

## **SPRING SEMESTER**

### **Life Cycle Assessment and Environmental Sustainability**

**SSD: CHIM/07**

**6 CFU**

The course "Life Cycle Assessment and Environmental Sustainability" provides advanced knowledge on Life Cycle Assessment (LCA). LCA is recognized as the prominent scientific and standardized methodology to objectively quantify environmental sustainability of any product, process, service or system in a holistic manner, thus considering all the life cycle stages and all the scientifically recognized environmental issues. The course comprises theoretical lessons as well as laboratory activities where the students will learn the use and interpretation of the main LCA softwares and database.

### **Innovation management**

**ING-IND/35**

**6 CFU**

Brief history of technology

Sources, forms and models of innovation

Technological, social, green, and design-driven innovation

Entry times and innovation protection mechanisms (open and closed innovation)

The organization and management of innovation projects

Techniques for developing corporate creativity and new product development teams

The financing of innovation projects and strategies for innovative start-ups

Critical analysis of the relationship between economy and society

Understanding of innovative processes and techniques to stimulate creativity

Development and management of innovative projects as a lever for business competitiveness

Conception, development and presentation of a project work for an innovative startup.

Management of a working group and presentation of the results of one's work.

### **Materials Technology for Design**

**ING-IND/22**

**6 CFU**

This course is structured with theoretical lessons and practical exercises to immediately apply what is learned in class.

The theoretical part consists of thematic meetings organized as follows:

- Historical introduction to technological innovations.
- Plastics: origin, types, and transformation processes with case studies.
- Metals: origin, types, and transformation processes with case studies.

- Composites: origin, types, and transformation processes with case studies.
- Wood: origin, types, and transformation processes with case studies.
- Ceramics and Glass: origin, types, and transformation processes with case studies.
- Auxetic Structures: what they are, where to find them, and how they are employed through new production technologies.
- Biomimicry and future materials: nature as a source of inspiration for design.

The practical part, alongside the theoretical, involves students in choosing an object. Subsequently, students will proceed with the disassembly phase to explore what is hidden inside. This includes elements that we cannot normally see or know, enriching our ability to observe and understand. The students will acquire theoretical fundamentals about the main transformational technology widely used to produce the final product and half-processed products.

### **Product Design Lab 1**

**ICAR/13**

**8 CFU**

The students will engage in an initial approach to the design process, which will entail an analysis of the generation of forms and the design and planning of individual products and product systems. This will be achieved through the completion of exercises and projects of low complexity. A multi-modal approach will be employed whereby the designer is required to break down, analyse, gain familiarity with and work with a single material. This process will commence with an investigation of the material's origins and the system of actors that could potentially influence it. It will then proceed to an exploration of the potential new morphological, functional, expressive and environmental characteristics and qualities that could be incorporated into the material.

The objective of the workshop is to equip students with the fundamental theoretical, methodological and operational tools pertinent to the field of design utilising a specific material. The development of the design process and its representation will be addressed, from the initial conceptualisation of the artefact, through to its technical representation, and finally, the realisation of study models and prototypes.

### **Product Design Lab 2**

**ICAR/13**

**8 CFU**

The Laboratory is moving to rethinking the relationships between individuals and communities and between man and nature.

The comparison with environmental, spatial and social issues requires the designer to also think about his own role and responsibility in choices and commitment and therefore in environmental and civic awareness.

It is considered useful to activate the planning and strategic process starting from the chestnut, essence, material and typical local food, present in abundance in the internal hilly areas of Emilia Romagna, Tuscany and the Marche, proposing it as a social material.

The objective is to create chestnut products with which to activate new relationships also through playful and recreational activities, board games, outdoors, between generations. The designed products are able to activate new relationship dynamics between the inhabitants of the places (resident community, visiting community), the places (natural and anthropic environment) and the ecosystem (flora, fauna, earth, man) in a concept of interdisciplinary inter-species project. The products are developed by applying a methodology that delves into the study of the entire production chain, from the nature of the material, to its transformation, to transport, sale and use of the product itself. Depending on the needs, the main material is accompanied by metal joint knots, local fabrics, for example in hemp or wool (and its derivatives) and other complementary materials. The product lines will be able to highlight the material and immaterial values of the places, reworking traditional production techniques and hybridizing them with contemporary techniques. The products will have the aim of enabling better relationships between people and the environment and increasing civic awareness towards others.

