tests, assignments and exercises to assess their achievements and preparation on the specified topics. This preliminary preparation need to be achieved due to a deadline that will be common to all the participating students from the different HEIs. In this phase, students are also required to participate to different activities of interaction on the platform XXX.
These will consist of chat, blogs, forums for a curated online discussion aimed at communicating with course peers during this individual phase to exchange course materials, information, insights, results of the assignments and to start to know each other.
At a designated (common) time throughout the course, students will be challenged with a specific brief presented by the two companies of the Fashion-Tech industry and will be focused on the development of a Fashion-Tech concept. Online webinars from experts will be delivered, allowing students to gather direct information and to ask questions/interact.
From then on, students will would work synchronically in multidisciplinary international groups with a practical assignment to be developed (problem-based learning). They will participate in group paced activities using alternative internet-based technologies which allow better remote collaboration. The VLEs required for working together remotely, for setting up a remote team culture, for managing the project and delivering the project passing through iterative phases of research, concept development, project development, prototyping, testing are XXXX together with Miro. On these two platforms, students are working together and are supported by tutors for reviewing the project phases.

During the overall duration of the course, teachers will be academics and professionals from the Company. Tutors from each HEIs will be available for supporting the reviews to cover different topics and disciplines. The final exam will be delivered digitally and remotely by groups as a digital exhibit and/or presentation.


Course Requirements

Students will use ... to login to the course from the login page (Link). They will be directly included in the course "title".

System requirements

- Reliable internet connection (DSL, LAN, or cable connection desirable)
- Laptop/PC with webcam
- Microphone and earphones (recommended)
- Mobile phone with camera
- An up-to-date web browser (Firefox or Chrome recommended)
- Course specific materials like drawing materials, camera, fabrics,

Software for digital and remote co-working

Prior to start the course, students need to download, install and try the following software:

- X
- Microsoft team (*download and install the desktop app: it takes 2/3 minutes*)
- Miro (*create a free account: it takes 2/3 minutes*)

Software for project development

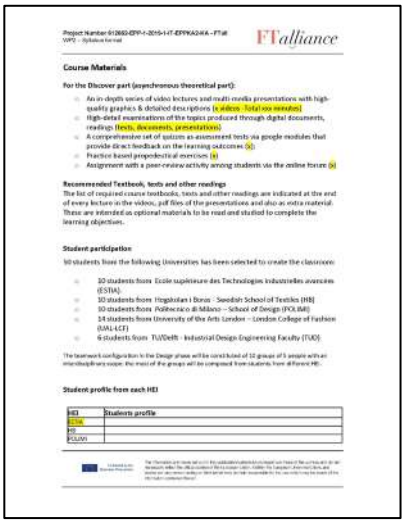
For exercises and for developing the challenge based part, students have to download and install the following software:

...

Course Calendar

Date	hours	Activity

Students should refer to the course calendar for specific meeting dates and times.
Dates might be changed during the course. In case this happens, students are going to be


Course Materials

For the Discover part (asynchronous theoretical part):

- An in-depth series of video lectures and multi-media presentations with high-quality graphics & detailed descriptions (x videos - Total xxx minutes).
- High-detail examinations of the topics produced through digital documents, readings (texts, documents, presentations).
- A comprehensive set of quizzes as assessment tests via google modules that provide direct feedback on the learning outcomes (x).
- Practice based propedeutical exercises (x)
- Assignment with a peer-review activity among students via the online forum (x)

Recommended Textbook, texts and other readings

The list of required course textbooks, texts and other readings are indicated at the end of every lecture in the videos, pdf files of the presentations and also as extra material. These are intended as optional materials to be read and studied to complete the learning objectives.

Student participation

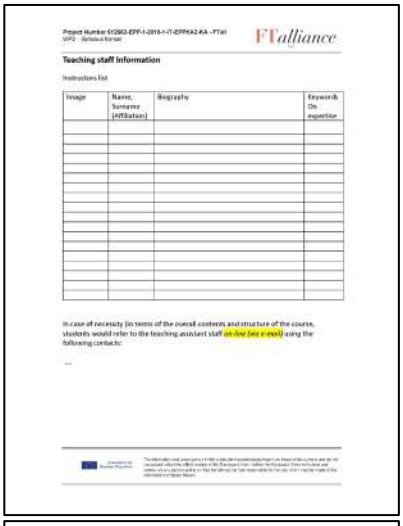
10 students from the following Universities has been selected to create the classroom:

- 10 students from Ecole supérieure des Technologies Industrielles avancées (ESTIA).
- 10 students from Högskolan I Borås - Swedish School of Textiles (HB)
- 10 students from Politecnico di Milano – School of Design (POLIMI)
- 14 students from University of the Arts London – London College of Fashion (UAL-LCF)
- 6 students from TU/Delft - Industrial Design Engineering Faculty (TUD)

The teamwork configuration in the Design phase will be constituted of 12 groups of 5 people with an interdisciplinary scope: the most of the groups will be composed from students from different HEI.

Student profile from each HEI

HEI	Students profile
ESTIA	
HB	
POLIMI	


Teaching staff Information

Instructors list

Image	Name, Surname (Affiliation)	Biography	Keywords On expertise

In case of necessity (in terms of the overall contents and structure of the course, students would refer to the teaching assistant staff on line (via e-mail) using the following contacts:

...


Part 2: Course Objectives

The general purpose of the course is to train professionals who are able to employ the potentials of digital technologies in the domain of fashion, to drive design processes in multidisciplinary contexts.
To this end, the course, through an innovative way of teaching, will provide students with useful tools and skills to critically interpret the project dimension within the broader context of social, cultural, and technological contemporary shifts (new lifestyles and needs, new typological configurations and innovative technological scenarios).
In particular digital theoretical lessons, preparatory exercises and application sessions will be delivered to transfer students knowledge on how fashion and digital technologies are interconnected, the potential as well as the limitations of this interconnection and how their interconnection is transforming the entire value chain, from ideation to production, from retail to communication.
The challenge-based part of the course will be addressed to explore the potential of interdisciplinary teamwork practice activities where students will be asked to develop a project, a capsule collection made of one to three products of outerwear, with particular attention both to creative/stylish aspects as well as to functional, structural and technical ones.
From product ideation, design and engineering phases, to business model strategy development, students will be asked to explore and exploit the potential of advanced prototyping and digital rendering tools, developing 3D models and identifying and critically evaluate 3D software tools, as well as the implications of digitalization and virtualization of the design process in relation to the innovation of the product development management.
Hence, the challenge-based phase aims at training adaptive professionals able to collaborate to deliver a project in the field of fashion tech, as in those sectors requiring the combination of a creative attitude and knowledge on technical materials and innovative technologies, interacting with other professionals.

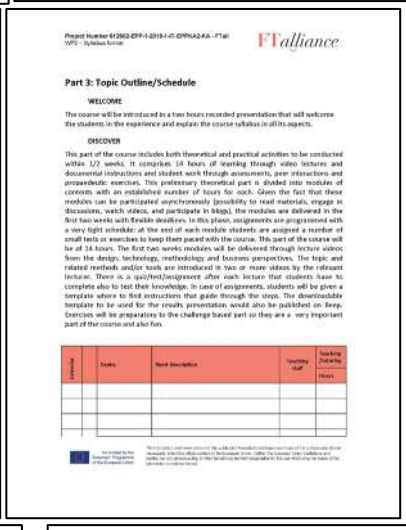
Learning Outcomes

Upon successful completion of the unit the students will deepen the impacts of the digital twin toward 3D applications in fashion, exploring its transformation in design, production, distribution, business management and sales processes. The students will improve in the following sectors:

Knowledge and understanding

...

Skills and abilities


Part 3: Topic Outline/Schedule

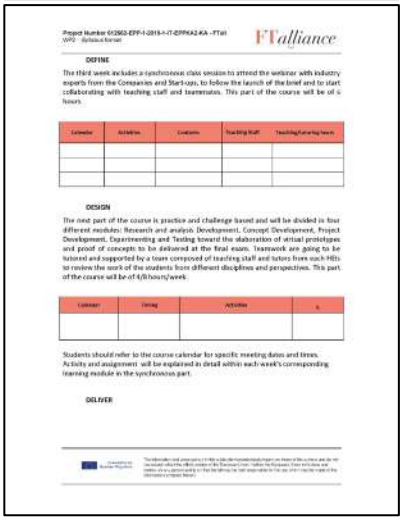
WELCOME

The course will be introduced in a two hours recorded presentation that will welcome the students in the experience and explain the course syllabus in all its aspects.