The objective of the laboratory is to deepen methodological, planning, technical and humanistic training compared to what was acquired in the first year. It is expected to develop all phases of the design process from the analysis of needs, to the market analysis, to the development of the concept, the definitive and the executive with the creation of models and prototypes.

## **Economies of projects and products**

**ING-IND/35**

**6 CFU**

The course is divided into two parts. The first aims to outline the functioning of the economic system in which we live by highlighting its advantages but also its criticalities and comparing it with alternative economies (circular economy, degrowth theory, gift economy). The massive growth of the world's population, high levels of environmental degradation and limited available resources require new values than those generated by consumerist culture and substitute economic systems. The second part of the course is devoted to learning about the business reality and developing the ability to observe its operation, convey the basic concepts and language of innovation management, and present some methodological tools for developing an innovation project. Finally, train basic skills in the field of economic evaluation with reference to cost accounting, including cost of disposal and reuse of the object, price formation in a competitive environment, calculation of economic results. Learning to construct a business plan that meets the demands and needs of the target company or institution but carries a new vision in defense of the environment, social rights and human relations is an important skill for young designers.

The ability to read economic reality, knowledge of how businesses and professional firms operate, and strategies for how to survive in a highly competitive market are useful notions for

students who intend to work in design, graphic design, or who dream of opening their own business. The course economies of projects and products outlines what systems, methods, and strategies to approach the future profession.

### **Modulo - Exhibit design**

**ICAR/13 6**

**6 CFU**

Today it is not possible to think of the museum as a single building, a closed space disconnected from its historical geographic and social context. Rather, it is necessary to think about design on a local and global scale. The museum is an environment linked to the territory in which it is located and simultaneously to the network of the world. The museum creates opportunities for encounters, opportunities for learning, and cultural experiences. The museum is dynamic and multipurpose space, a place of community and interaction among the people who frequent it. Technological environment, capable of enhancing heritages and at the same time offering services and spaces. The museum produces, creates.

The student obtains design skills to manage information content in an exhibition space. Specific consideration of the use of digital technologies in contemporary exhibit spaces is required in the lab.

### **Modulo - Experience design**

**ICAR/13**

**6 CFU**

### **Modulo - Digital Experience**

**ICAR/17**

**6 CFU**

During the Lab, students engage with the ideation, development and storytelling of complex, open source projects. They acquire in the field a method for approaching generative design, creative coding and machine learning for design. They learn to create their own digital tools, conceiving, making and testing prototypes and finished artifacts for communication and product design. The Lab, which takes place through lectures, exercises and critical review of case studies, also using collaborative tools and platforms, starts from the brief on the invisible, and includes a final collaborative project, released under an open license.

The student acquires the ability to manage, design and narrate relational and interactive systems related to communication and product design, as well as the ability to manage simulative project environments. The study of open source prototyping, machine learning, and versioning languages and platforms, along with the proper approach to collaborative design of concepts and experiences are requirements for the student to acquire within the teaching.

## **Modulo - UX-UI**

**ICAR/17**

**2 CFU**

Introduction and Fundamentals: Presentation of key concepts in user-centered design, usability, and accessibility. Explanation of course objectives and the final lab theme.

Foundations of UX/UI: In-depth exploration of User, Use, and Usability concepts, and the importance of usability. Analysis of a real case study and concepts related to User Experience (UX) and User Interface (UI).

Design Process: Explanation of the design thinking process and the macrophases: Start, Understand, Explore, and Materialize. Detailed explanation of the Empathize phase and user analysis, including interviews, surveys, and data usage in design.

Definition and Design: In-depth study of the Define phase, including the creation of personas, experience maps, and empathy maps. Analysis of scenarios, UX benchmarking, heuristic evaluation, and information architecture.

Ideation and Prototyping: Exploration of the Ideate phase, including collaborative workshops, user stories, and Design Sprint. Use of tools such as How Might We, Affinity Mapping, Crazy 8's, and the creation of interactive prototypes.

Design System: Understanding the importance of design systems and how to create, manage, and implement them to ensure consistency in user interface design.

UI Implementation: Creating responsive UI design, including concepts such as the grid system and breakpoint system.

Usability Testing: Learning how to plan, conduct, and analyze usability tests using various techniques to evaluate the effectiveness of the user interface.

Digital Tools: Familiarity with digital tools such as Figma for design, prototyping, and design system management.