DISCOVER

This part of the course includes both theoretical and practical activities to be conducted within 1/2 weeks. It comprises 14 hours of learning through video lectures and documental instructions and student work through assessments, peer interactions and propaedeutic exercises. This preliminary theoretical part is divided into modules of contents with an established number of hours for each. Given the fact that these modules can be participated asynchronously (possibility to read materials, engage in discussions, watch videos, and participate in blogs), the modules are delivered in the first two weeks with flexible deadlines. In this phase, assignments are programmed with a very tight schedule: at the end of each module students are assigned a number of small tests or exercises to keep them paced with the course. This part of the course will be of 14 hours. The first two weeks modules will be delivered through lecture videos from the design, technology, methodology and business perspectives. The topic and related methods and/or tools are introduced in two or more videos by the relevant lecturer. There is a quiz/test/assignment after each lecture that students have to complete also to test their knowledge. In case of assignments, students will be given a template where to find instructions that guide through the steps. The downloadable template to be used for the results presentation would also be published on Beep. Exercises will be preparatory to the challenge based part so they are a very important part of the course and also fun.

Calendar	Topics	Short description	Teaching Staff	Teaching/ Tutoring Hours


DEFINE

The third week includes a synchronous class session to attend the webinar with industry experts from the Companies and Start-ups, to follow the launch of the brief and to start collaborating with teaching staff and teammates. This part of the course will be of 6 hours.

Calendar	Activities	Locations	Teaching Staff	Teaching/Tutoring hours

DESIGN

The next part of the course is practice and challenge based and will be divided in four different modules: Research and analysis, Development, Concept Development, Project Development. Experimenting and Testing toward the elaboration of virtual prototypes and proof of concepts to be delivered at the final exam. Teamwork are going to be tutored and supported by a team composed of teaching staff and tutors from each HEIs to review the work of the students from different disciplines and perspectives. This part of the course will be of 4/8 hours/week.

Calendar	Timing	Activities	n.

Students should refer to the course calendar for specific meeting dates and times.
Activity and assignment will be explained in detail within each week's corresponding learning module in the synchronous part.

DELIVER


Assignments and Deliverables of the Discover part (theoretical)

Uploading
Please follow the instructions in the assignments to understand what is required as assignment for each lecture and module of the theoretical pillars.

Answering to questionnaires
You will be given a link to google quiz with a questionnaire to be filled after the lectures.

Uploading materials (assignments and exercises)
There are multiple ways to upload your work:

- In specific folders (homework) uploading any kind of file format up to 52 MB (preferably compressed files in .pdf format. You might use www.ilovepdf.com).
- In forum discussions providing either texts and images. Images can be uploaded using an on-line Url link (by using for example:). The procedure is that images have to be firstly published on-line to create the url to be posted in the discussion to be visible on the forum.

Share your work

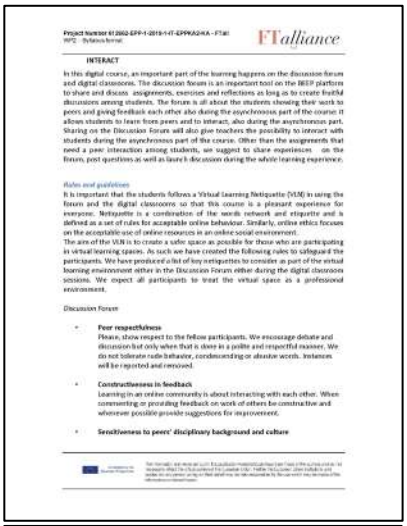
If you want to get direct feedback from your peers (as required in some assignments and activities) please do it in an open conversation using the Interact section of XXX. We suggest students to share their work on the discussion forum (INTERACT in XXX) when required for the assignments of the asynchronous phase (DISCOVER) but also in proactively creating new discussions in the forum.

You will also be required to work together as a classroom and as a group (during the challenge-based part) on a visual collaborative board (using MIRO) that is commonly shared between groups. This is giving the opportunity to collaborate as a team in a unique space but also as a classroom because you will be allowed to see others' activities and feedback (and provide feedback as well).

Assignment and deliverables of the Design Part (challenge based)

Templates
A deliverable template is defined for every review session during the DESIGN phase using the Miro Board collaborative space. These templates will act as a guideline of the process of design for students toward the final presentation.
Presentation
You are required to make a final presentation that shows the design process and the project finalization. The table of content of the presentation would include: Concept definition and design of the collection/products. 3D modelling and prototyping the


collection/products, including Fitting and Ergonomics
modelling, Materials digitalization, visualization and simulation, in both style and functional perspectives, Business development and model innovation and Project management innovation.
Video
You are required to make a final video of your project in which you discuss your output. Please make sure your video has a maximum length of 3 minutes. If you place your video file on an online streamer (for example Youtube or Vimeo) double-check if it works and if it is available for anyone watch. While making a video make sure if there is enough light and that you talk clearly.



INTERACT

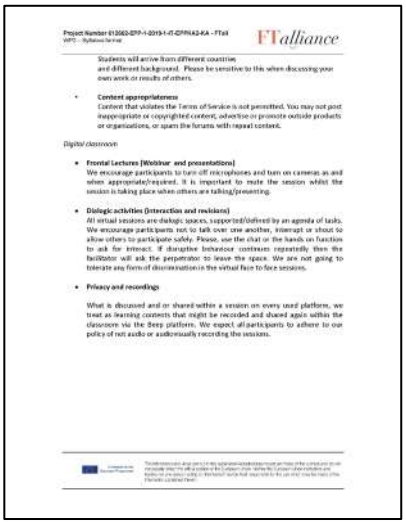
In this digital course, an important part of the learning happens on the discussion forum and digital classrooms. The discussion forum is an important tool on the BEEP platform to share and discuss assignments, exercises and reflections as long as to create fruitful discussions among students. The forum is all about the students showing their work to peers and giving feedback each other also during the asynchronous part of the course it allows students to learn from peers and to interact, also during the asynchronous part. Sharing on the Discussion Forum will also give teachers the possibility to interact with students during the asynchronous part of the course. Other than the assignments that need a peer interaction among students, we suggest to share experiences on the forum, post questions as well as launch discussion during the whole learning experience.

Rules and guidelines

It is important that the students follows a Virtual Learning Netiquette (VLN) in using the forum and the digital classrooms so that this course is a pleasant experience for everyone. Netiquette is a combination of the words network and etiquette and is defined as a set of rules for acceptable online behaviour. Similarly, online ethics focuses on the acceptable use of online resources in an online social environment.
The aim of the VLN is to create a safer space as possible for those who are participating in virtual learning spaces. As such we have created the following rules to safeguard the participants. We have produced a list of key netiquettes to consider as part of the virtual learning environment either in the Discussion Forum either during the digital classroom sessions. We expect all participants to treat the virtual space as a professional environment.

Discussion Forum

- **Peer respectfulness**
  Please, show respect to the fellow participants. We encourage debate and discussion but only when that is done in a polite and respectful manner. We do not tolerate rude behavior, condescending or abusive words. Instances will be reported and removed.
- **Constructiveness in feedback**
  Learning in an online community is about interacting with each other. When commenting or providing feedback on work of others be constructive and whenever possible provide suggestions for improvement.
- **Sensitiveness to peers' disciplinary background and culture**



Students will arrive from different countries
and different background. Please be sensitive to this when discussing your own work or results of others.

- **Content appropriateness**
  Content that violates the Terms of Service is not permitted. You may not post inappropriate or copyrighted content, advertise or promote outside products or organizations, or spam the forums with repeat content.

Digital classroom

- **Frontal Lectures (Webinar and presentations)**
  We encourage participants to turn off microphones and turn on cameras as and when appropriate/required. It is important to mute the session whilst the session is taking place when others are talking/presenting.
- **Dialogic activities (interaction and revisions)**
  All virtual sessions are dialogic spaces, supported/defined by an agenda of tasks. We encourage participants not to talk over one another, interrupt or shout so allow others to participate safely. Please, use the chat or the hands on function to ask for interact. If disruptive behaviour continues repeatedly then the facilitator will ask the perpetrator to leave the space. We are not going to tolerate any form of discrimination in the virtual face to face sessions.
- **Privacy and recordings**

  What is discussed and or shared within a session on every used platform, we treat as learning contents that might be recorded and shared again within the classroom via the Beep platform. We expect all participants to adhere to our policy of not audio or audiovisually recording the sessions.

Part 4: Assessment method

Students would work either individually (in the asynchronous part: DISCOVER) either in teams (in the synchronous part: DEFINE, DESIGN and DELIVER), individually they are required to follow the lectures, participate to experts webinar and to carry out individual assignment such as exercises and tests. The individual work will be evaluated through the individual assignments.

In teams they are required to develop a Fashion Tech project, participate to reviews and deliver the final project. They are going to work with their teammates by using the digital tools. During working hours each team will meet professors, experts and coaching assistants to present their work-in-progress. Sometimes these meeting would be informal reviews, to help the development of the project. Some other meeting would have the shape of real-term assessment to verify if the main project milestones are achieved and also if some needs or problems occurred. The teamwork will be evaluated with a final presentation on a digital platform. The final exam will be held in the form of a digital exhibition/presentation.

Students will pass the course if they through a combination of the following activities in this course:

- Attending the theoretical modules
- Completing the quiz and evaluation tests
- Participating actively to the available platforms for peer interaction
- Completing the assignments timely and qualitatively
- Participating to the reviews sessions
- Delivering the final assignment (exam)

Each HEIs will formalize the modality of evaluation of the course for their students:

POLITECNICO DI MILANO – SCHOOL OF DESIGN

UNIVERSITY OF THE ARTS LONDON – LONDON COLLEGE OF FASHION

HOGSKOLAN I BORAS - SWEDISH SCHOOL OF TEXTILES

TU/DELFT - INDUSTRIAL DESIGN ENGINEERING FACULTY

ECOLE SUPÉRIEURE DES TECHNOLOGIES INDUSTRIELLES AVANCÉES

Course Quality Evaluation

Before the end of the course, you will be required to complete a questionnaire for course evaluation that will ask your opinion related to the overall experience to understand your perspective in terms of Context Specific Quality, Knowledge sharing efficacy, Quality of coaching and Satisfaction with educational experiences. Part of the questionnaire will also focus on the importance of this course for your future profession and asks your perspective in terms of improved skills and competences and in terms of relevance of skills for future profession and employability.

Important Note: This syllabus, along with course assignments and due dates, are subject to change. It is the student's responsibility to check the platform on Beep for corrections or updates to the syllabus. Any changes will be clearly noted in course announcements or through email.

Annex 3 – Lecture format

SUGGESTION FOR THE STRUCTURE

- *The goal of this lecture…*
- Presentation: *Hi my name is…* (presentation of teacher) and presentation of lecture general topic
- Present the table of content
- Body of the lecture (consider to start with a case study or a question, to obtain students' attention)
- Conclusion: *During this lecture we have explored…* (short recap of the lecture)

HOW TO USE THIS TEMPLATE (1/3)

- Font DIDOT for slide main title size 48 pt
- Font HELVETICA for other texts size:
  - Minimum size: 20 pt
  - Medium size: 28 pt
  - Maximum size: 40 pt
- Make it visual and dynamic, using scheme, images and keywords.
- We suggest the use of black (RGB 0 – 0 – 0) pink (RGB 237 – 111 – 102) as colors for icons or keywords.

HOW TO USE THIS TEMPLATE (2/3)

The videos will include your:
(A) recorded speech (as audio)
(B) your recorded image while speaking
(C) your slides that is synchronised with the audio

The slides should take a large enough portion of the screen to be readable.

HOW TO USE THIS TEMPLATE (3/3)

You can
- insert the icon on the left bottom.
- half-half
- interchanging between person speaking and slides

Name Surname
X Department
Organization

Name Surname // Title of the Lecture

TITLE OF THE LECTURE

Name Lastname Lecturer/s
Affiliation

TITLE

Here you can use list, or plain text

Name Surname // Title of the Lecture

"This is a short quote: sometimes, a few words can sum up the wisdom of a thousand"

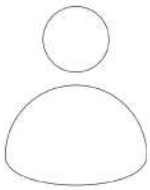
Reference information

Name Surname // Title of the Lecture

"This is a short quote: sometimes, a few words can sum up the wisdom of a thousand"

Reference information

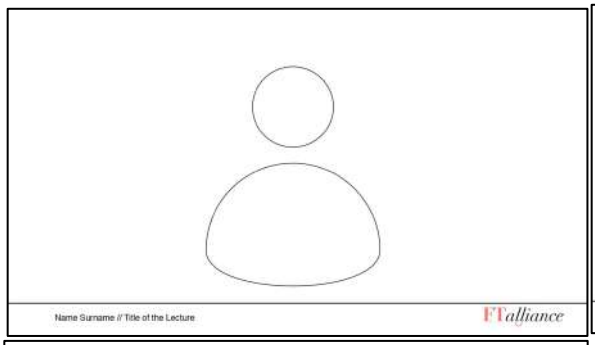
Name Surname // Title of the Lecture

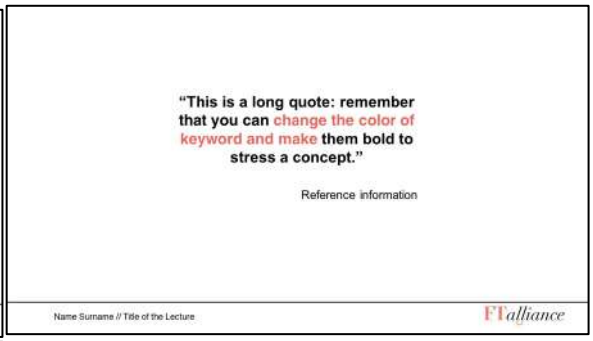


"This is a short quote: sometimes, a few words can sum up the wisdom of a thousand"

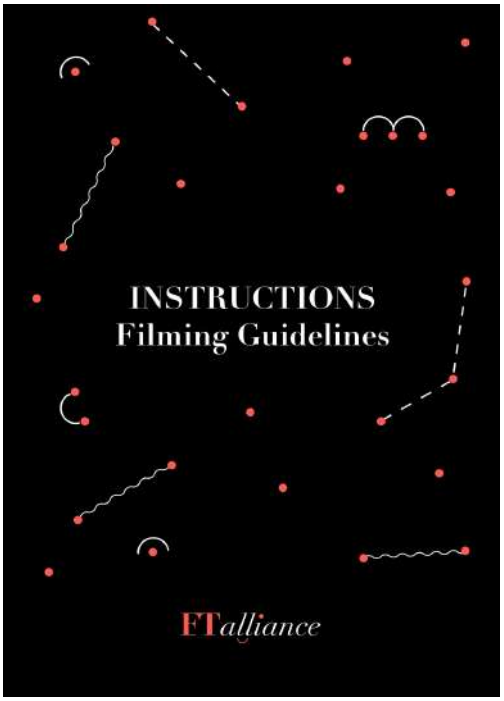
Reference information

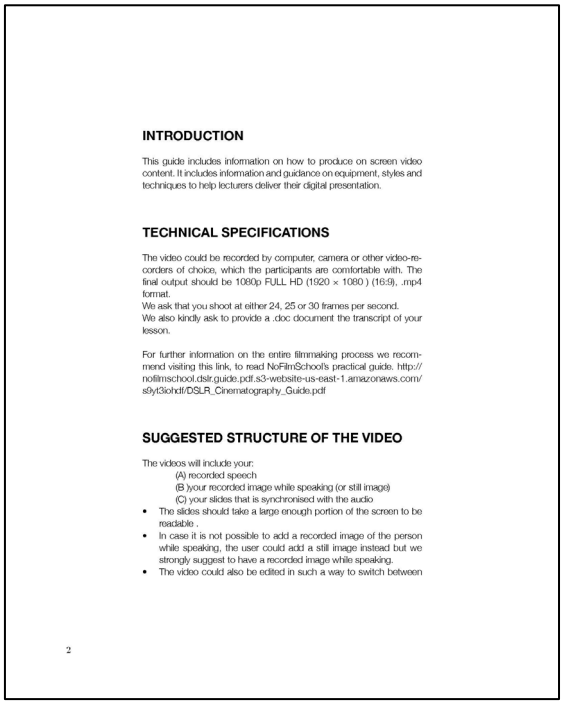
Name Surname // Title of the Lecture





Annex 4 - Instructions filming guidelines





INTRODUCTION

This guide includes information on how to produce on screen video content. It includes information and guidance on equipment, styles and techniques to help lecturers deliver their digital presentation.

TECHNICAL SPECIFICATIONS

The video could be recorded by computer, camera or other video-recorders of choice, which the participants are comfortable with. The final output should be 1080p FULL HD (1920 × 1080) (16:9), .mp4 format.
We ask that you shoot at either 24, 25 or 30 frames per second.
We also kindly ask to provide a .doc document the transcript of your lesson.

For further information on the entire filmmaking process we recommend visiting this link, to read NoFilmSchool's practical guide. http://nofilmschool.dslr.guide.pdf.s3-website-us-east-1.amazonaws.com/s9yt3iohdf/DSLR_Cinematography_Guide.pdf

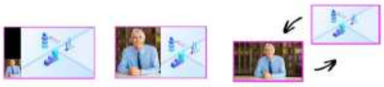
SUGGESTED STRUCTURE OF THE VIDEO

The videos will include your:
(A) recorded speech
(B)your recorded image while speaking (or still image)
(C) your slides that is synchronised with the audio

- The slides should take a large enough portion of the screen to be readable .
- In case it is not possible to add a recorded image of the person while speaking, the user could add a still image instead but we strongly suggest to have a recorded image while speaking.
- The video could also be edited in such a way to switch between

2

image of the content (slides) and image of the person speaking.



SETTING AND LIGHTING

We recommend a neutral background and choosing a location where you will not be interrupted and where it is quite.

- Be sure to sit near a light source like a window or lamp with the light shining on your face.
- Try to use either natural light (from a window) or an artificial light source; if possible, do not mix natural and artificial light sources, as doing so can make your images grainy.
- It is good to have at least one light source on your face at a forty-five degree angle. You may want to trythree-point lighting, which is common in film and video productions, but a single source of light is sufficient.
- We recommend filming at the "magic hour" just before dusk for the best natural light.

Easy light setup to improve your films: https://www.youtube.com/watch?v=NVlbizZn0M

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INSTRUCTIONS / Filming Guidelines

SOUND

When it comes to audio it is important to try to get the highest quality recording you can. Where possible you should look to use external microphones, but built-in microphones should be sufficient for these videos.

For best results, we recommend:

- Recording 2-channel Stereo audio.
- Encoding your audio at constant rate of 320 kbit/s.
- Setting your audio sample rate to 48 kHz.

Before recording the whole video, make sure to make a test first checking both the image and the audio quality. Please pay particular attention to have adequate volume in the final output.
You should try to reduce ambient noise as much as possible. Turn off fans, air conditioners, and space heaters that buzz, hum, or click. Be sure to turn off your alert sounds and the ringers on your computer and phone. Finally, if you have are using an external microphone, aim it at your throat (not mouth) at a forty five degree angle to reduce pops and to pick up the most resonant sound. If you are using the built in microphone, be sure to keep it at least nine inches from your mouth. You want to ensure any audio recordings are undertaken in a location with as little background noise as possible.

For further information on the entire filmmaking process we recommend visiting this link, to read NoFilmSchool's practical: http://nofilmschool.dslr.guide.pdf.s3-website-us-east-1.amazonaws.com/s6yt3iohdf/DSLR_Cinematography_Guide.pdf

WHAT TO WEAR

A good rule of thumb in making a video is to avoid shirts that are all white (which reflects light), all black (which absorbs light), bright red,

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stripes, paisley, or other loud patterns that cause wavy lines in the video.

"SUGGESTION"
SOFTWARE POWER POINT

To record your presentation and related audio embed in your slides. You have to:
Open the slide that you want to put the screen recording on.
On the top menu , under "Slide Show", select "Record Slide Show".
The screen below will open up
Click the red pot on the top to begin presenting (& recording)
After you finish the recording, you could reorganize the positioning of the video on the slides separately for each slide
Note: We realize that during the recording, if the author is speaking while switching to the next slide, it creates a break in the audio so we recommend
paying attention to this and preferably switching to the next slide in a silent moment in audio (e.g. between phrases)

reference:
https://support.microsoft.com/en-ie/office/record-your-screen-in-powerpoint-0b4c3f65-534c-4cf1-9c59-402b6e9d79d7?ui=en-us&rs=en-ie&ad=ie#OfficeVersion=Office_2013

reference for subtitles:
https://support.microsoft.com/en-us/office/add-closed-captions-or-subtitles-to-media-in-powerpoint-df091537-fb22-4507-898f-2358ddc0df18#OfficeVersion=Office_2010-2013

5

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Annex 5 - Multiple Choice questionnaire

LECTURE'S TITLE

STUDENT'S NAME AND LAST NAME
UNIVERSITY

DATE

QUESTION

Insert text (to be filled in by the teacher)

MULTIPLE CHOICE ANSWERS (HIGHLIGHT THE RIGHT ANSWER)

Insert text (to be filled in by the teacher)

TEACHERS **Name Lastname** TUTORS **Name Lastname**

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Annex 6 - Video Lesson Script Format

LECTURE'S TITLE

PILLAR TITLE

PILLAR AREA

SCRIPT OF THE VIDEO LESSON

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TEACHERS Name Lastname TUTORS Name Lastname FTalliance

Annex 7 – Bibliography Guidelines and Format

BIBLIOGRAPHY GUIDELINES

BOOKS

Printed books

Printed book with one author
In-text citation:
According to Guy (2001) the Zulus faced many grave dangers when confronting the British…
Reference list:
Guy, J. (2001) *The view across the river: Harriette Colenso and the Zulu struggle against imperialism*. Charlottesville, Virginia: University Press of Virginia.
Author/editor
Year of publication (in round brackets)
Title (in italics)
Edition (only include the edition number if it is not the first edition)
Place of publication: publisher
Series and volume number (where relevant)

Printed book with two or three authors
In-text-citation:
The carious process can be described as "the carious process is the metabolic activity in the plaque biofilm resident on the tooth surface" (Banerjee and Watson, 2011, p. 2).
Reference list:
Banerjee, A. and Watson, T.F. (2011) *Pickard's manual of operative dentistry*. 9th edn. Oxford: Oxford University Press.
Author/editor
Year of publication (in round brackets)
Title (in italics)
Edition (only include the edition number if it is not the first edition)
Place of publication: publisher
Series and volume number (where relevant)

Printed book with more than three authors
In-text citation:
This was proved by Dym *et al.* (2009)…
Reference list:
Dym, C.L., Little, P., Orwin, E.J., and Spjut, R.E. (2009) *Engineering design: a project-based introduction*. 3rd edn. Hoboken, N.J: Wiley.

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LECTURE'S TITLE

PILLAR TITLE

PILLAR AREA

BIBLIOGRAPHIC REFERENCES

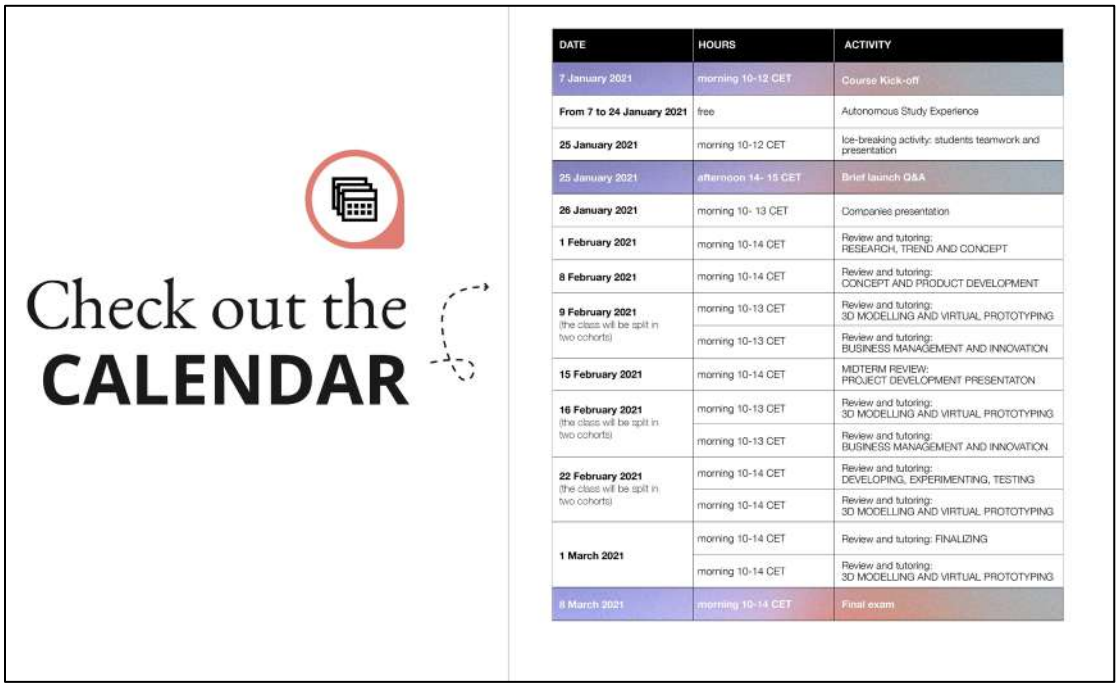
See "Bibliography guidelines.doc"

TEACHERS Name Lastname TUTORS Name Lastname FTalliance

Annex 8 – Miro board collaborative canvas structure

Figure 17 - Top left corner of the course information column: LOGO and reference to the project

Figure 18 - Course information column: brief description space



DATE	HOURS	ACTIVITY
7 January 2021	morning 10-12 CET	Course Kick-off
From 7 to 24 January 2021	free	Autonomous Study Experience
25 January 2021	morning 10-12 CET	Ice-breaking activity: students teamwork and presentation
25 January 2021	afternoon 14- 15 CET	Brief launch Q&A
26 January 2021	morning 10- 13 CET	Companies presentation
1 February 2021	morning 10-14 CET	Review and tutoring: RESEARCH, TREND AND CONCEPT
8 February 2021	morning 10-14 CET	Review and tutoring: CONCEPT AND PRODUCT DEVELOPMENT
9 February 2021 (the class will be split in two cohorts)	morning 10-13 CET	Review and tutoring: 3D MODELLING AND VIRTUAL PROTOTYPING
	morning 10-13 CET	Review and tutoring: BUSINESS MANAGEMENT AND INNOVATION
15 February 2021	morning 10-14 CET	MIDTERM REVIEW: PROJECT DEVELOPMENT PRESENTATON
16 February 2021 (the class will be split in two cohorts)	morning 10-13 CET	Review and tutoring: 3D MODELLING AND VIRTUAL PROTOTYPING
	morning 10-13 CET	Review and tutoring: BUSINESS MANAGEMENT AND INNOVATION
22 February 2021 (the class will be split in two cohorts)	morning 10-14 CET	Review and tutoring: DEVELOPING, EXPERIMENTING, TESTING
	morning 10-14 CET	Review and tutoring: 3D MODELLING AND VIRTUAL PROTOTYPING
1 March 2021	morning 10-14 CET	Review and tutoring: FINALIZING
	morning 10-14 CET	Review and tutoring: 3D MODELLING AND VIRTUAL PROTOTYPING
8 March 2021	morning 10-14 CET	Final exam

Figure 19 - Course information column: calendar of the course

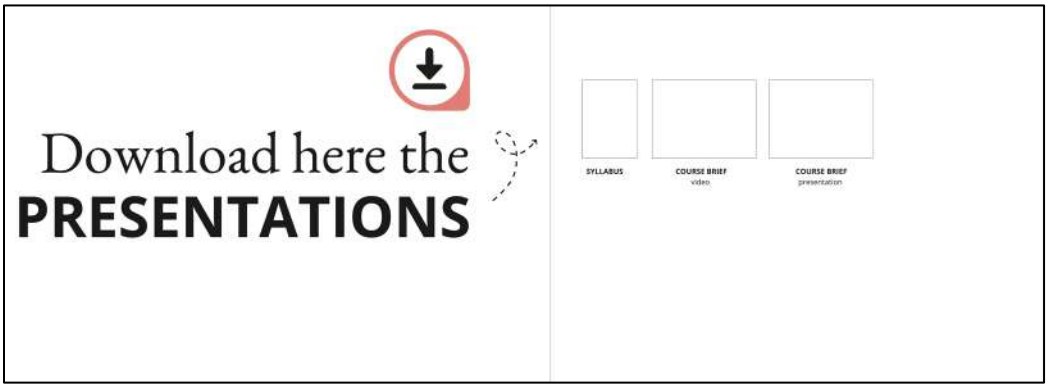


Figure 20 - Course information column: brief presentation and videos or other extra materials to guide the challenge based part of the learning experience

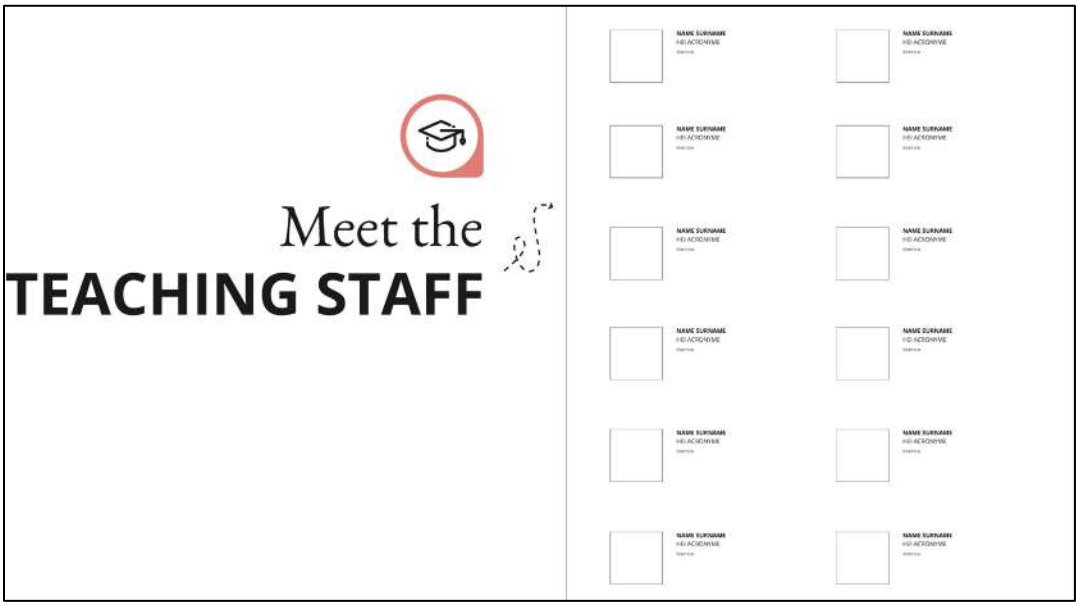


Figure 21 - Course information column: teaching staff picture and short biographic information

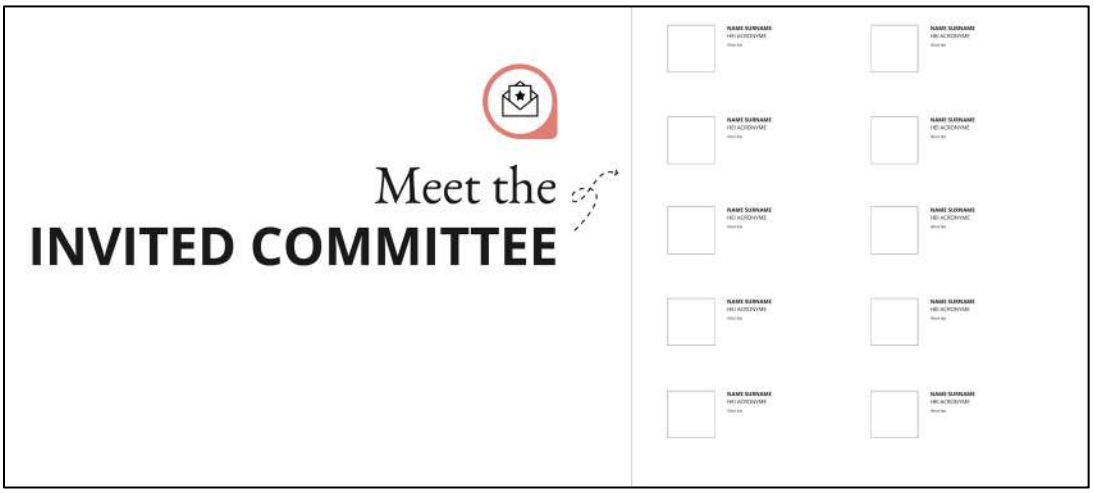


Figure 22 - Course information column: invited committee' s picture and short biographic information

Figure 23 - Working area: Group chart with components information and link to the e-classrooms they can use

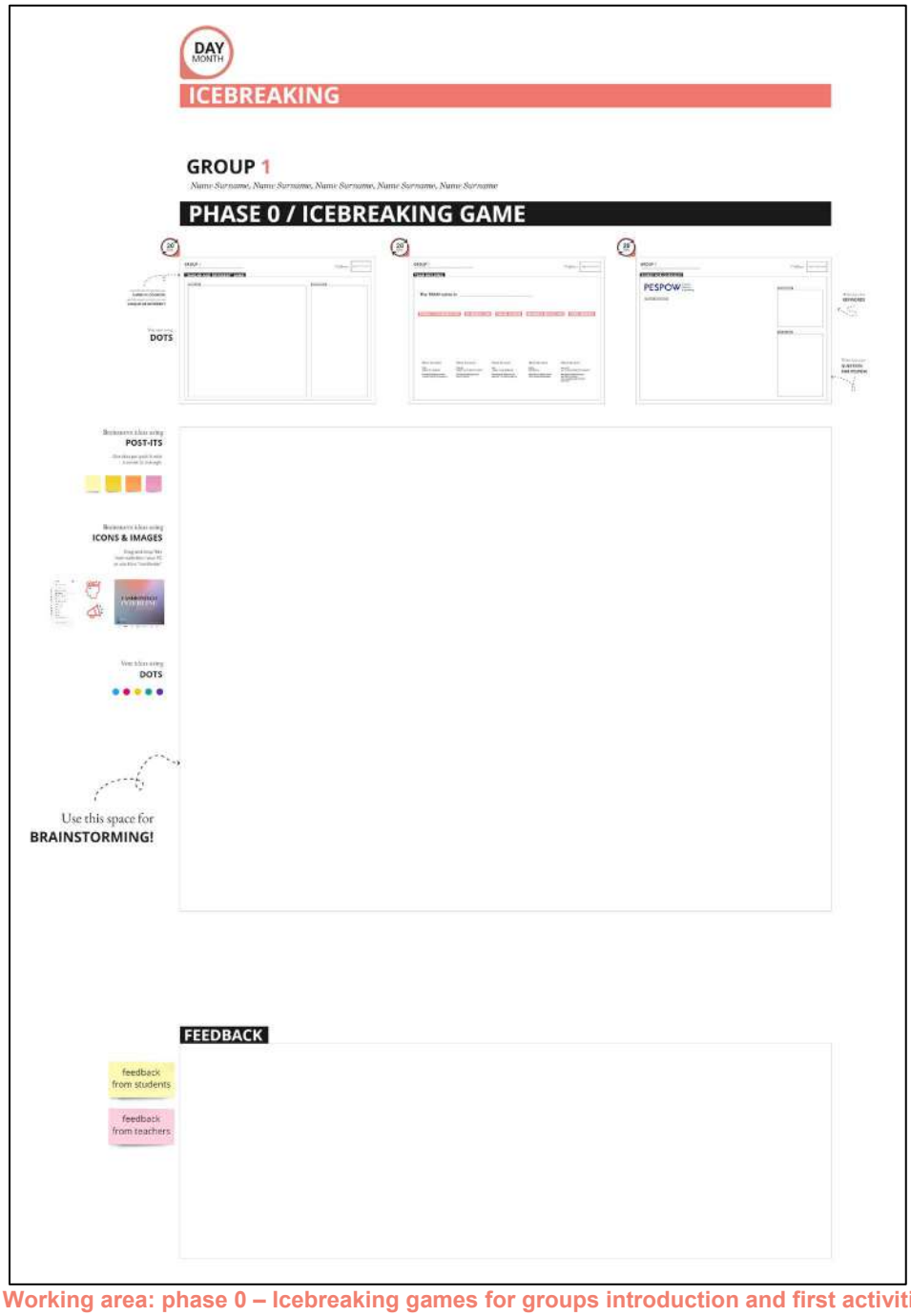


Figure 24 – Working area: phase 0 – Icebreaking games for groups introduction and first activities together

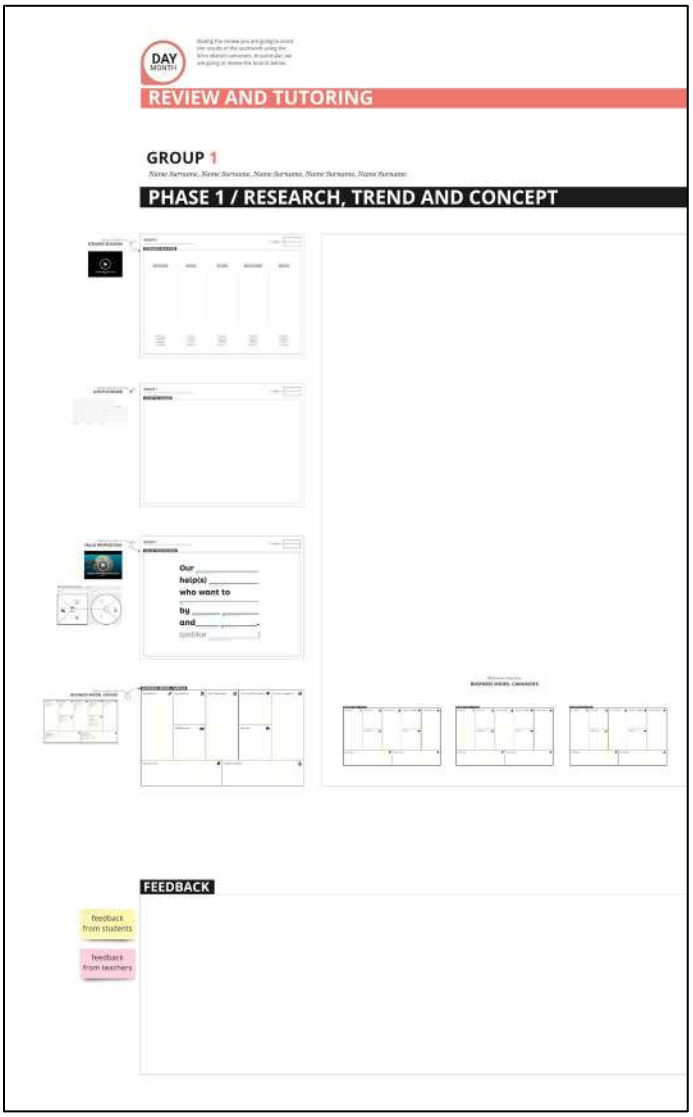


Figure 25 – Working area: phase 1 – research, trend and concept

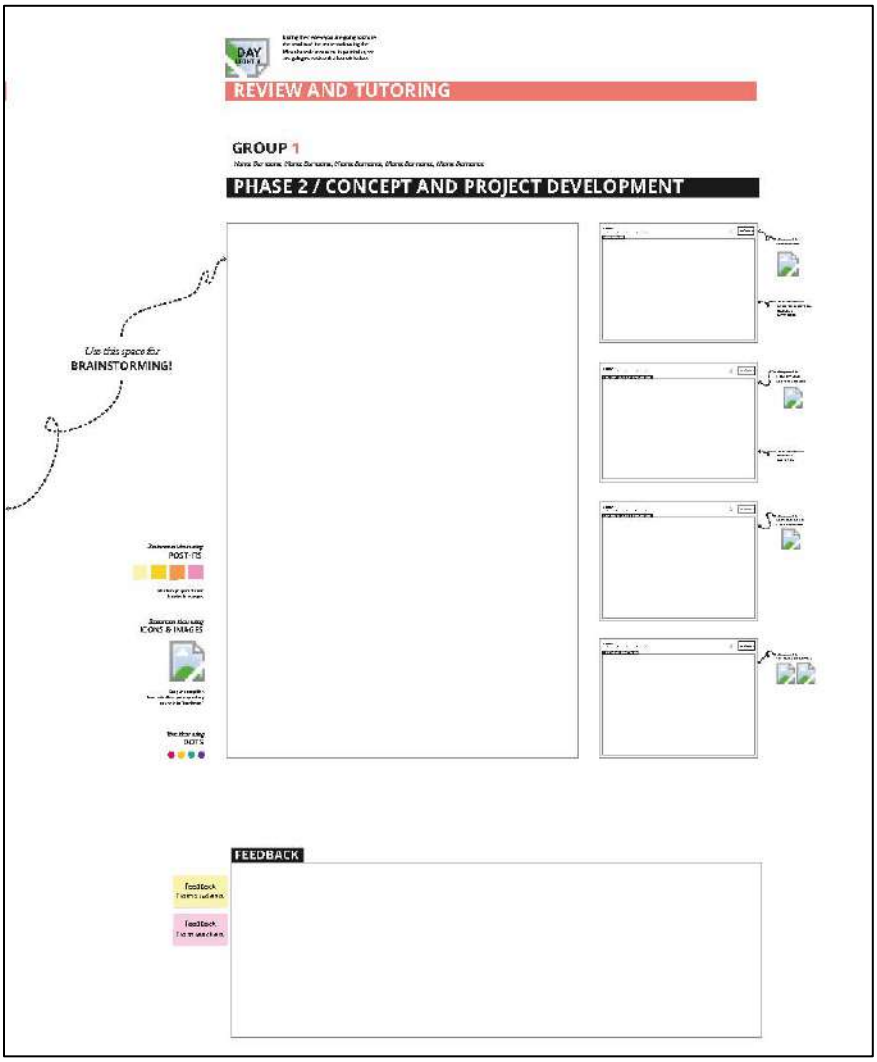


Figure 26 - Working area: phase 2 – Concept and project development

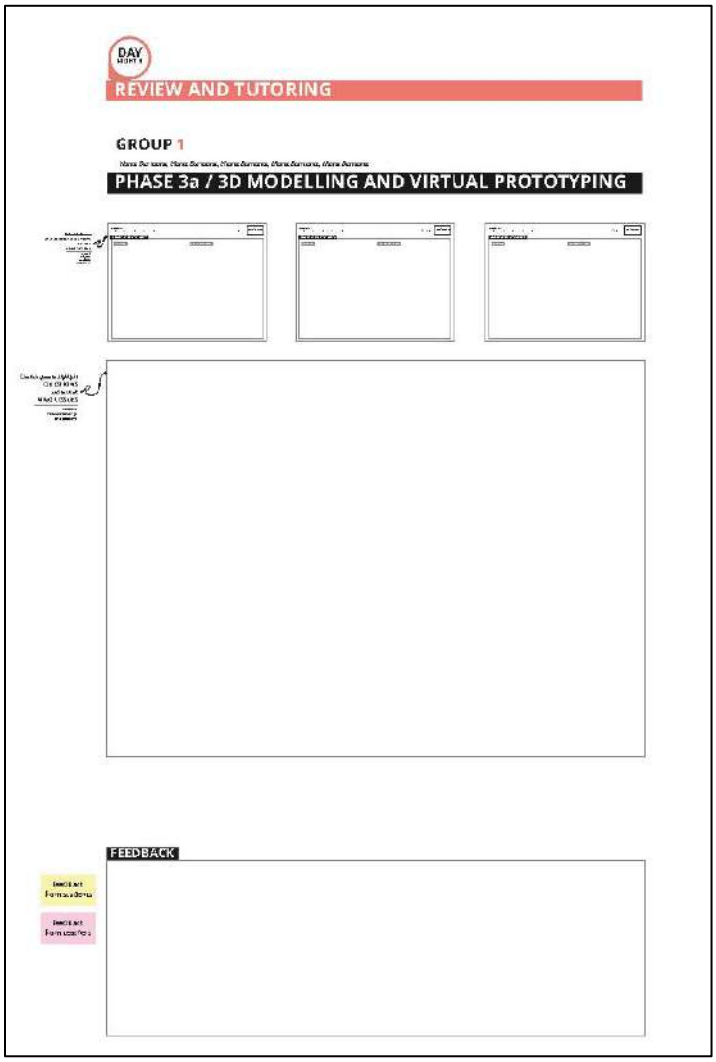


Figure 27 - Working area: phase 3a – 3D modelling and virtual prototyping

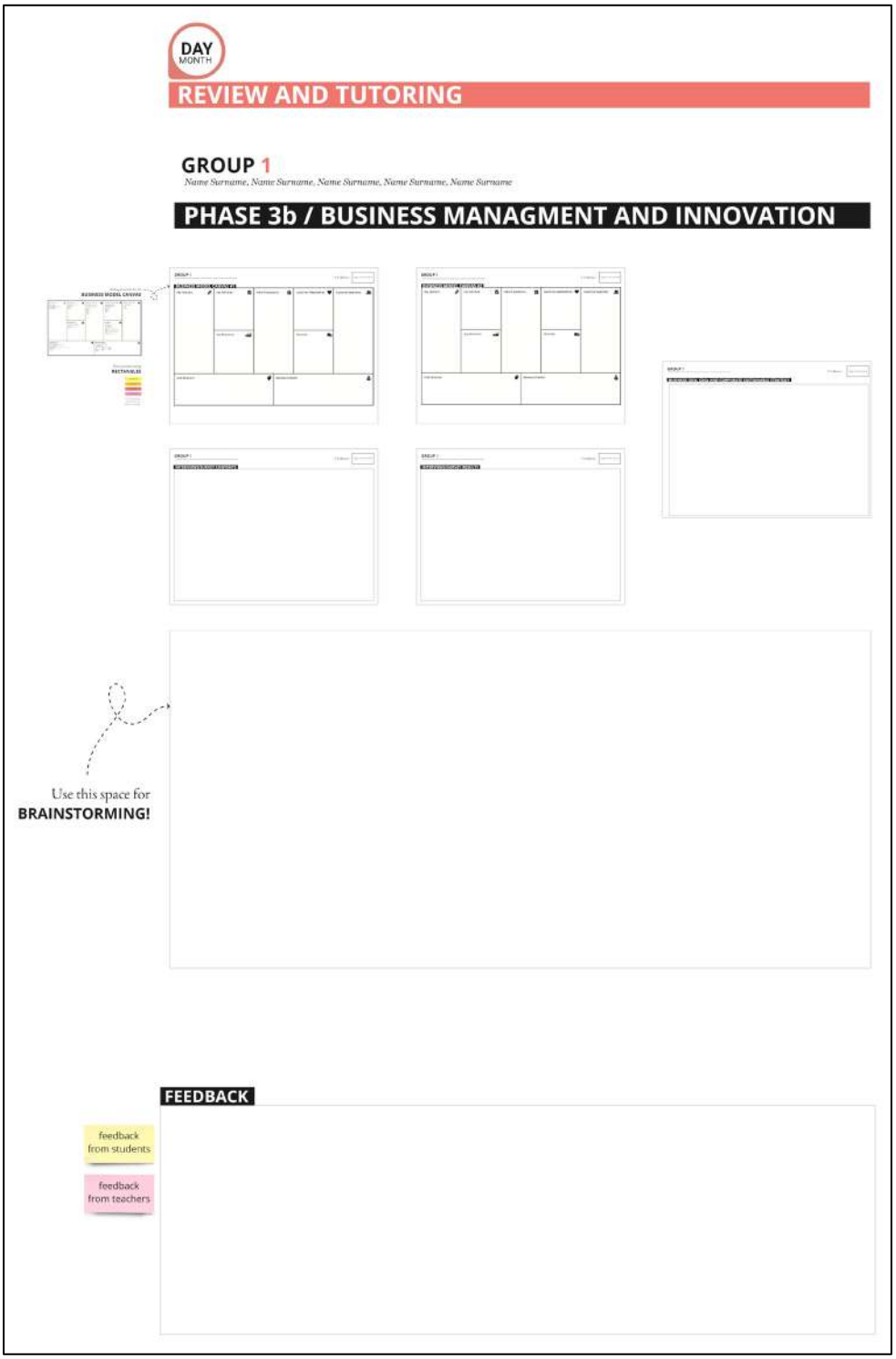


Figure 28 - Working area: phase 3b – Business management and innovation

Figure 29 - Working area: Mid-term review – presentation space

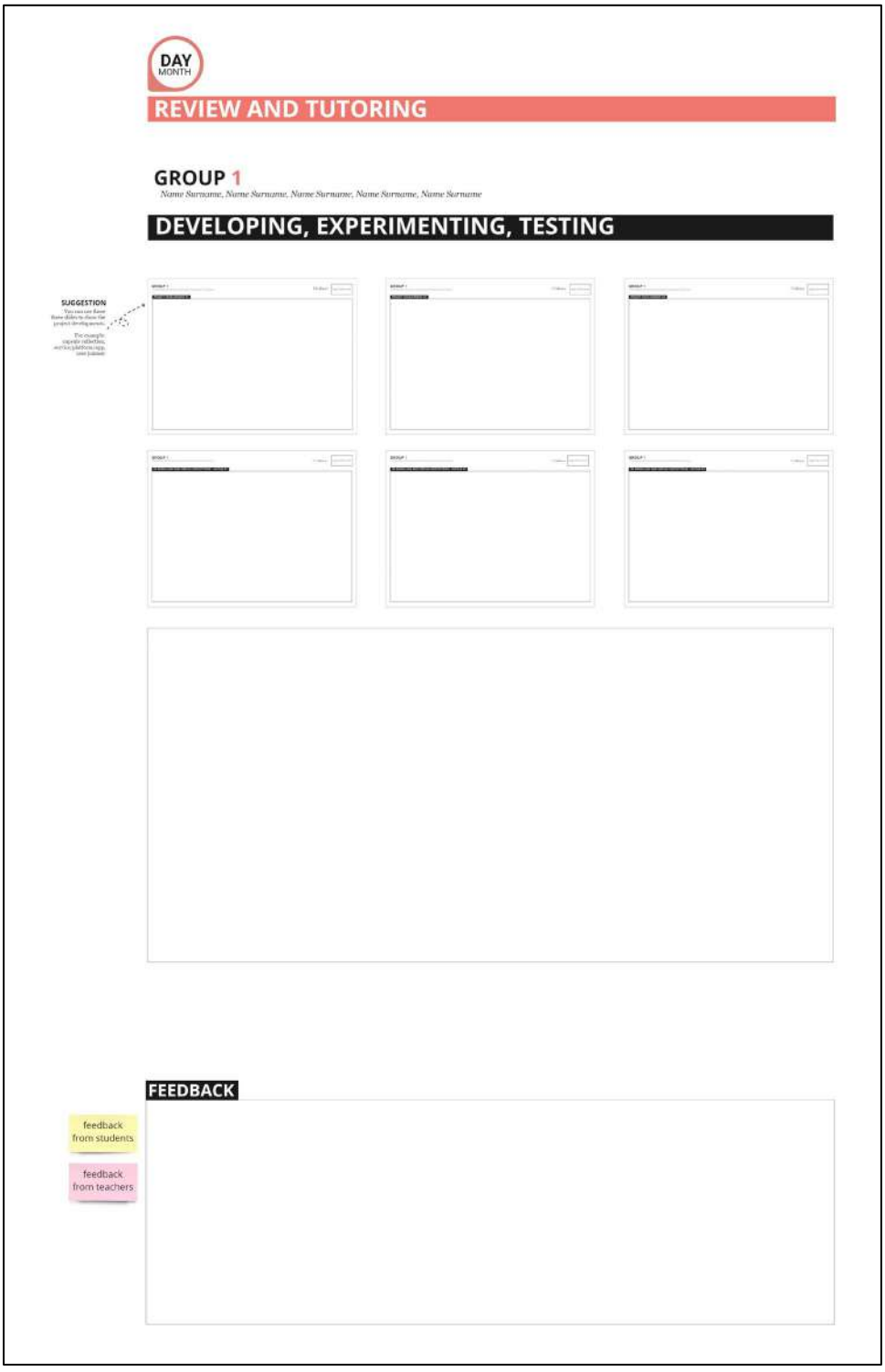


Figure 30 - Working area: phase 4 – Developing, experimenting, testing

Figure 31 - Working area: phase 5 – Finalising

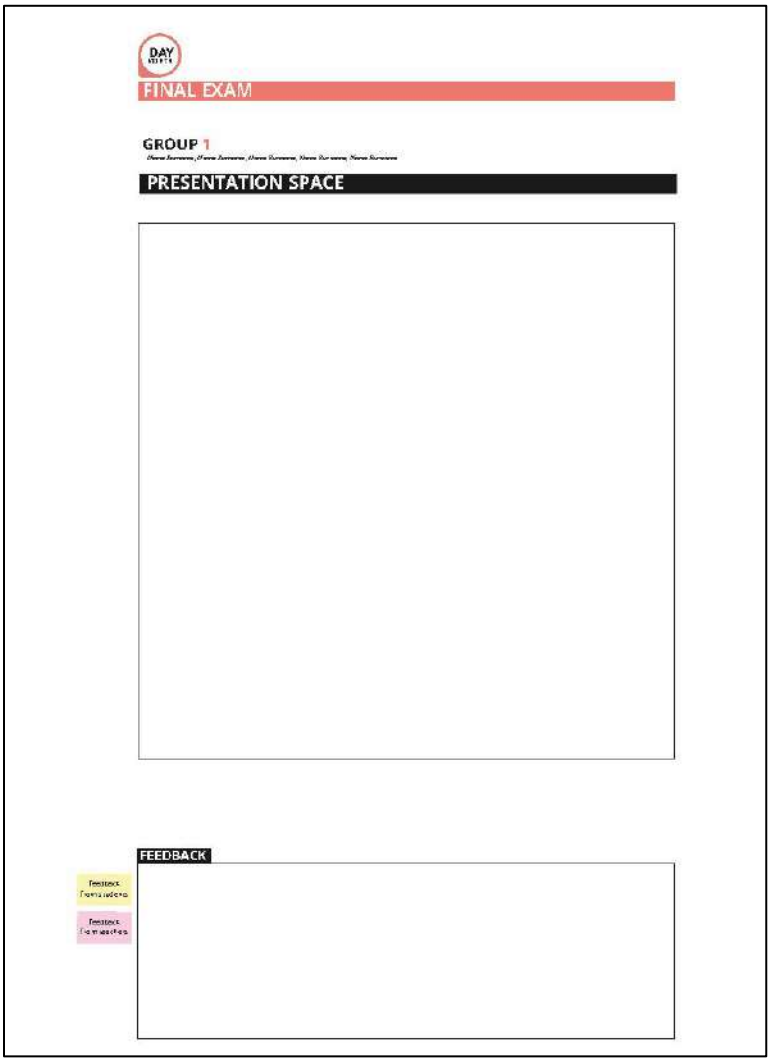
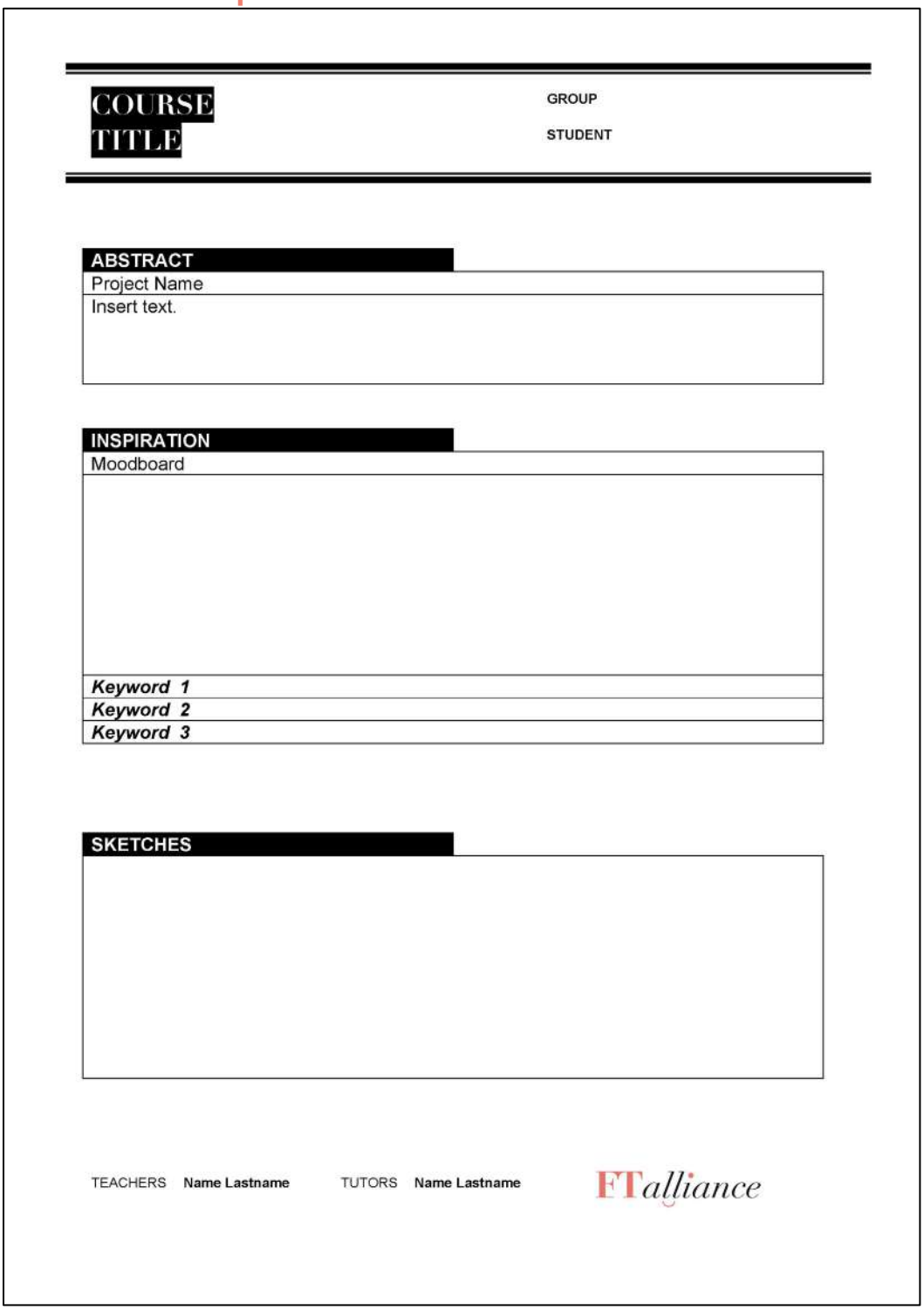


Figure 32 - Working area: Final exam presentation space

Annex 9 – Final report Format



COURSE TITLE

GROUP

STUDENT

ABSTRACT

Project Name

Insert text.

INSPIRATION

Moodboard

Keyword 1

Keyword 2

Keyword 3

SKETCHES

TEACHERS **Name Lastname** TUTORS **Name Lastname**

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COURSE TITLE

GROUP

STUDENT

TECHNICAL BOARDS

PROCESS

STEP 1	
Insert Title	Image
Insert Text	

STEP 2	
Insert Title	Image
Insert Text	

TEACHERS **Name Lastname** TUTORS **Name Lastname** FTalliance

COURSE TITLE

GROUP

STUDENT

FINAL RESULT

CONSIDERATIONS

FINDINGS

Insert Text

DIFFICULTIES

Insert Text

CONCLUSIONS

Insert Text

TEACHERS **Name Lastname** TUTORS **Name Lastname** FTalliance